ETHNO-ORNITHOLOGY AND CONSERVATION: TRADITIONAL ECOLOGICAL KNOWLEDGE (TEK) OF BIRDS AMONG THE MUSHERE AND THE CONSERVATION OF THE DULU FOREST IN MUSHERE, PLATEAU STATE, NIGERIA

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CERTIFICATION

I hereby certify that this dissertation constitutes my own work, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

I declare that the dissertation describes original work that has not previously been presented for the award of any other degree of any institution.

Student: Grace A.B. Pam

Supervisor: Dr Andrew G. Gosler

Co-supervisor: Professor David Zeitlyn

Examiners: Professor Will Cresswell

Professor EJ Milner-Gulland

DEDICATION

Dedicated to my sweetheart, Dung and our children Samuel Noro, Blessing Simi, Sophia Nesisieng and Stephanie Kpin-nerat for their amazing sacrifice and dedication to this cause.

And

To the loving memory of my late father, Bulus Kure Araba who always believed in me and in my dreams, and helped shape my love for nature. Dad, you would have been so proud.

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ABSTRACT

This research was aimed at determining the ethno-ornithological knowledge of three Mushere villages close to the Dulu Forest, Nigeria to determine whether this might hold potential for developing a local conservation programme to protect the forest. The conservation objective of the research was aimed at determining the drivers of forest degradation, and possible means of mitigation. Using a mixed method approach, quantitative/qualitative data were collected in two years from different demographics (men, women, children, age differentials, occupation, urbanization). Oral interviews, semi-structured interviews, picture elicitation tasks, free-listing exercises and focus group discussions were employed in the data collection process. The findings revealed a relatively low ethno-ornithological knowledge, and a general indifference (ornitho-apatheia) towards birds. Knowledge transmission was predominantly through oral means while TEK acquisition was mainly through vertical and horizontal methods. While adults perceived birds as not valuable, children generally perceived birds as valuable. Cultural utilization and ecological salience were the main drivers of bird naming and knowledge. However, there was a high valuing of the Dulu forest, with the main drivers of the forest degradation being timber extraction. Overall, I concluded that the indifference of the Mushere towards birds revealed a lack of cultural appreciation of birds, leading to little TEK of birds, insufficient to encourage the use of TEK of birds in the conservation of the Dulu forest, and the use of birds as flagship domain for promoting conservation. However, a sustained approach towards encouraging birding activities could improve the perception of birds. I therefore

suggest using an ecosystem approach in the conservation of the Dulu forest. Engaging the locals in dialogue, establishing a leadership structure for the management of the Dulu forest, providing alternative means of livelihoods are suggested as ways of mitigating the degradation of the Dulu forest.

KEYWORDS: Ethno-ornithology, Traditional ecological knowledge (TEK), Cultural salience, Ecological salience, Biodiversity, Conservation, Dulu Forest, Mushere, Cultural transmission, Knowledge Acquisition.

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CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

1.1 Ethno-Ornithology, Traditional Ecological knowledge (TEK) and Biodiversity Conservation

Ethno-ornithology, a branch of ethnozoology, is a relatively recent and growing discipline. It is the scientific study of the relationships between people and birds in cultures, a relationship that often spans protracted periods. As a discipline, it has evolved over the past two decades bringing together nature conservation and local or traditional knowledge systems in ecological management (Albuquerque et al 2009; Berkes et al 2003). It is an aspect of ethnobiology that is potentially a useful tool for engaging people from various cultures and communities into biodiversity conservation. By dwelling on the existing relationships between people and birds, and using such knowledge and interactions, we can draw people into relationships and projects that are geared towards biodiversity conservation.

A culture's beliefs and traditions may affect positively or negatively the survival of different bird species, and hence their conservation also (Muiruri and Maundu 2010). Therefore, an understanding of these relationships, the cultural processes of knowledge transfer and acquisition, cultural beliefs and practices, deciphering the underlying cultural and spiritual significance of such traditions is important for effective engagement with people of diverse cultures in conservation.

Birds occupy a special place in the lives of many people and cultures around the world (Ng'weno 2010; Clucas et al 2011; Clucas & Marzluff 2012; Alves 2012) owing to their power of flight, the ability to occupy diverse environments, sing melodious songs, add beauty by their colourful plumage, and even serve as pets (Fernandes- Ferreira et al 2012; Alves et al 2013).

In many cultures around the world, birds are utilized in rituals, food, traditional medicine (Sault 2010), in songs and arts, ornamentation, for companionship, for pleasure and as messengers of the gods (Anderson 2010; Muiruri and Maundu 2010; Nobrega et al 2012; Bezerra et al 2013; Alves et al 2012) and as seasonal/time predictors (Agnihotri & Si 2012; Pande & Abbi 2011; Ichikawa 1998; Kizungu 1998). Some birds, such as eagles, stand out in many cultures as symbols of strength, the number of countries that have an eagle as their national bird (Krech 2009; Smith 2011; Toft 2014) evidences this. Many cultures regard owls as evil and bringers of ill omen, they are feared (*ornithophobia*; Bonta 2010) and even persecuted (e.g. the Kamba in Kenya- Muiruri & Maundu 2010; Mbuti of the DRC Ichikawa 1998; the Andamanese- Pande & Abbi 2011). Still others such as the ancient Greeks hold them in high esteem as creatures of wisdom (Krech 2009), and the Bribri of southern Costa-Rica consider them special such that they must not be frightened or killed because they represent spirits in human form serving as messengers of the gods (Sault 2010).

The value of birds in science is multifaceted. Bird studies have provided insights into various aspects of animal behaviour. These broadly include mating systems, parental care, reproductive strategies and many more (e.g., Black 1996-Monogamy; Brown 1969-Territoriality; Bekoff 1977- Social dominance, taxonomy and behavioural variability; Cody 1985-Habitat selection; Magurran 1985- Vigilance; Roper & Wistow 1986; Creswell & Quinn 2011 -Predator avoidance; Berthold 2001-Migration; Beecher 2004-Socialization in song learning; Koenig & Dickinson 2004- Cooperative breeding; Cockburn 2006-Parental care).

In religion, birds play key roles in sacrifices, divination and ornamentation. At other times, they play distinct roles as mediators between humans and the spirit world (Moreman 2014; Smith 2011; Sault 2010). Birds have also been associated with war or misfortune (e.g., the Robin, Raven and Crows in English mythology, Smith 2011; Sault 2010), and there is a belief

in certain cultures that birds are capable of embodying spirits of the dead (e.g., the Pied Chat *Saxicola caprata,* New Guinea belief; Bulmer 1979,1969; Serjeantson 2009; Moreman 2014). Others such as Magpies, Ravens (Corvidae), Doves (Columbidae) and the Hammerkop *Scopus umbretta* in Africa are associated with foretelling the future (Smith 2011). Cranes (Gruidae) are associated with longevity, while robins (Petroicidae) foretell the weather (Smith 2011). There is hardly any culture in the world that does not have one form of association or the other with birds, though the degree of association differs between cultures (Sault 2011).

However, not all cultural associations, beliefs and practices are wholesome. For example, the trade in vulture parts in many parts of Africa for use in traditional medicine and witchcraft have had detrimental effects on the vulture populations; it is one of the reasons vultures decline in the region (Virani et al 2010; Williams et al 2014; Awoyemi 2014; Kioko et al 2015; Birdlife 2015). Other practices such as killing birds for their beautiful feathers (Ng'weno 2010; Muiruri & Maundu 2010) and sport hunting have all had negative effects on different bird populations in history (e.g., the Passenger Pigeon *Ectopistes migratorius*). Bonta (2010) categorized the levels of interactions of people with birds into seven categories as follows: a mere awareness of the presence of birds; some knowledge about birds; interaction with them; interest in them; concern about them; an obsession with them (*ornithophilia*) and reliance on them. Another level of interaction is a fear of birds (*ornithophobia).*

The level of interaction of people with birds depends upon several factors such as their culture/ cultural beliefs about birds, socio-economic levels, education, geo-physical environment, and their cosmological worldviews. For example, in Europe and America (affluent, industrial/technologically advanced, and educationally advanced regions), and other such parts of the world, many people love birds, as is evidenced by the popularity of bird-watching and related activities as pastimes, and the many scientific activities relating to bird studies and conservation. The number and strength of the various organizations that work for

the protection of birds evidences this. The RSPB in the UK and the National Audubon Society (the oldest such organization in the USA, which has about 500 affiliated local organizations), and many global partners including Birdlife International are the largest of such organizations. With more than a million members, the RSPB is a leading partner in Birdlife International, which is itself the largest conservation NGO in the world, working in more than 120 countries. Many people in the UK and USA provide food for the birds in their gardens (Jones 2011, 2008; Ishigame & Baxter 2007) and participate in diverse bird-related events and activities including Citizen Science projects contributing ecological data on birds to aid their conservation (Jones & Reynolds 2008; Greenwood 2007; Bonta 2008).

In Africa and other less advanced regions of the world, the strength of birdwatching and such activities is relatively low, although there are a growing number of bird enthusiasts and conservation organizations. In Nigeria for instance, a few bird clubs have been established such as the Nigerian Conservation Foundation (NCF) bird club, Ibadan bird club (IBC) managed by the International institute of tropical agriculture (IITA) and the Jos bird club (JBC) managed by the A.P. Leventis Ornithological Research Institute (APLORI). Other regions of Africa (e.g., south and east Africa) also have bird clubs united under one big umbrella body, the African Bird Club (ABC www.africabirdclub.org). In Kenya, birdwatching is becoming popular as a hobby among different ethnic groups ages and gender (Ng'weno 2010).

Despite the many uses and relationships humans have with birds, certain bird species globally are threatened or at risk of extinction (13% globally, IUCN 2015), mainly because of habitat loss. As humanity develops more technological advancement and populations increase, the need for land for development and agriculture also increases, leading to the conversion of previously natural habitats housing biodiversity and birds into either farmlands, houses or other developmental facilities. These all drive more organisms into the threatened status or even to extinction (IUCN 2015).

1.2 Deforestation in Africa And Nigeria

Deforestation rates all over the world are alarmingly high, and Africa has the second largest deforestation rate in the world, with West Africa leading in this (Fairhead & Leach 1998). By the mid-1980s, West Africa's forest covers were estimated to be only about 8 million ha remaining, while a report by the world conservation monitoring centre suggested that only 13% of West Africa's original forest covers remained (Fairhead & Leach 1998).

Nigeria is among the leading countries where the loss of forest is happening at an unprecedented rate (Ogunwale & Azeez 2011), the major drivers have been population growth, migration and socio-economic developments (Fairhead & Leach 1998; Eja 2006; Suleiman et al 2017). In addition, the country continues to lose its forests due to unsustainable use resulting from abuse arising from ineffective forest management policies (Akinsoji 2013; Enaruvbe et al 2016). Forest reserves account for less than 10% of the nation's total land area (FOA 2003; Alamo & Agbeja 2011), while undisturbed forest area covers approximately 13% of the country's total land area (FAO 2003). As Udo et al (2009) observed, the reasons why local people in Nigeria indulge in illegal forest activities are complex, but they include ignorance (including of forest laws and the workings of the forest ecosystem), lack of alternative income sources, low ethical societal standards, greed, and inadequate penalties for offenders. In addition, there is '*an absolute disregard for forest management,*' (FAO 2003), while Alamo & Agbeja (2011) also reported that forest laws were outdated, inadequate or were poorly implemented.

Many authors (e.g., Eja 2006; Onojeghuo & Onojeghuo 2015; Enaruvbe et al 2016; Modibbo et al 2016; Suleiman et al 2017, but see Adepoju & Salami 2017 for a contrary view) have observed that the rate of deforestation in Nigeria has been steadily increasing, and since

deforestation is an indicator of biodiversity loss, this means that more birds and indeed other biodiversity are losing their homes.

To make use of bird habitats sustainable, it is essential to understand the humans that share the space with birds, how they utilize the space, and their perceptions of birds and wildlife in general. It is this understanding that can lead to better management of nature for biodiversity, birds and people. It is vital to understand also the human-bird interactions that exist, the different uses made of birds, the species mostly utilized, the type of utilization and the values placed on birds at any given time and place (Alves et al 2013), people's perceptions and attitudes towards nature and birds, and the underlying beliefs that create them need to be understood as well. This is important because people will only conserve what they consider of value or important to them (Stoke 2007).

1.3 Cultural Transmission of Knowledge

To understand how people conceptualize and use nature, and birds, it is important to understand how traditional/cultural knowledge is acquired, retained and transmitted among local populations. Most of the work on cultural transmission is found in the cultural and social anthropology and psychology fields. Cultural transmission is defined as the many ways that a group of people learn and pass on knowledge/information (Bisin et al 2009). This process is influenced by the way a culture socializes with its younger generation, especially children

1.3.1 Methods of Cultural Transmission

There are three methods of transmission within the cultural transmission framework; vertical transmission, horizontal and oblique transmission methods. Vertical transmission refers to learning which occurs from parents to offspring, while horizontal transmission refers to

transfer of information/knowledge between peers. Oblique transmission on the other hand refers to the intergenerational knowledge transfer which takes place between non-related members of the community or that between children and their grandparents. These concepts were first developed from the works of Cavalli-Sforza & Hewlett in the early 1970s.

1.3.2. Factors That Affect Cultural Transmission of Knowledge

Some of the important factors that affect cultural transmission in a population include an individual's age, gender, education, occupation and socio-economic status and religion amongst others. These factors determine how diverse types of knowledge are acquired and transmitted within a population, and who the holders of these different knowledge types would be. For instance, certain knowledge types are gendered, such as the knowledge of domestic/ household chores e.g., traditional healing remedies (e.g., Camou-Guerrero et al 2008) which are considered as women's domain in certain cultures.

Understanding the role of children, who are future custodians of knowledge is also important, especially since many researchers have reported knowledge erosion among the younger generation (e.g., Reyes-Gracia et al 2013), while some knowledge is restricted to children of certain ages, who subsequently consider such knowledge outdated as they grow older (e.g., Gallios et al 2017).

Another crucial factor in the transmission of knowledge which has been linked to traditional loss of knowledge is urbanization (e.g., Reyes-Garcia et al 2014; Lu 2007; Godoy et al 2005; Maffi 2002). Urbanization, which is mostly brought about by technological and developmental improvements, and the desire for a change in individual's socio-economic standing, and population increase usually threatens the continual importance of certain knowledge types in cultures (e.g., Saynes-Vasquez et al 2013). Also, as children spend more time away from traditional family relationships to attend formal schools, it has been claimed that the processes

involved in cultural transmission of traditional knowledge become affected in many societies. Story-telling, learning by observing and apprenticeships are no longer feasible in many traditional settings because of children's schooling (Ruddle and Chesterfield 1977; Ohmagari and Berkes 1997; Hewlett and Cavalli-Sforza 1986). Learning in most traditional settings is mostly through observation and listening/practice (Rogoff et al 2003), learners especially children acquire such skills and information as they participate in family and communal activities. In this thesis therefore, I shall consider the effects of these social factors on the traditional ecological knowledge of birds of the Mushere, my arguments will be based on the roles these factors play in the knowledge of birds among the study group. The introductory chapters will expound more on the relevance of these factors on individual knowledge transmission and acquisition.

1.3.3. Language and cultural Transmission of Knowledge

Language is usually the principal medium for cultural transmission of knowledge, therefore, a look into the vocabulary of a culture can reveal aspects of nature that are significant to that culture (Gatewood 1983). For example, the work of Sutherland (2003), and other scholars (e.g., Harmon 1995, 2002; Maffi 1998, 2001; Bernard 1992) have shown that there is a correlation between the number of species found in a place and the linguistic diversity there, in fact, one of the indices used in measuring the correlation between biodiversity and language was bird diversity and languages. Proponents of the biocultural diversity theory, recognize the importance of language in the preservation and transmission of TEK, and a decrease in the diversity of languages, or indeed in a language means a decrease in the traditional knowledge of the people, especially in the future of the species inhabiting the environment with such a people (See Bernard 1992).

Language ecology, is the field that studies the relationship between language and the environment (Haugen 1972). From language, we can deduce how a culture relates with the natural world. A biological domain which is culturally salient should be expressed in the number of terms or names it is given in a language. Species are going extinct at a very fast rate, and it is estimated to be 1000 to 10,000 times higher than it would have been in the absence of humans (De Vos et al 2015). There is a correlation between cultural extinction (especially languages that are the media for passing on TEK; Maffi 1998) and biodiversity extinction, such that it has been projected that within the next 100 years, about 90% of the world's languages will be threatened with extinction or even go extinct (Stork 1999; Ramstad et al. 2007).

Tsuji (1996) reported on loss of TEK in Cree people of western James Bay in Canada using the sharp-tailed Grouse *Tympanuchus phasianellus*. The study identified the separation of children from their families as the major cause of TEK loss, with the effect that children lose the use of their native language and with it their TEK and cultural identity. This makes the study and documentation of TEK of diverse biodiversity groups of significant importance, so that this knowledge can be preserved for future generations and for science. In chapter four, an analysis of Mushere text is presented, to find out how language reveals the importance of a domain to a culture.

'*...There is also a desperate need to record knowledge that is being forgotten, and far more importantly, to save the cultures and ecosystems whose death is causing the forgetting'.* Eugene. N. Anderson, 2011-11.

1.3.4 Cultural and Ecological Salience

Cultural salience defines species that are prominent in a culture. They have been defined as 'species that shape in a major way, the cultural identity of a people, as reflected in the

fundamental roles these species have in diet, materials, medicine, and/or spiritual practices' (Garibaldi & Turner 2004; Nabhan & Carr 1994). A culturally significant or salient species may or may not be ecologically abundant, (Soule et al 2003).

Hunn (1999) described ecological salience as an aspect of perceptual salience that is independent of an organism's physical characteristics (phenotypic characters) or its size, but '*...reflects the bio-geographic and phenological interactions of a population of organisms to be classified and the human populations classifying them'*. This means that the rate of encounter with an organism within a given area (determined by its abundance) by humans of a given culture, determines its ability to be named irrespective of whether it is small or large, dull or striking in its features. On the other hand, less abundant and less widely distributed organisms might not have cultural names. He notes that nocturnal animals may be less likely to be named than diurnal and confiding species of similar or equal abundance. Likewise, migratory species may be less recognized than culturally resident species of similar phenotypic salience. These aspects of ecological salience are somewhat influenced by the cultural component, choices made by the people resulting from culture. For example, people's distribution in space, and their attitudes and perceptions to nocturnal organisms are culturally controlled, and both influence the recognition and naming of a species. Five criteria have been identified (Garibaldi & Turner 2004) by which a species can be regarded as being culturally salient. These are:

1. Intensity, type and multiplicity of use
2. Naming and terminology in a language, including the use as seasonal or phenological indicators
3. Roles in narratives, ceremonies or symbolism
4. Persistence in the memory of use in relationship to culture change
5. Level of unique position in culture

6. Extent to which it provides opportunities for resource acquisition from beyond the territory.

Culturally salient species are usually well named, and have associated vocabulary, and feature prominently in daily conversations (Garibaldi & Turner, 2004).

1.3.5. Ethno-ornithology and Conservation

Ethnobiology, in particular, ethno-ornithology has the potential to encourage more participants in bird conservation (Ng'weno 2010) through an appreciation of people's traditional knowledge of birds. As earlier observed, natural habitats of biodiversity are continually being lost to human expansion, and this is a worldwide phenomenon. It therefore means that wherever biodiversity occurs, whether in the so-called 'biodiversity hotspots' or not, we have a moral responsibility to adequately protect and manage it in the interest of posterity and for its own intrinsic/extrinsic values. To achieve this, we must engage with people at all levels, especially the immediate communities that live with and depend on this biodiversity.

Studies are lacking within the context of using ethno-ornithology for conservation (Bonta 2010). These studies could be useful in providing supplementary information to science on various aspects of human-bird relationships that can be useful in formulating conservation plans and actions on what is already present and occurring within traditions and cultures. This will help conservation scientists and practitioners use such existing traditional knowledge and expertise in understanding better how these local ecosystems work, and how to effectively manage them. It could also serve to reveal to conservation practitioners what cultural practices are beneficial to biodiversity, and which are detrimental (Bonta 2010).

More broadly, ethnobiology has made contributions in local conservation of biodiversity by acknowledging that local and/or indigenous people hold knowledge about their environment

which can be useful for understanding and protecting biodiversity, and promoting the understanding of ethno-ecology, although the implementation of such knowledge in the conservation of biodiversity remains a challenge (Charnley et al 2007).

The understanding of the traditional ecological knowledge systems (TEK), beliefs and practices and respecting indigenous people's knowledge of their environment was strengthened by the UN declaration (Brundtland report 1987 and Convention on Biodiversity CBD, 1992). In Particular, articles 8(j) and 10 (c) provide guidance on the use of TEK of indigenous people in biodiversity conservation. Article 8 (j) emphasizes the respect and promotion of such knowledge where it exists for wider application, with the consent and involvement of the knowledge holders. Article 10 (c) on the other hand requires that the customs and traditional uses of biological resources be protected and encouraged (UN-CBD 1992; see Higgin 1998 for a detailed review).

In the next section, I discuss TEK and its importance in conservation, and subsequently relate such knowledge to community-based conservation (CBC).

1.4 General Overview of TEK And Its Importance in Biodiversity Conservation

'*There is a wild plant that grows on the Somali border under the driest conditions less than 200mm of rain a year...There are other crops, things people have known where to find in distress times. They go to the mountains, pick them, and survive somehow. But if you destroy the natural environment of such plants, you lose these resources, and your monocultures won't save you'.* Anonymous

TEK is knowledge that people in cultures have about their environment and its biodiversity because of long association with that environment, driven by a need to obtain their necessary food, shelter, and other livelihood needs (Huntington 2000; Ramakrishan et al 1998). This knowledge is usually transferred from one generation to the next through oral methods

(Mazzocchi 2006; Becker and Ghimire 2003) such as in songs, stories, arts, folklore, religious beliefs (Ford 2011). As a key survival tool, TEK is often highly localized (Turner et al. 2000) and has been defined as '…*a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by transmission about the relationship of living beings (including humans) with one another and with their environment*' (Berkes 1993; Berkes et al 2000). It has been useful in finding drugs, in agriculture, land use, and it has contributed to a wide range of ecosystem goods and services. In summarizing the values of TEK: '*...it has the capacity to provide humanity as a whole with new biological and ecological insights, has potential value for the management of natural resources and might be useful in the development planning and environmental assessment'* (The World Conservation Union 1986; Mazzocchi 2006). Traditional people on the other hand are defined as '*people living a subsistence lifestyle, close to nature and natural resources*' (Cheveau et al 2008). Although TEK, LEK and IK (indigenous Knowledge) are used interchangeably, there is still debates on what is most appropriate. I will use TEK to refer to knowledge that is specific to a particular people of a given culture and history transmitted culturally (see Mazzocchi 2006 for a review on TEK/IK/LEK), instead of the broader term 'local knowledge' which can refer to knowledge which people residing in a given geographical area hold, who may or may not have a long history of association with that environment, and who may belong to different cultures (Mazzocchi 2006). *'Indigenous knowledge is the essence of the identities and world views of Indigenous peoples. Traditional knowledge constitutes the collective heritage and patrimony of Indigenous peoples. Therefore, it is priceless to us, and its value cannot be calculated for economic exploitation*.' (International Indigenous Forum on Biodiversity 2003: Item 7).

Due to the possession of TEK, many traditional cultures could adapt in their environments despite environmental changes (Mazzocchi 2006), even during adverse environmental conditions such as droughts, because they possessed such knowledge of the various aspects of

their natural and biological environments, and to some extent, both habitats and biodiversity were 'conserved' using TEK. An example is the Massai pastoralists of northern Tanzania and southern Kenya who traditionally know where to find water and green shrubs that can be fed to young calves even during protracted periods of drought (Burford et al 2003). TEK is not only limited to economic and culturally relevant species (Ramstad et al 2007; Kimmerer 2002), but traditional communities may also hold some TEK of seemingly not so culturally useful or relevant species. TEK can be a source of new ecological information, as scientists have sometimes reported discoveries which local people have always known (Ramstad et al. 2007). It can also provide useful insight into how local ecosystems were in the past, since it is older than most monitoring systems (Ramstad et al 2007).

TEK is useful in resource management, such as is seen in most marine fishing communities. For instance, Drew (2005) observed that '*... using TEK allows for a mutually beneficial relationship to be created between conservation biologists and local people. Conservation biologists gain access to bodies of knowledge that are site-specific and generated through long-term association with the area. In turn, local people gain a feeling of ownership over the project and an opportunity to become engaged with a larger debate about sustainability*'.

TEK is usually holistic; it combines both traditional knowledge with spirituality, morality etc. (Anderson 2011). Most sacred groves for example are treasured and conserved for their spiritual values. For example, in India biodiversity is conserved outside protected areas because of close relationships between religious, socio-cultural beliefs and conservation (Anthawal et al 2010). As Pierroti (2014) observes '*... a major strength of the indigenous approach is the integration of the spiritual aspects of knowledge'*. The importance of TEK for the protection of biodiversity and the achievement of sustainable development is gradually beginning to be recognized internationally (Mazzocchi 2006; Gadgil et al 1993), as exemplified by the United Nations convention on biological diversity (United Nations 1992).

However, with globalization and a globalized economy, many traditional cultures are beginning to lose their TEK as cultures become unified through formal education and economic forces. More people are growing away from interaction with the wild, and thus are losing both the value they perceived in it, and the knowledge that they have, as they come to regard TEK as less useful to their present survival (Gadgil et al 2000). This eventually leads to over-exploitation of nature's resources and a lack of connection with it (Louv 2008), causing local management systems to be threatened. Pilgrim et al (2008) consider the lack of ecological knowledge today to be *'...a constraint on the conservation of biodiversity, particularly where state management approaches are distinct from the concerns of local people'.* Further, Burford et al (2002) argue that the greatest threat to the economic stability of the African continent is not in its changing climates, but in the loss or gradual erosion of TEK and the accompanying destruction of natural wealth (plants, animals, insects, soil, clean water and air), and human cultural wealth (songs, proverbs, folklore, social cooperation). This goes on to rob people of the ability to respond to social and environmental change, by removing the resource base and attacking the foundations of human identity. Engaging local people's TEK in conservation can be a means of fostering partnerships between local knowledge holders and scientific researchers in the conservation of biodiversity and it can serve to fill in the gaps in knowledge between western scientific knowledge and TEK. For instance, Haenn et al (2014) used such an approach to understand the ecology of the King Vulture *Sarcoramphus papa* in Mexico with the aim of filling in the gaps in knowledge concerning the species, and found that local people indeed held TEK which was similar to scientific knowledge and recommended the use of TEK in conservation. Others who have also made such recommendations include Baral & Gauten (2007), Mascia et al (2003), Nazarea (1999), Hunn (2007) and Berkes et al (2000). However, there are few examples of projects that have successfully implemented this approach (Infield 2001).

1.5 Community-Based Conservation (CBC)

Recent debates in conservation have centred on using community-based conservation approaches (CBC, Mehta & Kellert 1998) in conserving wildlife and nature. CBC is defined as '*conservation of natural resources or biodiversity protection by, for, and with the local community*" (Ruiz-Mallen et al 2015; Murphree 1994; Western & Wright 1994; Berkes 2007). It also refers to '*wildlife conservation efforts that involve rural people as an integral part of a wildlife conservation policy*' (Hackel 1999; Adam & Hulme 1998), and is a recent approach that has come to be popular throughout the world as a means of conserving wildlife and their habitats (Hackel 1999).

One crucial factor in the CBC concept is the inclusion of local people in the process of decision-making and policy development relating to the management of their biodiversity (Ruiz-Mallen et al 2015; Bajracharya et al 2006; Adams et al 2004; Wells & McShane 2004; Hackel 1999). It has its modern origins in the experiences of conservationists working in poor, underdeveloped countries in the 1960s and 1970s (Hackel 1999). Conservation practitioners realized that the hostility of local people towards conservation could be overcome if they were involved in the management of wildlife and their habitats and if people's needs were taken into consideration alongside wildlife management and conservation (Berkes 2007; UNEP 2007; Adams & Hutton 2007; Schwartzman et al 2000; Bajracharya et al 2006; United Nations 1992).

Community emphasis was based on the belief that if conservation and development were simultaneously tackled, the interests of both could be achieved (Berkes 2004; Bajracharya et al 2006). CBC is based on the premise of conservation and development, development here referring mainly to livelihoods, making a living, meeting needs, coping with uncertainties and responding to opportunities (Salafsky & Wollenberg 2000; Berkes 2007; Brandon & Wells 1992; Mishra 1982). There are four goals with which CBC is built upon: 1. Inclusion of

people in policy, decision-making and allowing them to live within conservation areas, 2. Devolution of ownership of natural and wildlife resources to local people, 3. Improving livelihoods of local people from benefits derived from biodiversity conservation (Bajracharya et al 2006; Hackel 1999). It has been suggested that this approach, though in many respects better than the protectionist/exclusionists approach of creating national parks and reserves through government action that excluded local people and others from the habitats, should no more be regarded as a panacea for conservation than was protectionism (Berkes 2007; Hackel 1999). This is because CBC has many challenges that make its implementation difficult (e.g., Ruiz-Mallen et al 2015; Berkes 2004; Agrawal 2001; Terborgh 1999), and few examples exist of real successes achieved through this method (e.g., Porter-Bolland et al 2012; Nelson & Chomitz 2011; Andam et al 2010; Gaveau et al 2009), because of the lack of a detailed model on how to carry out CBC programmes, although it has become so popular a term that '*almost every rural conservation project is now termed 'community-based'* (Hackel 1999).

The CBC debate has two positions of opinion: the first school of thought holds that '*the failure of CBC is not due to the weakness or impracticality of the concept, but rather to its improper implementation, especially with respect to the devolution of authority and responsibility*' (Berkes 2004; also, Songorwa 1999 and Murphree 2002). The second school of thought holds that conservation and development are both very important and as such should be treated and handled separately, as mixing the two results in none of the objectives being achieved successfully (Berkes 2004; Redford and Sanderson 2000).

More recently, Ruiz-Mallen et al (2015), have argued that two other positions could be found effective in CBC management, they argue that first, CBC should include people-oriented management which aims to establish partnerships between local communities and external conservation organizations, although some critics argue that this approach can only work if the

people are prioritized above the mechanism, and if the process does not undermine the people despite it being tagged 'participatory' (Ruiz-Mallen et al 2015; Schultz et al 2011; Lele et al 2010; Little 1999) and secondly, the use of 'time-tested' customary methods that have helped in the management of biodiversity sustainably (Berkes 2009; Folke et al 2005; Maffi 2005; Posey 1992). Problems which might arise from this approach however include an understanding of the definition of conservation from the perspective of the locals, and whether conservation is a result of a deliberate effort of the locals or a result of market forces, low population demographics, and unsophisticated technologies (Ruiz-Mallen et al 2015). By formalizing such traditional conservation practices, these challenges may be subdued.

As Hackel (ibid.) observed in his argument about the conservation of African biodiversity, both protectionism and CBC are important in their own rights depending on the peculiar context of the area for conservation. In Africa, where most indigenous people are faced with the problems of extreme poverty, because of several complex factors (Hackel 1999; House & Zimalirana 1992), conservation is mostly looked upon as a misplacement of priority; how is it that wildlife and plants should take more prominence than the needs of humans? This kind of perception and view is common among Africans (Hackel 1999). It is usually hard for rural Africans who struggle daily to meet basic living requirements to understand how biodiversity excluding humans seems to be more important to their governments and conservationists. In such situations, employing CBC may be a better approach because without tackling the development needs of the communities, the likelihood of their accepting any conservation project would be in question, although Infield (2001) argued that though there is a link between environmental degradation and poverty, most of the protected areas (PA's) in Africa do not contribute significantly to poverty reduction (but see Clements & Milner-Gulland 2014 for a contrary view on how PA's can be beneficial when payments are made for environmental services).

Nevertheless, is there any guarantee that communities would conserve if their needs were met, if for example in the case of avian conservation, there is a lack of cultural valuing of birds? As Berkes (2004) argues, asking whether CBC works is asking the wrong question because sometimes it works, and at other times, it fails. The right question would be, what makes it work, and why does it fail? He suggests that the answers to this dilemma could be found in various interdisciplinary subfields such as common property, TEK, in addition to local perceptions and valuing/lack of valuing of wildlife including birds, etc. The most studied and probably the best-known CBC project is CAMPFIRE in Zimbabwe (http://campfirezimbabwe.org/). It seems to be working because there are collaborations with the locals on the management of wildlife, and a method of resource sharing. Where all the parties involved feel at ease with the arrangements of CBC, where the locals do not feel cheated or used, and where planning from the inception is done together with the locals, it provides a better platform for CBC to succeed. One other challenge of CBC is determining whom to work with in the communities. Where a considerable proportion of the locals feel left out, and where the benefits do not seem to cut across all members of the communities, there is a high likelihood of the communities not working towards the conservation of biodiversity.

As Hackel (1999) observed, the central issue in rural Africa is land accessibility, neither farmers nor pastoralists are usually willing to give up land to wildlife or have them close. Their concerns '*...usually focus on crop loss caused by animals, prohibited land access and personal safety*' (Hackel 1999). These issues make CBC a challenge in Africa. Songorwa (1999) relates how school children in Tanzania felt threatened by wild animal attacks on their way to and from school due to conservation efforts in their communities that increased the populations of wild animals. Thus, many frequently were absent from schools and some stopped going altogether, increasing the illiteracy levels in the project areas (see also

Gandiwa et al 2013; Mhlanga 2001). Such human-animal conflicts are also challenging to the success of CBC projects. Do the projects have the blueprint on how to handle the increasing number of wild animals that might result from the project's conservation efforts? How will wildlife populations be controlled? The locals must understand the objectives of the project from the earliest inception including the future implications of the program, so that issues of conservation, development and human-animal conflicts are discussed early in the project. Therefore, though CBC as a concept seems holistic, many have considered how practical it is in achieving both its conservation and development goals in rural communities (e.g., Berkes 2007; Berkes 2004; Songorwa 1999).

In communities where for example, big game is absent, (as is the case with my study area) how will revenue be generated? How will the project be sustained in the absence of revenue from tourism (Infield 2001)? Hackel argues that for wildlife conservation to succeed in Africa, it needs to be a mix of protectionism, community involvement, public relations, conservation education and revenue sharing (Hackel 1999), a position I strongly agree with. Without some form of protectionism, it will be challenging to ensure people abide by established laws, as there will always be those who will not see the need for the project. Without community involvement, the locals will stand as on-lookers, and the likelihood of sabotaging the project will be increased. As the debates on the right approach to conservation continue, tropical forests and their biodiversity, continue to be lost. Using environmental education, local involvement in management, (including the acknowledging, respect and inclusion of TEK), regulated access to protected lands, compensation for protecting wildlife (such as employing former poachers to become forest guards), and compensation from activities such as hunting and tourism, CBC can be a useful tool for conservation (Hackel 1999).

How do TEK and CBC function together? Although both are unique in their own rights, one way to ensure that CBC is indeed participatory and inclusive is to utilize and maximize the TEK of communities that hold such knowledge. There are not many examples of combining CBC with TEK, the concept still mostly remains at the theoretical level (Goldman 2003), although suggestions have been made on how the two can be utilized (e.g., Rai 2007; Mathooko 2005; Goldman 2003; Berkes 2003).

By nature, TEK is usually highly localized and adapted to a culture, and it could be specific knowledge about a certain plant, animal or other domains. Where such knowledge exists, one challenge might be that it is not in the domain of conservation interest to conservation practitioners and scientists, and so might not be considered a valuable resource (Goldman 2003). However, that could be a starting point for the acceptance of a project by the locals, when their TEK of a specific domain, is acknowledged and respected, and even included in a conservation plan. Local people could then become more interested and involved in a project, than if they had no understanding at all the issues being discussed. Mathooko (2005) argued that African communities were guided in the past by TEK which they had developed about their natural environment. Their resource utilization was guided by social taboos, religious rituals, sacred animal totems, TEK, he claims, began to erode when modern scientific knowledge became available, leading to unstainable utilization of wildlife resources. He further argues that using TEK of fisheries in East Africa could compliment scientific ecological knowledge (SEK) in the sustainable utilization and management of fish resources.

An example of how CBC and TEK could be complimentary in conservation is described by Goldman (2003), in her work with the Massai in Tanzania. Goldman (2003) observed that although most projects in Tanzania claimed to be community-based, they in practice still followed the top-down approach. For example, the historical relationship between the Massai

and their wildlife has not been fully understood, because the conservation practitioners have not worked at finding out such vital information, relevant to the success of their *work* among the Massai, instead, the main approach includes education and training (Goldman 2003). She argues that '*without asking the key questions such as how the harmonious relationship between Massai and their wildlife came to be, what the real relationship looks like, and what Massai know about wildlife, there is a risk of transforming local practical knowledge, and land use patterns in adverse ways'.*

However, Scoones & Thomson (1993), reported a successful application of CBC and TEK in conservation by the Medicinal plants conservation centre (MPCC), Pune, Western India, where over 50,000 medicinal plants belonging to about 50 distinct species were identified using collaborations between traditional healers, local communities, non-governmental and government agencies. The project was honoured as one of the best conservation projects by the United Nations Development Program (UNDP) in 2002. The recommendations from the project suggested that such collaborative actions, and the incorporation of various TEK are what is needed for a successful CBC programme.

1.6 Research Aims

This work aims to find out the ethno-ornithological knowledge of the Mushere and their knowledge and use of the Dulu forest by documenting their traditional ecological knowledge (TEK) of birds, their perceptions of the forest, including drivers of deforestation and applying the findings to determine whether using birds as flagship species for the conservation of the Mushere Dulu forest would be effective in the Mushere context.

1.7 Research Objectives

The research had three main objectives: First, the documentation of Mushere ethno-ornithology including bird folk names, cultural uses and associations. Secondly, investigating cultural transmission of knowledge including knowledge acquisition and transmission.

Thirdly, I considered the people's perceptions and valuing of the forest and the drivers of deforestation/degradation of the forest.

1.8 Research Approach

A mixed methods approach involving both quantitative and qualitative was used in data collection, involving focus group meetings, questionnaires, oral interviews and free listing, and participant observations. Ethnography was also used in documenting individual stories and experiences. The results presented here are a combination of qualitative and quantitative data sets.

1.9 Structure of the Thesis

Each chapter in the thesis is presented as a manuscript to be submitted for peer-review, as such, the presentation of chapters follows that order. However, because data collection involved using similar approaches, chapter three (methods) provided an overview of the various approaches used in data collection, which are then presented in more details in the chapter sections. Where a diverse set of approaches or tool was employed, I describe the methods in the chapter. Every chapter begins with a brief introduction to the chapter, followed by the presentation of results and then the discussion and the conservation implications of the findings. There is a single list of references to save paper and avoid repetition.

Chapter one, introduces the reader to ethno-ornithology and conservation, and reviews relevant literature in the field. It also introduces Traditional Ecological Knowledge (TEK), and discusses its practical applications in conservation. Cultural transmission of TEK and factors affecting the acquisition and transfer of traditional knowledge is also reviewed. Lastly, I discuss Community-Based Conservation (CBC) and its relationship with TEK, its advantages and challenges against the backdrop of employing it in the Mushere Dulu forest conservation project.

Chapter two presents the study community and the people. Here, I give a brief history of the people, the geo-physical descriptions of the area and the socio-cultural background of the Mushere. I also discuss the land tenure system in Nigeria and specifically, among the Mushere, in the context of resource use and ownership of the Dulu forest.

Chapter three presents a detailed general description of the methods used in data collection including the steps taken in relationship building prior to the start of the research, and the limitations of the methods used.

In chapter four, I present the knowledge of adult Mushere villagers, specifically, I present the cultural methods of TEK acquisition and transfer, bird knowledge of adults, and culturally salient birds for adults.

In Chapter Five, I present the knowledge of urban Mushere residents, and compare their knowledge with the knowledge of villagers.

Chapter six looks at the knowledge of children, and discusses knowledge transmission and acquisition, and whether bird knowledge is children's knowledge. The findings have been accepted as an article in a peer reviewed journal for publication.

In chapter seven, I present the ethno-ornithology of the Mushere, including bird folk names, cultural uses and associations of birds. I also discuss their perceptions and valuing of birds and consider the conservation implication of these findings. The chapter has also been sent for publication and is in the second stage of peer review.

In chapter eight, I present data on Mushere people's perceptions and valuing of the Dulu forest including their perceptions on the management and conservation of the forest. The chapter also looks at the drivers of TEK loss and deforestation of the Dulu forest.

Chapter nine summarizes and concludes on findings from the various chapters and discusses how they all fit together in addressing the main research questions. I also make suggestions for further research and recommendations on the Dulu forest conservation project.

CHAPTER TWO

Physical and Socio-Cultural Environment of Mushere

Mushere is in Bokkos local government area of Plateau state, North-central Nigeria. It is located at 9º 9’ 0’’ N, 9º 3’ 0’’ E. The Mushere are one of the tribes occupying the southern side of the Jos Plateau. The northern part of their tribal area is on the open high plateau at around 1200 metres above sea level, while the southern part extends through the maze of hills and valleys through which the plateau descends to the Benue Valley lowlands in the south, at about 300 metres ASL - there is no scarp in this area.

The Jos Plateau has a considerable effect on rainfall in areas adjacent to it. The western edge and nearby areas have considerably higher rainfall than other places in Nigeria at the same latitude, with a tendency for a slightly longer rainy season also. This means that forest naturally occurs within this belt, which extends round to the western part of the southern edge of the plateau. This is not merely gallery forest as elsewhere at this latitude since, because conditions are marginal, most land within this belt is southern guinea savannah. Over one hundred bird species have been recorded within the general area (as described by Hopkins 2013 pers. comm).

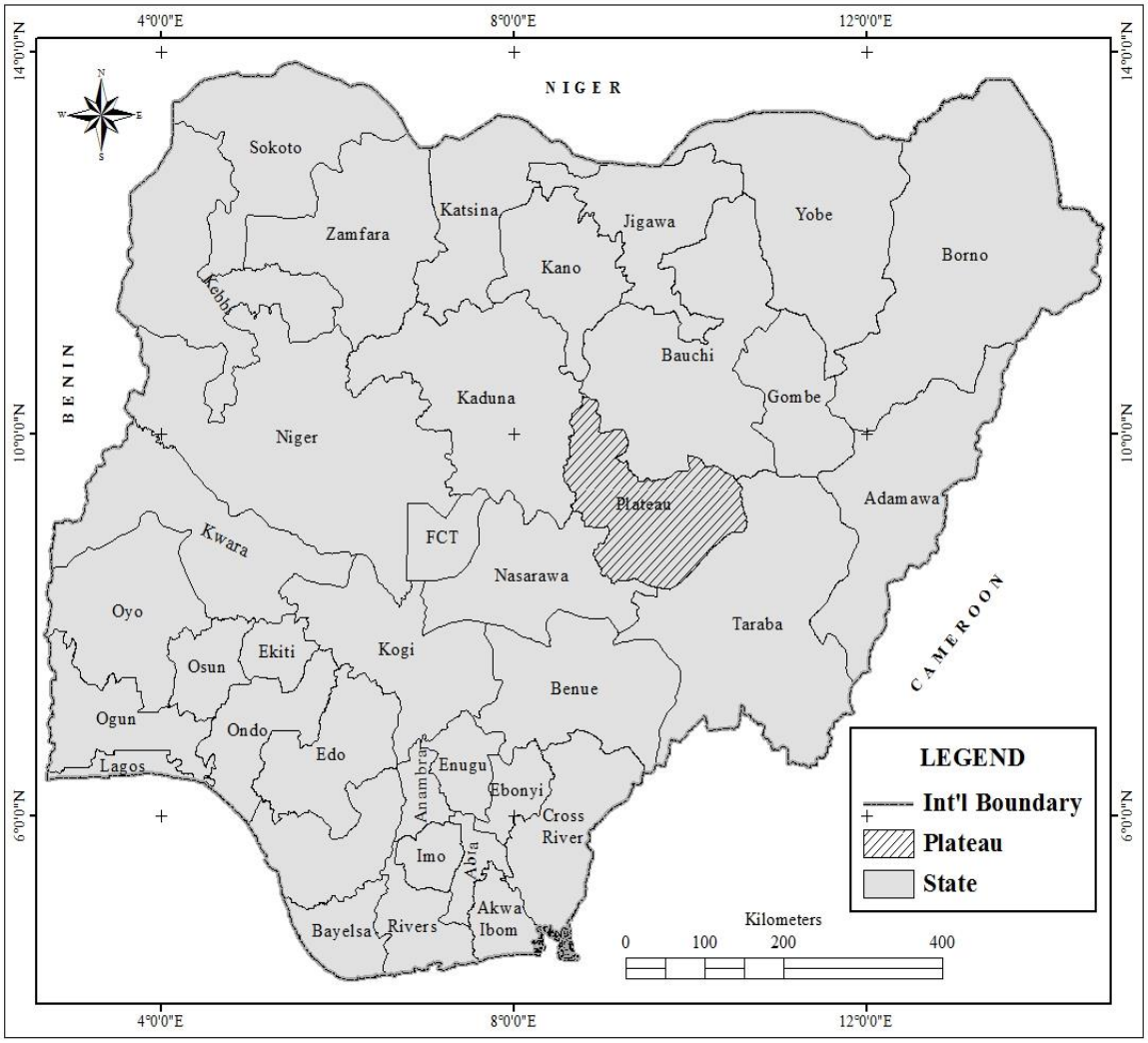

Figure 2: Map of Nigeria Showing Plateau State

Source: GIS Unit University of Jos.

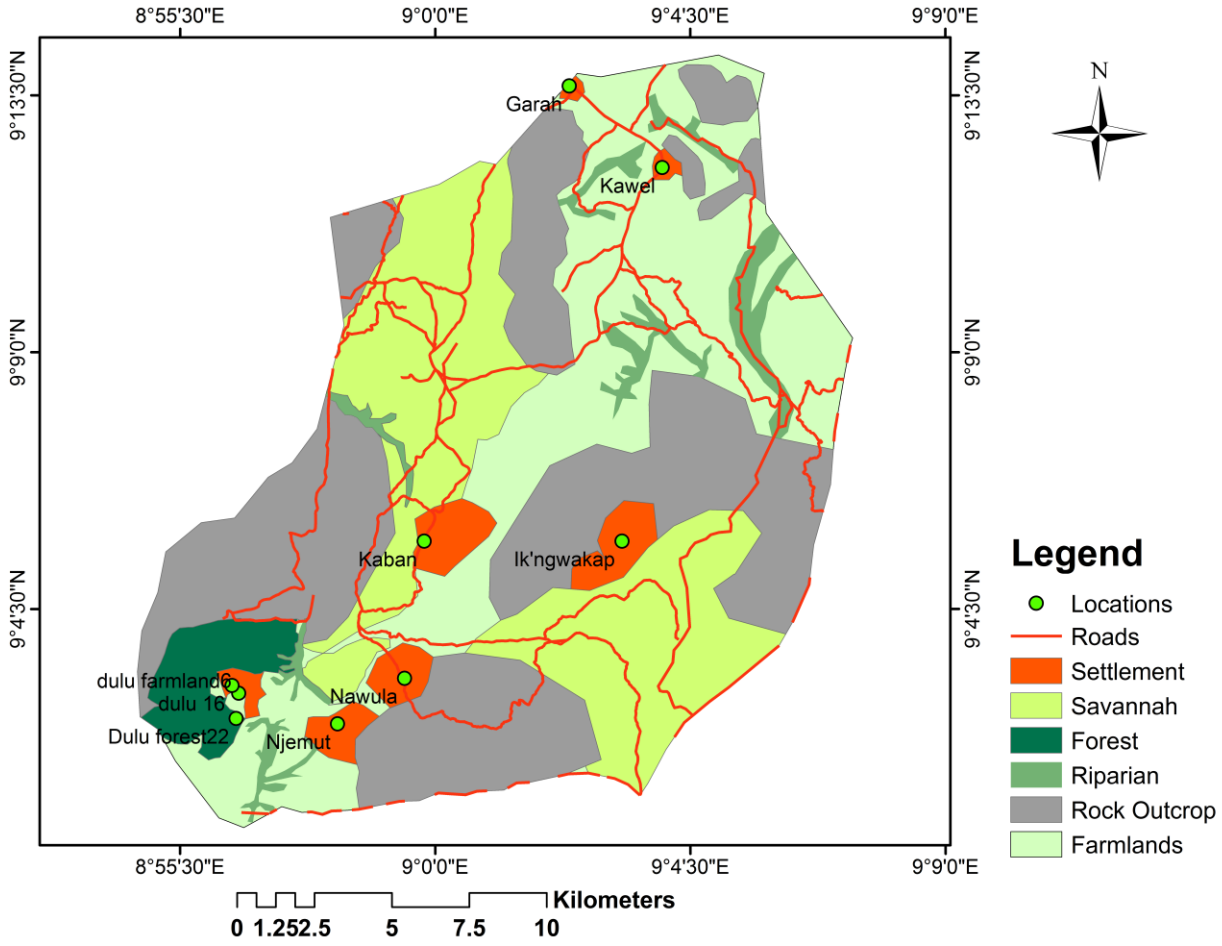

Figure. 2.1 Ecological Map showing the study communities and the Dulu Forest. Source:

National Remote Sensing Unit, Jos.

2.1 The History of The Mushere

As with most of the language groups in Plateau state, there are no written accounts of the history of the origins of the Mushere, or how they came to settle in their present location (Danfulani 2003). I have tried to find a verifiable written account no matter how sketchy about aspects of the Mushere history and origins but have been largely unsuccessful. Bokkos, the local government of the Mushere has three major tribes occupying it; the Ron to the north, Kulere in the west and Mushere, but surprisingly, writings on the inhabitants of Bokkos local government area mostly mentions the Ron and the Kulere, leaving one wondering how such a major group in the LGA could have been so overlooked. This work, although interested in their bird-human relationships, hopes to also draw the attention of especially anthropology and history scholars to this huge gap in knowledge and the need to document the life and history of this group. It is worth commending the efforts of Mushere youths under the umbrella body called Federated Union of Mushere Students (FUMS) for working on a document on the origins and history of the Mushere, which to the best of my knowledge, remains the only available documentation of the Mushere history at present. The document relied mostly on oral history, although the authors claimed to have consulted some older written records, they were not fully referenced in the document, and none of the authors could be reached during the research period to gain access to such records. I was privileged to have a phone conversation with one of the respected elders of the Mushere people, Chief Luka T. Rinmak, who further strengthened this observation that literature on the Mushere people's history is scant and almost absent. I also held an oral interview with Pa Iliya Longmuut (June 4^{th,} 2014), a respected Mushere elder on their history, (though he confessed to having lost most of this information) and observed that his narrative agreed with most of

the narratives in the youth publication. To fill in this knowledge gap, I have decided to look instead to the history of the larger group to which the Mushere belong, the Chadic and to the history of their close neighbours the Mwaghavul, Mupun and Ngas to gain insight into the history, life and culture of the Mushere. The Mushere and these neighbours speak languages that are mutually intelligible (Danfulani 2003) such that they can be considered as dialects of a single language (Isichei 1983; Danfulani 2003).

The Mushere belong in the Chadic-language group (Meek 1925; Danfulani 1995, 2000, 2003; Longtau 2012) along with their neighbours, the Mwaghavul, Mupun and Ngas, with whom they share language and cultural similarities, and probably their ancestry also. The Chadic languages are believed to have migrated from the lower Chad basin in the east (Temple & Temple 1965, Meek 1925, Isichei 1982, 1983; Danfulani 2003); assumedly under the leadership of a single strong individual, or as a group of individual people each with its own distinct and powerful leader (Danfulani 1995; Longtau 2012). They are said to have been a part of a larger empire known as the Kwararafa Kingdom that existed around the 17th century. The Kwararafa kingdom was centred around north-eastern Nigeria, with its headquarters located in Wukari. It was located southwest of the Borno Empire and south of the Hausa states (Fischer 1975). Kwararafa, as a confederation of many tribes, was very powerful, but was disestablished in the 18th century, a period which must have been when the Mushere and their close neighbours the Mwaghavul, Ngas and the others were said to have migrated to Bauchi state, staying there for a while, before moving on to Plateau state, where the groups established themselves in their present locations.

The Mushere ancestors settled in diverse groups, but the group leader who was called Tongkwan (Mushere et al 2007) moved to Ik'ngwakap and settled there, Ik'ngwakap is still the headquarters of the Mushere chiefdom. The name Mushere was coined from a river called River *Mushe*; meaning 'we start', and the river derives its source from a mountain known as

the *Kuteng* (Mushere et al 2007). The exact period for these migrations remains unknown as the true causes of migration are also not known, hence it is hard to know for sure how long the Mushere have occupied their present location (for a more recent history of the Chadic group on the plateau, see Danfulani 2003).

There are about 14 communities in the Mushere chiefdom including the following; Kawel, Rom, Horop, Kopmur, Mbur, Garah, Margif, Kanger, Suwa, Hokk, Kaban, Kaddim, Ngoksar (Mushere, et al, 2007). The entire population size of the Mushere is estimated to be around 37,000 (Nigerian National population commission, 2015 projected population). Mushere shares boundaries with the Ron in the north, Kulere in the west, Mupun and Chakfiem in the east, Mwaghavul in the north-east, Quaanpan and Lafia in the south. It covers a total land area of 870.25 km² (Mushere et al 2007). The Language spoken by the group is known as Mushere and most present day Mushere are bilingual, speaking the local dialect in addition to Hausa language, the lingua franca in northern Nigeria, others can also speak English as a third language of communication.

2.2 Study Communities

I worked with six study communities (Garah, Kawel, Ik'ngwakap, Kaban, Naula, Njemut), selection criterion was mainly the proximity to the Dulu forest. Kaban, Naula and Njemut represented communities close to the forest while Garah, Kawel and Ik'ngwakap are non-forest communities closest to the Dulu forest. None of these communities could recall their settlement histories, and those who tried gave conflicting versions. Danfulani (2003) made a similar observation and said: '*…the many undocumented and often contradictory local histories of the various clans and villages of the Chadic-speakers presents us with a chaotic picture'*. Garah, Kawel and Ik'ngwakap are close neighbours such that one is left wondering if the divide is not merely political, but the settlement narrative holds that they arrived at these locations at separate times perhaps in the last 200 or more years considering the historical records of the

fall of the Kwararafa kingdom in the 17th century (Fisher 1975), and from different previous locations among neighbouring tribes, leading to the slight dialectal variations in their tongues. This was the pattern reported for each of the villages: like that reported for the larger Mwaghavul, Mupun and Ngas neighbours. The populations of each of these communities fall between 300-1000 individuals to 2,900 in Ik'ngwakap, the headquarters of the Mushere district (National Population Commission 2015).

In Garah, Kawel and Ik'ngwakap communities, there are some basic modern facilities such as a telecommunication mast, one or two government or community owned primary and secondary schools, several privately owned primary and secondary schools, and many small-scale commodity stores and businesses; there are also several churches of different denominations in these communities. The major road network that passes through Mushere district passes right across these three communities, making transportation of people and goods possible. A market is held in Ik'ngwakap once every week, where local farmers from surrounding Mushere villages bring their produce to trade. The major road linking Mushere villages from Bokkos ends at Horop, which also has some of the modern basic facilities such as a police station, a local primary health care clinic, a telecommunication mast, and several private primary and secondary schools. After Horop, the bad road networks begin into Kaban, Naula, and Njemut communities. These are typical rural villages that lack the infrastructural facilities of any growing rural settlements. For example, while each of these three villages has a community primary school, the villagers complain about absent teachers, whose absence forces children to stay away from school most week days because the teachers do not like to live in the villages; they are probably less motivated due to the poor condition of the roads and lack of basic living facilities, and hardly show up to work. Transportation into these areas is mostly by using motorbikes, which most men in the villages own, and almost everyone has got at a mobile device for communication. Interestingly, the inhabitants of these villages live what

I describe as the average 'city life', where most of their basic subsistence needs are bought from the local grocery store, local district markets, or local government headquarters in Bokkos. Unlike what one might expect of a village, there are very few home gardens, where vegetables and animals are grown and bred for family use. Few women in these villages own gardens, most of their food and other requirements are bought using the cash generated by their husbands from the timber business. These communities are rapidly moving away from a farming culture due to the timber business.

The communities of Garah, Kawel, and Ikn'gwakap are on savannah flatlands, and so engage more in agriculture beyond the subsistence level. They engage in commercial agriculture, producing mainly potatoes and maize. Kaban, Naula, and Njemut communities are more on higher elevations, comprising of rocky outcrops, and surrounded by guinea savannah woodlands. As such they are mainly terrace subsistence farmers, growing Fonio *Digitaria sp* (i.e. hungry rice locally called "Accha"), guinea corn *Sorghum bicolor* and Beniseeds *Sesamum radiatum*. They also grow sugarcane *Saccharum officinarum* in Kaban, as their major cash crop.

2.2.1 Religion and Occupation

Mushere people were mainly traditionalists, with the *Miskakham Kuum* as the religious and political leader (Mushere et al 2007*).* The official place of worship and political affairs was Ik'ngwakap, the religious and political headquarters of the Mushere. The Object of worship was known as *Pa Naan* meaning; 'God the father' (Mushere et al 2007). The present Mushere are predominantly Christian, with a few adherents to the old traditional ways of worship, and even fewer Muslims. During my work in Mushere, I only came across one Muslim, and was shown the home of another. I was also informed of intermarriages between the Fulani-Muslims residing in the area and the Mushere women, meaning there may be more Mushere Muslims as women than men. The church is central in the lives of the average Mushere person, especially

the rural population, such that one finds it challenging separating religious lives from their daily activities. There is at least one church in each of these communities, predominantly the evangelical church. The local pastors are well respected and decisions regarding families, and the community mostly involves the contributions of the clergy. For example, on one of my visits, I found Naula village almost devoid of women except the older women and children, with a few younger women to care for the old and children, because the women had gone on a visit to the family of the local pastor who had lost a relative the previous week in another village.

Whenever there is a church event that requires adjustments to their daily activities, that takes highest priority. The church thus is central to the lives of the average villager in Mushere.

Agriculture is the main occupation of the Mushere as a large population reside in the villages, engaging in swidden agriculture, with most women engaging in firewood selling as well. Logging has also become one of the main sources of income for some of the communities especially those around my main study sites who are close to the Dulu forest (i.e. Kaban, Naula and Njemut).

2.3 Dulu Forest

Dulu is part of a small remaining forest in Mushere land said to belong to the Kaddim communities comprising of Naula, Njemut and Kaddim-kasa (made up of Njemut and Kaddim-Bisa). It covers an area of approximately 40-50 square kilometres and is to the southern-eastern fringe of Mushere land, which harbours vegetation that may have been mainly lowland rainforest type, but presently is predominantly woodland guinea savannah interspersed with gallery or riparian forest and rocky outcrops. This forest is a source of commercial timber for the surrounding communities and beyond as such it has become heavily degraded. The most pressing challenge the forest faces is logging, as most farmlands are situated at the edges of the forest. Hunting activities may also be affecting the forest biodiversity negatively although the

extent of the effect of each activity on the forest is a subject for further research. The forest is fast disappearing, this degradation is presently being slowed down (although not considerably) by the lack of a good road network except for tractor trails created by the timber extractors. This gives hope for the conservation of the forest, and the ability of the forest to regenerate if conserved. Trips into the forest revealed pockets of banana farms within the forest, and evidence of hunting, such as campsites; we even experienced a fire once. This also has its effects on the understory vegetation, soil and biodiversity

A Hunter's Shelter in the Dulu Forest. Credit: Grace Pam 17/10/2015

Dulu is presumably home to many species of plants and animals including species of birds such as the Green Turaco (*Tauraco persa*) which is a forest species. Dulu's biodiversity, other than the avifauna has not been studied or documented, and so information about its biodiversity is lacking.

2.3 Land Use and Tenure Systems in Nigeria

Forestry in Nigeria is managed at the three tiers of government i.e., Federal, State, and Local Government levels. The Forestry Reserve Act of Nigeria (1937) stated that powers to create and manage forest reserves fell within state government's jurisdiction (Aruofor, 2001), while the federal government, through the office of the Federal Department of Forestry (FDF), an arm of the Federal Ministry of Environment, is responsible for monitoring the activities of the states, and formulating national forestry policies and laws, it also plays an advisory role to the State Departments of Forestry (SDF). The federal government do not have executive authority in the management of forest reserves and other forest lands (FAO, 2003). There are several laws enacted to help strengthen these agencies in their roles of ensuring proper management and use of the nations' forest resources. The existing laws include the following:

1. The National Resource Conservation Act (1989) which establishes the Natural Resources Conservation Council (NRCC), an agency responsible for formulating and implementing policies, programs and projects that aim to conserve the nation's biodiversity and natural resources including water, soil, forests, fisheries and wildlife in general.
2. Federal Environmental Protection Agency (FEPA) act (Chapter 131, laws of the federation), 1990, this act established the federal environmental protection agency (FEPA), an agency that acts to protect the nation's land, water and air by formulating policies that limit the contamination and pollution of land, air and water in Nigeria.
3. The Environmental Impact Assessment (EIA) act (number 86) 1992: This act states out guidelines and policies that ensure an assessment of the impact of various

developmental projects on the environment. It acts to protect all lands, in the country from hazardous effects from such developments.

4. Endangered Species Act, 1985. This law acts to prohibit the trade, hunting, or capture of any species (91 species in Nigeria) that is listed as threatened or endangered, and the penalties that follow such acts of violation.
5. National parks decree (1991), establishing the right to form parks to protect Nigeria's wildlife. (Abere & Jasper 2011).

2.3.1 Land Tenure Systems and Resource Management

Land tenure is 'the relationship, whether legally or customarily defined among a people, as individuals or groups with respect to land (including resources such as water and trees, (Udry 2011; USAID 2010; FAO 2011, 2002; Dorner & Thiesenhusen 1992; Lane & Moorehead 1991). It is the set of rules set by societies to govern how land and other natural resources are utilized, by whom, for how long, and under what conditions (FAO, 2002).

There are several types of land tenure systems such as the private **system** where resources belong to specific individuals or groups such as families, corporate organizations, or an individual. The rights to such lands and resources therein belong solely to these private holders**,** for example, privately owned housing land, or properties belonging to an organization such a church, or a private farm are not accessible to others outside that group (FAO 2002). In a **communal system**, land resources belong exclusively to the community and every member of the community (due to common descent) has the right to access resources from such lands e.g., a community forest while non- members are restricted from accessing such resources (FAO 2002; Lane & Moorehead 1991; Bruce 1986)**. Customary systems** are based on traditional, usually unwritten rules and codes on resource use and allocation. Many African societies operate using this system (Udry 2011). The customs and traditions dictate how land is owned

and inherited for farming, burial etc., and the local people who live in, or near the forests/resource own it (Sunderlin et al 2008). **Open access system**, operates where there are no restrictions and laws on who can use a resource. Everyone has the right to the resource, an example is the high seas, which do not belong to any country and so is open to all. Lastly, in **state ownership** systems, land is owned by a sector of the government, which could be national, state or local government, e.g., national forest reserves or parks and state forest reserves (Vergara & Potvin 2014). Members of the society are restricted by law from accessing the resources from such lands without due process (FAO 2002).

In Nigeria, before the formulation of the land use decree (1978), the land tenure system was communal tenure system, allowing individuals and families to own lands in rural areas for farming and own land for housing in urban areas through inheritance (Abere & Jasper 2011; USAID 2011, 2010). In 1978, the law gave over land rights to state governors who then became the 'custodians' of all lands in the states (Abere & Jasper 2011). The objectives were so that all Nigerians can have access to land, prevent speculative purchase of communal lands, streamline and simplify the management and ownership of land, make land available to government at all levels for development, and lastly, to provide a system of government administration of rights that would improve tenure security (USAID 2010). This act has not been well received by Nigerians, and in 1999, it was included in the constitution which makes it even harder to be changed. As a result, most land transactions in Nigeria are still customarily and communally controlled, even though in principle, the state tenure is the lawful system (e.g., Vergara & Potvin 2014; USAID 2010, White and Martin 2002).

Buckley (1987) grouped the forests in Plateau state into four main categories; Forest reserves, communal forest areas, mine reclamation areas and groups of farm and village trees. He defined communal forest areas as '*areas which were developed for exclusive forestry use by the state forestry division in consultation with local government councils and local village communities.*

Local communities own both the land and the forest produce, are responsible for all planting, harvesting and maintenance activities under the supervision of the L.G. Cs'. This is not the type of communal forest the Dulu is, because it is not a man-made plantation forest nor a gazetted forest, it is a free forest, i.e., forests which are not under the strict management of SDFs or LFDs, but permission to exploit forest resources such as trees should be obtained from either of the two (Olaleye & Ameh 1999).

There are six main forest reserves in Plateau State which are managed by the state and local government forestry departments. The local government forestry departments in Nigeria have different roles from the south to the north of the country (FAO 2003). In the more forested south, LGA forest departments do not have the responsibility of managing forest resources within or outside forest reserved areas, while in the north, LGAs responsibility can include forest reserves and even free areas (FAO 2003), such as the Dulu forest. So, although the forests are managed at communal levels, and communities still claim ownership of their lands, by law, the lands in practice belong to the state government and the LGA forestry office may in some instances regulate activities within community owned (free) forests.

Osemeobo (1991) defined common resource as '*…a natural resource with social, cultural, economic and political importance subject to collective ownership but to either individual or communal use'.* This kind of resource utilization is usually practiced in communally owned land, where a community is defined as '*…a land holding unit comprising of a village or a number of villages'* (Osemeobe 1991), where traditional regulations guide resource management, and have the characteristics of providing subsistence needs such as shelter, food, medicine and cash to the communities (Osemeobe 1991). Usually, common resources are utilized at four levels; the first is the individual who by descent as an indigene of the community holds absolute rights to the common resources, under the traditional regulations. Secondly, individuals or groups who have joint use-rights to a resource such as fishermen and

hunters. Thirdly, the entire community which has the rights to common resources such as forests, rivers, etc. Fourthly, strangers can also obtain permission to have access to a common resource. In this case, there are usually two types of cases; open access, in which permission must be sought and granted before the resource(s) can be used, e.g. land for farming, harvesting timber, or palm oil etc. or free access in the which case no permits are required e.g., hunting/fishing (Osemeobe 1991). Plant use in communal tenure systems in Nigeria depends on the type of tenure system that is practiced. In traditional communal tenure systems, plants enjoy different forms of protection ranging from sacred or forbidden forests where community members are restricted access to the sites and plants which are usually entrusted to the care of a few community members such as religious priests, village head and elders except when they are needed for worship or ritualistic purposes (Osemeobe 1991)

In the study communities, a *de jure* communal tenure system was reported, where both the community and the LGFDs manage the forest and its resources (Bokkos LGA forestry officer, pers. Comm. 2017). The government provides two forest guards and a chief ranger who work in collaboration with the communities in managing the forest and its resources, and report back to the LG on activities that go in in the forest, such as illegal harvesting of forest resources. Although community members have equal rights to land use, and forest resources, commercial extraction of timber requires that individuals obtain permission from the LGFD and taxes are paid for such extractions, which benefits both the communities and the government (LGFD, Pers. Comm. 2017).

A major challenge to forest management and use reported by the LG was inadequate number of forest personnel, especially forest guards, to ensure proper management and utilization of forest resources. The community chiefs and elders manage land and forest resources at the community level. Membership of the community is by descent, and each member has equal rights to land resource. 'Outsiders' who settle in these communities and engage in farming

typically consult with the leadership institution who can grant access to suitable land for building and or farming. Individuals are not required to pay for such lands, the rules for the tenancy agreement are unwritten and based on mutual trust understanding that it is non-transferable, and the community owns the rights to the land when the land user decides to leave the community. With respect to the use of plants, members of the community all have equal access to wild fruits, vegetables and tubers, while trees in the Dulu forest can only be harvested by community members. Timber extraction by community members for local use does not require permission from the government, but from the local chief, while 'outsiders' in principle are not allowed to extract timber from the forest without permission from the LGF authorities.

A logging site within the Dulu Forest.

Credit: Grace Pam 17/10/2015

CHAPTER THREE

Methodology

Mixed methods (qualitative/quantitative) were employed in data collected which are discussed in the sections below. As a first approach to any ethnobiological research, consent seeking, rapport building, and ethical considerations are important first steps. In accordance with the requirements of the International Society for Ethnobiology (ISE) code of ethics (http://ethnobiology.net/code-of-ethics/), I was careful to ensure that the rights of individuals were not infringed upon. Ethical clearance for this research was obtained from the University of Oxford Central University Research Ethics Committee (CUREC) for both adult and children's participation respectively. (CUREC Ref No: SSD/CUREC1A/14-089 and Ref No: SSH_C1A_15_115). I ensured that no individual was coerced into participating in the research. Individual oral consent was sought of each participant before involvement. Where children were involved, oral consent was sought from parents/guardians and the child/ward was also asked their permission before participation. Individuals were made aware of their rights to withdraw at any stage of the research by simply informing the researcher ahead of time, and their rights to decline from answering any question if they felt it was too personal or were not willing to share that information. Respect for all participants was paramount throughout the research.

Oral consent, not written permission was culturally acceptable in the study communities and so was utilized (Albuquerque et al 2014). Asking individuals for their signatures is interpreted to mean their oral consent was not respected, and that raises suspicions on the actual reason for the signatures. Written consents were therefore avoided, although a written introduction to the research and researcher was produced and circulated to willing and literate

individuals who wished to understand the research better. In following these procedures, however, it was observed that the people were completely ignorant of such rights and did not appreciate the consent-seeking process, feeling instead that since their community leaders were aware of my presence and activities, and had granted me permission to work with them, I did not need to seek individual consent. I found this quite intriguing and challenging, and it brought out a sense of responsibility in me. I needed to protect them even when they did not fully understand their rights. It meant I made extra effort to explain where necessary why for example I did not need to record people's names against their responses (most wanted that done). I thus continuously emphasized the responsibility of the researcher towards ensuring that the rights of participants were respected and protected, and stressed that this was an academic and globally accepted code of conduct. Although not everyone appreciated this, most of them seemed to understand and appreciated the procedure.

3.1 Rapport Building and Consent-Seeking

As is common in ethnobiological research, the first approach for this research was paying visits to establish rapport and seek the consent of the communities. My method of rapport-building followed the suggestions of Albuquerque et al (2014:3) who suggest that to gain the trust of communities, it is important to visit all the households to explain to them the importance of the work and its purpose, to identify oneself as a researcher, and to organize a general meeting to explain the study and the processes of data collection. Although I could not visit all households in the six study sites, I met with the various community leaders of groups, and held several meetings in the churches in all the communities (Mushere people are predominantly Christian, and church gatherings are important meeting places) to further develop rapport with other members of the communities. Because of the time spent building relationship with the various communities, I could find local informants among the people who assisted greatly in the mobilization of participants for various aspects of this research.

Prior to the start of the work, I paid visits to the villages I was to work with, in the company of my assistants and mediators. First, we visited the local chiefs and elders of the three communities closest to the Dulu forest (Kaban, Naula and Njemut) together with their elders and representatives of women and youths and the community development chairperson. During the visits, I had the opportunity to discuss the aim of my research, the methods that would be involved in data collection, and methods for participant recruitment.

Consent seeking and rapport building for the communities without a forest (Garah, Kawel and Ik'ngwakap) were done in the palace of his royal highness, the *Mishkaham* Mushere, the high chief of the Mushere people. Other lower chiefs of the villages were also present at the meeting, which was jointly organized by the researcher and the staff of EDEN. During the meeting, all the lower chiefs of the Mushere chiefdom, including those whose villages were not included in the study, were informed about my research, and the activities of EDEN. I therefore obtained permission from the high chief and the entire Mushere chiefdom for the research. But that was not all; I also needed to meet with their elites in the city, whom I later discovered had already been informed of my presence and activities in the villages. The meeting with the Mushere elites served to calm previous suspicions and concerns from the villagers about the true motives of the research, they perceived that their elites would understand better if there were any hidden motives. A second reason why the meeting with the elites was important was because I had planned to compare the traditional knowledge of villagers and city dwellers as a measure of knowledge acquisition, transmission, retention or loss.

Figure 3.1: Courtesy and Consent-seeking Visit by the Researcher and Members of EDEN to HRH the Mishkaham Mushere (Front Row Middle).

Credit: Justin Olajide 9/07/2014

Figure 3.2: Rapport-Building and Consent-Seeking Visit to Njemut Village.

Picture Shows Researcher with the Village Chief (Seated, and some youth representatives)
Credit: Moses Daben 3/05/2014

3.2 Selection of Research Assistants and Consultants

Selection of my research assistants/consultants took place prior to the start of the study. Two individuals of Mushere descent with whom I had already established relationships were recruited as assistants and mediators. The criteria for their selection were based on their knowledge of the area, fluency in both Hausa and Mushere languages (our two languages of communication), and the mutual respect accorded them in the communities. Several meetings were held with both individuals, but it was important to first meet them individually due to their very diverse backgrounds even though they both spent their childhood years in the Mushere villages, Moses Daben is a biologist/academic, while Haggai is a teacher/ pastor. Each consultant therefore brought different strengths, abilities, possible contributions and expertise. During our earlier meetings, the aims and objectives of the research were explained to each, and the responsibility sought from each also explained. The meetings with both consultants were organized to introduce them to each other and to harmonize our thoughts and strategies. Both individuals are within the age group 35-45, and speak Mushere and the intermediate language (Hausa) quite fluently. It was important to choose people whom the communities recognize and respect. The cleric had worked among them for several years and is well known and respected in the communities; likewise, the academic consultant is a respected individual among his people, being regarded by many youths as a mentor. It was important to work with both men because of the cultural and religious implications of being a female researcher in the communities, and the biological aspect of the research required a local consultant familiar with the subject area. Another reason why having both consultants and assistants was necessary was because having a single male companion working with me in a patriarchal society would have raised suspicions as to the true motive of the relationship, a situation which could bring disrespect to me as a woman, and hence disrepute to my work. Hence, having two well-

respected members of the communities worked to my advantage, as I could not find an available and willing female who met my earlier stated criteria for selection.

3.3 Questionnaires and Forms

Semi-structured open-ended questionnaires and forms (in which the interviewer filled out the responses; Albuquerque et al 2014:19) were used in assessing participant's knowledge of bird names by generating free-lists (Quinlan, 2005), uses and cultural associations of birds and respondent's perceptions on various aspects of the survey on the importance of TEK and birds. Using questionnaires proved a valuable method in engaging respondents to share their local bird knowledge. The major challenge I encountered was that respondents could not understand why each response had to be independent of inputs from others; they always wanted other villagers to assist them in recalling bird names and other variables needed in the study. For instance, when I was interviewing a respondent, and filling out the forms for the non-literate respondents, other individuals passing by, or who were willing participants would usually come around to try to 'help' the respondent recall information. In such instances, the interviews were interrupted while I explained to them why the responses had to be free of interference. At another time, I discovered that some literate respondents from Garah (3 (10%) respondents out of total 31, final sample size = 28), had filled out their questionnaires corporately. These questionnaires had to be invalidated, as they were no longer independent (see Quinlan 2005:5 for a similar experience). It is therefore important in conducting such research to always be ready and willing to give out 'counsel' on why the research procedures must be adhered to avoid pseudo-replication, time and again, and to always isolate respondents for interviews, but wisdom must be applied so as not to unnecessarily offend respondents. Indeed, Quinlan (ibid.) also suggests a similar approach to reduce the effect of compromising the data.

3.4 Survey Method

Participants were selected using a purposive sampling (Albuquerque et al 2014; Elo et al 2014; Vaismoradi et al 2013; Bernard 2010; Braun 2006) technique. The initial goals of the research included understanding the extent of bird knowledge and the depth of individual knowledge among the Mushere. In the absence of local bird experts, purposive sampling was used in sampling the population. Purposive sampling has been described by (Elo et al 2014; Teddlie & Yu, 2007) as being suitable for this type of research where the researcher is interested in informants who have the best knowledge concerning the research topic, and data is mostly qualitative. The advantages of purposive sampling method include the following:

1. It is cost-effective and saves time. It was practically impossible to sample the whole population, and since my interest was in a specific knowledge type, finding holders of such knowledge was more important than having a large sample size with little or no useful contributions.
2. Purposive sampling may be the only appropriate method available when specialized information or data is required, such as in this study.

   It is usually effective in exploratory research, where the discovery of meaning can benefit from an intuitive approach (Bernard 2000)

   Limitations of the method includes;

   a) Vulnerability to errors in judgement by the researcher which could serve as a source of bias.
   b) It has low level of reliability and high levels of bias.
   c) Inability to generalize from the findings of the research (Bernard 2000)

Further, I approached individuals by households, but inclusion in the research was dependent on the set criteria explained earlier. It was therefore possible to visit approximately all

households in villages like Kaban and Naula, but for the more populated villages like Garah, Kawel and Ik'ngwakap it was not possible to do so due to limitations in time and resources. Instead, I visited as many households as possible, but also made use of gatherings such as market days, and Sundays, where almost everyone was around. I then sought out individuals who met the selection criteria. This ensured that I had the opportunity to meet many more people.

Certain members of the communities avoided participation on the grounds of ignorance of the subject matter. The purposive method had the advantage of helping me find potentially willing individuals who had the desired knowledge, which would have been difficult to do with a random sampling method. Limitations of the method are mostly on the aspects of generalization of results to the whole population, but as Eto et al (2014), pointed out, for a mostly qualitative research, the most important factors for the choice of method used are the methodology and the topic, not the need for generalizability of the findings, although this is important. A likely bias to this approach in the selection of both study sites and participants is the likelihood of having left out participants who might have a different perspective on birds, but this is unlikely, as the participants in this study represent those who claim to have some knowledge of birds. Also, I am sampling six out of the 14 Mushere villages, meant that I missed out on the knowledge of the other villages, but I do not think had a significant effect on my result, as the only villages with dialectal differences were all represented in the data. Being a homogenous cultural society, I do not think that the results are not representative of the whole Mushere, despite the small sample size. Also, selection of village was dependent on its relationship to the Dulu forest based on the closeness or distance from the Dulu forest, thus justifying why the other villages further away the forest were not included. Participant observations and informal unstructured conversations were also a part of the whole research process, and forms part of the data presented.

3.4.1 Bird Survey

Direct observations of birds with the aid of a pair of binoculars, as the researcher and others involved in the inventory exercise walked along the communities and the Dulu forest were carried out between 2009-2015. Standardized census techniques (e.g., point counts or line transects) were not used because of the following reasons:

a. Inaccessibility to most parts of the forest
b. Lack of demarcation of the whole forest, hence inability to mark out specific areas.
c. Lack of consensus by all communities regarding access to the forest, limiting access and protection.

   Other factors which affected the surveys included the distance of the forest from the nearest villages (Naula and Njemut), such that start time was usually between 0900 hours to 1600 hours (GMT+1), despite starting the trips as early as (0600hours GMT+1). Birds within the Mushere communities were recorded as the researcher drove to the Dulu forest, stopping at intervals to record birds sighted. However, most of the data presented are from Mark Hopkin's records from 2009-2012, using the same approach. The inventory lists are a combination of birds of the Dulu Forest and those sighted within the communities (Appendix 2).

3.5 Freelisting

Freelisting is a structured interviewing method that is used to elicit scientific data collection on various cultural domains (Thomson & Juan 2006; Quinlan 2005). A cultural biological domain can be defined as a collection of items that are all of the same type (Borgatti, 1999) for example, as in this research, the domain of birds. A cultural domain is defined as '*an organized set of*

words, concepts or sentences, all on the same level of contrast that jointly refer to a single conceptual sphere' (Weller & Romney 1988:9).

Freelisting involves asking several respondents (sample size depends on the domain's coherency) to name all the items they know within that given domain, and then ranking the position of each item on the list and the number of times (frequency) it is mentioned by respondents. It is particularly useful when taking inventories, trying to find out the culturally salient items or species, or trying to establish the relative salience of an item within a given domain (Quinlan ibid.). There are three assumptions to the freelists:

1. People will list terms in order of familiarity and importance.
2. More knowledgeable individuals will have longer lists than others.
3. Most mentioned items signify cultural salience (Quinlan 2005). Also, people will tend to recall items that they encounter in daily life rather than items they hardly encounter.

Quinlan also observed the shortcomings of the method to be the non-exhaustive nature of inventories gotten through free-listing.

Its advantages include:

1. Being simple and rapid, allowing for much larger samples to be collected in less time.
2. Freelists are quantifiable.
3. They are useful for measuring intra-cultural knowledge variation, with novices mentioning terms that are more general while individuals that are more knowledgeable mention more subtle ones.
4. It can be used in both literate and non-literate communities since oral free-lists and written free listing is possible.

Using the free-listing method to generate folk bird names proved a fast and effective method to get people to talk about birds they knew, however, it also generated many folk bird names that were unverifiable, and there were at least two dialectal variations, further complicating the

verification of bird names. There was also a lengthy list of folk bird names that were mentioned only once, and so did not qualify as culturally accepted bird names, since there needs to be an agreement by more than one individual for it to be a culturally accepted bird name (Borgatti 1999; Quinlan 2005). Considering the limited time available for the research, and mainly because adult survey was undertaken first as an exploratory research to establish the place of birds in the Mushere culture and the identification and knowledge of birds, it was not possible to undertake bird recognition tests with adults. This would have involved going back to each respondent after the first set of data were collected and the culturally salient birds established. It was however possible to use the recognition test on children because it was based on the results from adult survey. This is an aspect to be considered in the future.

Figure 3.3: Freelisting Exercise with a Respondent from Kaban

Credit: Moses Daben 27/05/2014

Figure 3.4: Focus Group Discussion with Men from Kaban

Credit: Haggai Ezekiel 8/06/2014

Figure 3.5: Focus Group Discussion with Women from Kaban

Credit: Haggai Ezekiel 8/06/2014

Figure 3.6: Oral History Interview with an Elder in Ik'ngwakap

Credit: Moses Daben 30/07/2014

Table 3.1: Summary of Mixed Research Methods Used

Research Method/Approach	Information Collected	Village + Demographic information
Free-listing interviews May-October 2014, September-December 2015 Semi-structured Interviews	Folk bird names, cultural uses and associations of birds, stories. Perceptions on the importance of TEK Suggestions for the retention and transmission of TEK	Garah (20 men, 8 women), Kawel (22 men, 28 women), Ik'ngwakap (38 men, 8 women), Kaban (3men, 24 women), Naula (29 men, 31 women), Njemut (0men, 20 women)
Questionnaire interviews February 2014, October-December 2015	Perceptions and valuing of the Dulu forest	Kaban (4 men, 3 women), Naula (28 men, 16 women), Njemut (2 men, 0 women), n=53
Focus group meetings 14-31 January 2015	Identification and verification of folk names generated from 1 above. Ecological information on birds.	Garah (7 men, 8women), Kawel 9 men, 6 women), Ik'ngwakap 10 men, 5 women) Kaban (5 men, 5 women), Naula 6 men, 4 women)
Unstructured interviews May October 2014, January-April 2015	Ethnographic information on human-bird interactions	Kaban 6 men, 6 women), Naula (15 men, 12 women), Kawel (7 men, 10 women), n=56

Free-listing interviews with children October-November 2015	Children's bird knowledge	Kawel (14 boys, 12 girls), Garah (8 boys, 2 girls), ik'ngwakap (12 boys, 10) children), n=56
Oral unstructured interview/ participant observation (2014-2015)	All stages of research	All communities, especially Naula.

3.6 Picture Elicitation Exercise Using Focus Group Discussions (FGD)

I held focus group discussions (FGDs; Albuquerque et al 2014, Bernard, 2000) in Kawel (15 participants), Garah (15 participants) and Ik'ngwakap (15 participants) on the 14th January 2015, and one other focus group meeting with representatives from Kaban, Naula and Njemut (20 participants) on the 31st of January 2015. The meetings were meant for identifying and verifying bird names generated during the initial free-listing exercises, and to find consensus/verify information collected on cultural and ecological aspects of bird knowledge shared (see questionnaire on appendix 9). Approximately an equal number of women and men were represented in the meetings for each village, because I stressed the need for female participation in the meetings because I had noticed a male-domination in the research activities. Prior to this exercise, I had held similar pre-testing sessions with the separated genders, immediately after the free-listing exercises were done (Figure 3.4 & 3.5). The aim was to test the FGD approach (i.e., the usual women only/ men only, or a mixed FGD) that would be best in testing the validity and identity of birds mentioned and cultural/ecological information collected. From the exercises I noticed that both groups shared similar information, although women did not recognize many birds which some men had named and identified, and vice-versa. There was therefore a need to have a wider audience involving both groups. The choice of participants was based on the community's selection of those they perceived had some knowledge of birds. This was necessary for two reasons; firstly, to avoid researcher bias by

going through my lists and selecting those I thought held more knowledge, and secondly, it was a way of involving the communities in the research process. A disadvantage of this selection process is that the researcher had little or no control of any local selection criteria that might have been involved apart from the ones I had set out to the leaders responsible for the selection i.e. (knowledgeable individuals who must be members of the Mushere- speaking community, who must be willing to participate and share their knowledge). Participants included literate and non-literate individuals, young and old, with different occupational backgrounds represented. There were no locally recognized experts in the bird domain in the study communities, so all participants were general members of the communities. Pictures of all the birds in our inventory list (One hundred and six) and their related bird calls were shown to participants (appendix 2 for birds presented). The pictures were obtained from a web search on the Google search engine, while the bird calls were from the collection of African bird sounds vol.2 (Chappuis, 2000). Although there were many bird names to be verified, and picture elicitation tasks to be done, the people were willing to spend the day on the exercise, and arrangements were made for a lunch break. Afterwards, each participant was appreciated by giving them the local equivalent of a labourer's day wage. I also used pictures from the field guide on birds of western and central Africa (Ber Van Perlo, 2002) for pictures of birds that did not seem very clear in my photographs, although I ensured that the pictures I selected were clear and of high resolution. I also tested the people's ability to recognize two-dimensional images prior to the exercise and found that although some birds seemed to get them confused in the pictures, they could correctly identify a sizeable number of birds. The pictures were shown to participants and the associated birdcalls were played from my laptop so that both the bird and its call could help them in identification. The challenge that this method produced was that certain respondents mistook some species which had similar features, such as bee-eaters and kingfishers in pictures, as Ng'weno (2010) observed,

birdwatchers and ornithologists rely on printed material to identify birds, but local people rely on sights and sounds, and might not be comfortable with printed material depending on their literacy level. To check against this bias, consensus was sought for each bird entry, and where there was no agreement, the call or song was played as an alternative recognition tool.

Figure 3.7: Picture-Elicitation Exercise with Participants from Ik'ngwakap, Garah and Kawel. Credit: Moses Daben 14/1/2015

CHAPTER FOUR

Mushere Villager's Knowledge

Abstract

Traditional bird knowledge of Mushere adults from six villages was surveyed to determine the effects of environment (non-forested/forested) on respondents' knowledge, factors that affect cultural transmission of knowledge, methods of knowledge acquisition and transfer and perceptions on TEK including drivers of such perceptions. Mixed methods survey methods were used including the use of semi-structured questionnaires and free-listing and focus group meetings. Factors that were considered as likely determinants of adult bird knowledge included gender, occupation, education and age. The effects of salience (cultural, ecological, phenotypic) were considered.

Results revealed that respondents from non-forested environments were more knowledgeable than those living close to forest ($p < 0.001$), men were more knowledgeable than women ($p < 0.05$), non-farmers were more knowledgeable than farmers ($p \leq 0.001$), age was however not statistically significant ($p > 0.05$). Oral and vertical methods of transmission were the predominantly reported method/modes of knowledge acquisition and transfer. Respondents predominantly perceived TEK as decreasing, due to changes in socio-economic conditions, lack of interest in nature, lack of cultural transmission of TEK, formal education and loss of language and cultural values. I conclude that cultural transmission of TEK in Mushere closely reflects the theoretical framework, and that the local perceptions of TEK and the drivers could serve as baseline information in driving the conservation management and policy in Mushere.

Introduction

In this chapter, I aim to consider three main objectives; First, the local bird knowledge of village adults and determinants of such knowledge, secondly, cultural transmission of knowledge including various components involved in the process such as language, and lastly the perceptions of the locals of such knowledge and the drivers of knowledge.

4.1.1. Cultural Transmission of Knowledge: Definition.

Cultural transmission, is defined as 'the process of acquisition of behaviours, attitudes, or techniques, through imprinting, conditioning, imitation, active teaching and learning or a

combination of these' (Cavalli-Sforza et al 1982). It is a complex process, that is usually driven by socio-cultural, biological and physical factors (Smith 2000; Kelly, 1995; Boyd & Richerson 1985). Fundamentally, especially in small-scale societies, individuals learn from socializing and actively engaging with their cultures and environments (Matthew & Perreault 2015; Henrich & Boyd 2008). Understanding how cultures evolve involves studying and measuring various aspects of the transmission of traits and behaviours within a given population (Henrich & Broesch 2011). Cultural transmission theory, developed from the fields of cultural and social anthropology (Cavolli-sforza & Feldman 1973, 1981, 1982), and deriving its origins from the biological transmission of traits, is the conceptual framework for understanding cultural patterns of the transmission. It states that knowledge is usually unevenly distributed and differentiated by gender, age, (Ayantunde et al 2008; Zent, 2009) and education (Reyes-Garcia et al 2010; Bates 2009), political and religious views (Botero et al 2014). Warren & Pulliam (1981) defined culture as '*a population of learned behavioural traits or customs which are transmitted between individuals through social learning*'. These traits transform the behaviour of individuals in a population when that behavioural trait improves the chances that another individual will adopt a behavioural trait characteristic of the first, either through active teaching or passively by observation and imitation (Warren & Pulliam 1981). In this chapter and subsequently, knowledge is defined as "facts, feelings, awareness, consciousness or familiarity gained by experience or learning'' (The Collins English Dictionary 1986).

4.1.2 Cultural Transmission Methods

Carvolli-Sforza & Feldeman (1981) and Acerbi & Parisi (2006) classified the methods of cultural transmission into three categories; vertical transmission-which is the intergenerational transmission of attributes from parents to offspring, horizontal transmission- which involves

intragenerational transmission between peers and lastly, oblique transmission which involves intergenerational transmission between individuals who might be related or not. These transmission types have been found to have relative importance depending on the societal type (Matthew & Perreault 2015). For example, horizontal transmission has been associated more with economically advanced societies, while vertical transmission is thought to be the predominant method in small-scale traditional societies (Acerbi & Parisi 2006; Hewlett & Cavalli-Sforza 1986).

4.1.3 Modes of Cultural Transmission of Knowledge and Drivers of Knowledge Change

The predominant mode of knowledge transmission in small-scale societies is usually through oral means, practice, such as apprenticeship, and observation (see Lancy 2010; Odden & Rochat 2004). By considering transmission modes, it is possible to determine the rates of evolutionary change of cultural traits and behaviours over time (Cavalli-Sforza et al 1986). The model also emphasizes the importance of familial influence on especially, vertical cultural transmission (Rogoff, 2016; Guglielmino et al 1995). It has also been reported (e.g., Reyes-Garcia et al 2014; Gomez-Baggethun & Reyes-Garcia 2013; Turner & Turner 2008; Lozada et al 2006; Godoy et al 2005; Case et al 2005; Begossi et al 2002; Kingsbury 2001; Benz et al 2000; Tsuji 1996) that local people are beginning to lose their TEK as a result of several drivers such as modernization, education, language loss and change in environment of learning and that most local/indigenous communities are beginning to regard such knowledge to be of little or no use in the present (Reyes-Garcia et al 2013).

4.1.4 Language and TEK

'…language, notably encapsulated in vocabulary provides compelling evidence for the mental transformations that give rise to the conceptual worlds we all inhabit'. Eugene Hunn, 2014

Language has been used to determine salient domains in cultures, as the words which appear mostly in everyday language use give an indication of the importance of a domain to that culture (Hunn 2014; Hunn & Brown 2011; Guglielmino et al 1995). Berlin (1992, 1973) observed that a careful study of any language usually yields an inventory of at least 1000 lexemes naming 'folk species' locally known. While Hunn (2014) suggested that such vocabulary usually constitutes about 5% of the language's working vocabulary, *'...such linguistic resources allow people to describe, remember, understand and imagine their ambient biodiversity'* (Hunn 2014).

Therefore, to examine the relevance of language in cultural transmission of knowledge among the Mushere, an aspect of this research was to consider the literature of the Mushere to analyse the use of birds in language, and three closely related languages to the Mushere (Mwaghavul, Mupun and Ngas), all Chadic speakers believed to have the same historical origins. An analysis of words in the four languages should help provide insight into the historical context of the perceptions, and relationships of the Mushere to birds.

4.1.5 Importance of Cultural Perceptions of Nature

Although not all TEK is usually accurate and reliable, (Huntington 2000; Moller et al 2004) understanding how a group of people perceive their local environment, and the meanings and importance they attach to the different biodiversity therein is an important first step in conservation (Vining et al 2008; Kesby 2003; Marten 2001; Salmon 2000). It is therefore important to understand how the Mushere perceive TEK, and to understand if their perceived drivers of TEK gain or loss corresponded with the observations of others reported elsewhere.

4.1.6 Specific Objectives

To understand the dynamics of knowledge transmission and modes of acquisition and transfer among the Mushere, I ask the following questions: Do the Mushere follow the theoretical pattern of vertical, horizontal or oblique knowledge transmission? Do the transmission methods support the conceptual framework of the cultural transmission theory what roles do age, gender, environment, education and occupation play in the acquisition and transmission processes? What modes of transmission are used in Mushere? What factors drive their TEK? What are the attitudes and perceptions of respondents on the value of birds and TEK?

4.2 Method

4.2.1 Survey method

Three non-forested villages (Garah, Kawel and Ik'ngwakap) and three forested ones (Kaban, Nawula and Njemut) were selected based on the absence of a nearby forest and their relative distance to the Dulu forest (see map on fig 2.1), to test the hypothesis that bird knowledge was independent of the presence of a forest. Alternatively, villagers closest to forest should hold more knowledge of birds due to the relative frequency of encounters with nature. Also, gender, age, occupation and education should have no effect on an individual's TEK. Alternatively, older respondents should exhibit more knowledge of birds both in terms of naming ability (list length) and the depth of information about birds than the younger members of the communities, farmers should hold more knowledge due to their closeness to nature, and less educated members of the communities should be more knowledgeable. Respondents were selected using purposive sampling technique (Black 2000; Tongco 2000; Saunders 2012) where I sampled individuals who reported having some knowledge of birds, since only those with some

knowledge of birds could make meaningful contributions to the research. In the absence of local bird experts who would have provided most of the baseline data, I sampled a wider number of individuals from six villages. In smaller villages such as Naula and Kaban (population < 400), I visited approximately 70 % of the households, and surveyed willing Mushere adults between the ages of 17 years and above, who reported having some knowledge of birds. In the larger villages (Garah, Ik'ngwakap and Kawel), it was not possible to visit all households mainly because those villages have a population size of (>1000) and have many non-Mushere residents. I however visited about 30% of the homes in these villages, and made use of special meetings such as Sundays when most people where home and with their families and gatherings were held in village squares to survey conduct more surveys.

Limitation of the method was the ability to determine how many of the respondents who met the desired criteria for inclusion in the research would be differentiated according to the variables being tested for i.e. gender, age, occupation, education and village. With a random approach, the researcher can determine and control the sample sizes for each variable, but with a purposive sampling method, and the condition that the potential respondent's right to decline participation be respected, it meant that the sample sizes differed greatly with respect to the variables being tested. One strength of the method however was that I was able to focus on individuals who had held some knowledge of the domain of birds within the limited time and resources available, and since these were the selected knowledgeable members of the communities, I do not doubt that it is representative of the bird knowledge of the communities. relationship to birds (Albuquerque et al 2014; Araujo et al 2012; Tongco 2007; Davis & Wagner 2002).

4.2.2 Data Collection Tools

Semi-structured interviews, open-ended questionnaires (appendix 7) and Freelisting questionnaires were used in collecting demographic information on respondents, and their knowledge of the birds they mentioned. Respondents were also asked to share their knowledge, views and perceptions of various aspects of their TEK of birds, and the methods and modes of TEK acquisition. Time spent with each respondent was between 35-45 minutes for none-literate respondents, and 20 minutes for literate respondents who then used about 10-15 minutes in filling out their freelists. I was careful not to ask leading questions, although this proved really challenging, as the literacy level of the people was quite low, and we had to break questions down to very simple levels for respondents to understand what we meant, and although some questions interpreted back to English might seem leading, in the native Hausa or Mushere languages which were the main modes of communication, they are presented differently in ways that made sense and meaning in the context of the culture.

4.2.3 Data Analysis

Descriptive statistics was used in analysing demographic distribution of the data, and in presenting the results of the perceptions of respondents to the valuing and useful of TEK. Such responses were first analysed using thematic approach (TA; Braun & Clarke 2006). The method involves analysing the contents of respondents' responses to the different questions, generating initial codes, searching for common themes, reviewing the themes and assigning/defining the themes (Braun & Clarke 2006, Bernard 2000). For example, in response to the question 'why do you like or dislike birds'? Several reasons were proffered, which were first analysed into 10 categories (food, providers of information on phenomena,

general dislike or disregard for birds, birds as destructive agents, birds as God's creation, beauty of birds, interest in their lovely songs, birds not considered important, animals generally not considered important and those who had no known reasons for their dislike or love for birds).

These were further re-grouped into six central themes; cultural utilization (food, information providers e.g., heralders of evil /good tidings, indicators of seasons (i.e., social and ecological indicators), harmful uses (birds as crop pests or predators of domestic birds), aesthetic values (beautiful, lovely songs), anthropocentric reasons (I just dislike them, birds are just not important, animals are generally not important) and lastly, don't know (those who had no known reasons).

Categories for sources of TEK transmission/ acquisition were grouped into six categories; vertical transmission was themed parent(s) for all those who mentioned one or both parents, oblique transmission for any reference to one or both grandparents, vertical/oblique for combination of one or both parents/one or both grandparents, horizontal for any mentions of siblings/friends, and unrelated others for mentions of having gained one's knowledge from the community or school, etc.

Responses on the modes of TEK transfer were grouped into four themes; oral method (including responses such as by story-telling), oral/observation (story-telling, and personal interest), oral/practice (story-telling or oral conversation/ practical engagement such as hunting), and a combination of all three methods oral/ observation/practice.

When respondents were asked what they perceived the current situation of TEK was in the communities, responses were grouped into four groups; decreasing (including responses that suggested that TEK was not being learnt, was getting lost, dying out etc), increasing, still intact as the past, I don't know. Further, respondents were asked to give reasons for such

perceptions on the status of TEK. These were grouped into under four main themes from an initial 10 codes. These were; 1. Preservation of culture and knowledge (including responses that spoke of the importance of language, importance of transmission of TEK to younger generations, and the understanding of the cultural values of birds), 2. Cultural/ economic reasons (e.g., birds are food sources, birds are destructive to crops etc), 3. TEK is no longer useful knowledge and 4. 'I don't know' category. Finally, Respondents were asked to give reasons for why they perceived TEK was either increasing, decreasing, or otherwise. These responses were analysed into six themes; Economic reasons (e.g., change from farming/hunting to business), lack of interest in nature, formal education, lack of transmission from older to younger generations, loss of language and culture, and the 'I don't know 'category.

Age categories were grouped into three based on biological categorization of age into young adults (18-29 years), middle-aged respondents (30-49 years), and older adults (50 years and above). This category was created to reduce the effects of outliers due to disparity in the sample sizes and to reduce the spread in the number of years of respondents in the analysis. Occupational types were categorized into two broad groups; farmers and others, due to the difference in the sample sizes between farmers and the other occupation types (i.e., student 31, hunters 4, civil servants 14, and business persons 23), these other groups were treated together because the difference in sample sizes would have affected the outcome of the results by skewing the data greatly. The bias in the data toward farmers was unavoidable, as over 90% of the villagers identify themselves as farmers. The implication of having two categories was that post-hoc tests could not be carried out to ascertain the actual sources of any observed differences in occupational types. Subsequently, respondents' perceptions were compared using Chi-Squared tests to determine the levels of differences in perceptions of respondents by gender, age, village and occupation.

A generalized linear mixed model (GLMM) was used in analysing the data to find out the relationships of the various variables on respondent's knowledge. Knowledge was measured by an individual's list length, as more knowledgeable individuals produce longer lists (Quinlan 2005). The model takes into account the relationships of each variable on the number of names respondents could recall based on their village, age, gender, occupation and education and provides a better measure of the relationship of the each variable on an individual's knowledge, taking into effect the relationship of the other variables as well, which then gives a better representation than if each variable were considered singly, as the effect of one could have a confounding effect on another due to parameters such as differences in sample sizes. The GLM takes these differences into account when analysing the data.

4.2.4 Freelists Data Analysis

Using the software Anthropac (Borgatti 1999), I found out the relative salience of each item (i.e. species/group mentioned) in the list, (first=1). The salience index (Smith's S), is calculated as $S = ((\sum(L - Rj_{+}1))/L)/N$

Where *S* = average rank of an item across all lists in the sample weighed by the lengths of the lists in which the item occurs, *L*=length of item *j* in the list, *N*=the number of lists in the sample (Smith & Borgatti 1998). The last item listed takes a score of 1/L. The relative salience of an item therefore gives a reflection of its cultural importance i. e., '*the state or quality which it stands out relative to other items*' (www.wikipedia.org). The highest salient of an item=1. Determining the cultural salience of an item is usually done by the researcher, because there is a lack of a standard procedure (Quinlan 2005). Usually, there are visible breaks in the data between items that were frequently mentioned (consensus) and those which few respondents mentioned, and the researcher uses his/her judgement to determine where the breaks should be.

4.2.5 Analysis of Mushere Literature and Vocabulary in Relation to Birds

I analysed the only available Mushere literature related to their daily use of words: 'One Thousand and One Mushere Proverbs/Idioms' (Jungraithmayr & Diyakal 2008), and three language dictionaries of the closely linguistically related neighbours of the Mushere (Jungraithmayr et al 2016, Ngas; Blench et al 2014, Mwaghavul; and Zygmunt, 1991, Mupun), to look for references on birds, as a reflection of the value of birds in the Mushere culture, and how comparing with their neighbours might give more insight into understanding the place of birds in the regional culture, since language has been linked to the conceptualization of the world people inhabit (Hunn 2014).

Method included counting every mention of bird in all documents (including also other plants and animals), counting the frequency of mentions of specific/general names, and counting the number of times each species or group was mentioned in each document. This was necessary to provide a baseline for understanding the conceptualization and relationship with birds of the Mushere and their surrounding neighbours as revealed in language. The results were presented as percentages and frequencies.

4.3 Results

4.3.1 Cultural Transmission of Knowledge: Effects of Age, Gender, Occupation, and Environment.

Two-hundred and twenty-eight respondents were surveyed, 112 (49.1%) men and 116 (50.9%) women. Overall, respondents could recall a mean of 9±3.3 SD (men =10 ±3.1 SD; women=8 ±3.1 SD). A generalized linear model (GLM) result revealed that knowledge of respondents differed statistically by village, occupation and gender, while the difference in knowledge by

education and age were not statistically significant ($p > 0.05$). Respondents from the three non-forested villages were more knowledgeable than respondents from forested villages ($p < 0.05$). Similarly, men held more knowledge than women ($p < 0.05$) table 4.1.

Table 4.1: Generalized Linear Model (GLM) Results of Respondents' Knowledge in Relation to Proximity of Village to Forest, Gender, Age, Occupation and Education

Parameter	B	Std. Error	95% Wald Confidence Interval		
			Wald Chi-Square	df	Sig.
(Intercept)	10.018	.7202	193.483	1	.000
[villa=non-forested]	1.716	.4125	17.299	1	.000
[villa=forested]	0[a]	.	.	.	.
[age=18-29]	-1.638	.5958	7.555	1	.006
[age=30-49]	-.781	.5693	1.881	1	.170
[age=50-above]	0[a]	.	.	.	.
[occupation=farmers]	-1.529	.4486	11.614	1	.001
[occupation=others]	0[a]	.	.	.	.
[education=non]	-.613	.5873	1.091	1	.296
[education=educate]	0[a]	.	.	.	.
[gender=men]	1.034	.4345	5.663	1	.017
[gender=women]	0[a]	.	.	.	.
(Scale)	7.964[b]	.7459			

a. Set to zero because this parameter is redundant.

b. Maximum likelihood estimate.

Although neither gender knew much about the ecology of the birds, during focus group meetings, more women gave ecological information than men. only one male respondent who had been a Shepard boy growing up could give similar information. Farmers held less knowledge than others occupational categories, the difference was statistically significant ($p < 0.05$).

4.3.2 Valuing of Birds, Methods of TEK Transmission and Modes of Acquisition

When respondents were asked about their perceptions of the valuing of birds (appendix), 141 (62 %; 65 men, 76 women) thought birds were not important, while 87 (38 % 47 men, 40 women) thought birds were important, these responses were not statistically different for men and women (Mann-Whitney U= 6010.00, S. E= 418.94, $p > 0.05$). One hundred and thirty-four (59 % 62 men, 72 women) respondents perceived birds to be valuable because of their cultural utility (crop pests, food, indicators or give information about phenomena), 46 (20 % 23 men, 23 women) had negative values for birds due to anthropocentric reasons (e.g., birds are just animals, only good for eating, animals are not important), 23 (10 %, 14 men, 9 women) valued birds because of their aesthetic values (beautiful, lovely songs), 6 (3 %, 2 men, 4 women) gave religious reasons for valuing birds (e.g., birds are God's creation) and finally, 19 (8 %, 11 men, 8 women) did not have any reasons for their perceptions on the values of birds. These responses did not differ between men and women (Mann-Whitney U= 6117.50, S.E = 441.77, $p > 0.05$). On the methods of TEK transmission, 148 (65%; 63 men, 85 women) reported learning through vertical transmission, 37 (16%; 20 men, 17 women) learnt through oblique transmission, 20 (9%; 14 men, 6 women) learnt from other non-related community members such as teachers, 9 (4%; 3 men, 1 woman) learnt through vertical/oblique transmission, 8 (4%; 7 men, 1 woman) reported learning through personal interest, while 2 (1%, 2 men) learnt from a combination of vertical/oblique/others, and vertical/oblique /horizontal methods respectively. These responses differed significantly between genders (Mann-Whitney U=5238.55, S. E= 422.93, $p < 0.05$). On modes of TEK acquisition, 105 (46 %; 60 men, 45 women) reported learning through oral means such as stories, 74 (33 %; 20 men, 54 women) reported learning through oral tradition/observation, 11 (5 %; 4 men, 7 women) learnt through observation, 10 (4 %; 10 men) learnt through observation/practice, 6 (3 %; 3 men, 3 women) learnt through oral tradition/practice, while 3 (1 %; 3 men) reported learning through

practice. These responses were not statistically different for men and women (Mann-Whitney U= 7002.50, S.E = 463.73, $p > 0.05$).

4.3.3 Perceptions on TEK

Respondents were also asked to state their views on the status of TEK among the Mushere (appendix 8). Results showed that half, 114 (50%; 65 men, 45 women) perceived that TEK was decreasing, 44 (19 %; 20 men, 24 women) thought individual TEK was increasing, 42 (18 %; 19 men, 23 women) did not have any opinion on the matter, while 28 (12 %; 8 men, 20 women) thought it was still as it used to be in the past. These perceptions differed significantly for men and women (Kruskal-Wallis $H_{228, 2}= 7.16$, $p < 0.05$).

When respondents were asked to give reasons for their perceptions, 53 (23%, 29 men, 24 women) stated a change in socio-economic lifestyle as reasons for the decrease in knowledge, 43 (19 %; 24 men, 19 women) thought a lack of interest in nature was responsible for the decline, 62 (27%; 26 men, 36 women) thought a lack of cultural transmission of knowledge was responsible, 22 (10%; 11 men, 11 women) thought formal education was responsible, 25 (11 %; 9 men, 16 women) perceived that the loss of language and culture were responsible for the decline, while 23 (10%; 13 men, 10 women) did not have any reasons for their perceptions. It is important to note that among the 144 respondents who had previously stated that TEK was either increasing, still as it used to be, or belonged in the category that had no opinion, only 23 (10%) still had no opinion, while the rest gave responses that implied that TEK was decreasing, despite the clarity in the question being asked (appendix 8).

Respondents were also asked if they considered TEK as a valuable resource, and 220 (97 %; 106 men, 114 women) thought it was still valuable, while 6 (3 %; 4 men, 2 women) did not think it was valuable, mainly because it is no longer useful knowledge. Those who thought it was still valuable gave the following reasons; it is important for the preservation of knowledge

and culture 171 (75%; 81 men, 90 women), cultural/ economic reasons (including understanding how to protect crops from birds) 38 (17%; 21 men, 17 women), religious reasons 4 (2 %; 2 men, 2 women), and 'I don't know' 8 (4 %; 5 men, 3 women). The responses were not statistically different for men and women (Mann-Whitney U=6950.00, S. E= 461.68, $p > 0.05$).

Lastly, I also wanted to find out respondents' perceptions on ways that the transmission of TEK can be encouraged in Mushere, due to the relevance of local perceptions in management planning and policy. One hundred-six (46.5%) respondents suggested encouraging outdoor birding activities especially with children, followed by the suggestion to organize school outreaches to teach children about birds 20 (8.8%), while 7(17.0%) suggested documentation in print format of such knowledge for the preservation and transmission to younger generations, table 4.2 gives a summary of the respondents' suggestions. Note that these responses were self-suggestions from an open-ended question.

Table 4.2: Respondents' Suggestions on TEK Retention and Transmission

Suggestion	Frequency	%
Organize outdoor birding activities	106	47
Organize seminars/ events on birds to encourage interest in birds	20	9
Document Mushere folk bird names, cultural uses and associations	17	7.5
Teach language/culture to children	14	6
Use both formal/informal methods to teach about birds	14	6
Create stories about birds in Mushere language to share with children	7	3.1
No suggestion	37	16
Total	228	100

4.3.4 Freelists Results

There was a close association between the most abundant bird groups; Estrildidae and Columbidae (abundance measured in terms of actual number of each bird species sighted per number of visits) and the most culturally salient species or group in both men and women's freelists, while Phasianidae (Francolin; *kwom*), the third most abundant group, was the most salient group in farmers' freelists. Figure 4.7 shows the correlation between the ecologically salient birds and respondent's salience scores.

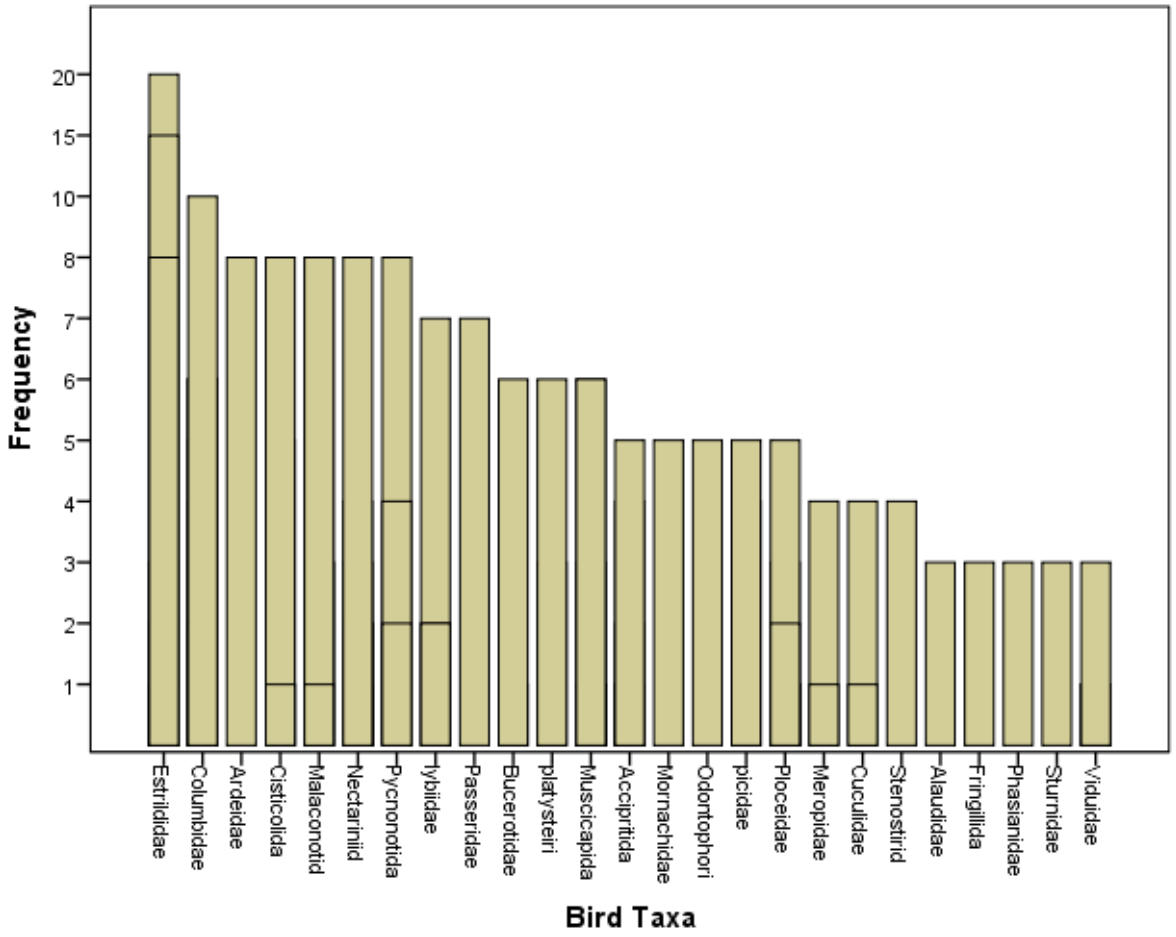

Figure 4.3: A Summary of Bird Abundance Data Showing Some Ecologically Abundant Bird Taxa Whose Actual Number of Sightings Were Equal to Or Greater Than Three.

Women's lists had *mbul* (Columbidae) *and tidit* (Estrildidae) as the first two most salient species, while men had *mbul* (Columbidae) and *kwom* (Phasianidae) as the first two most salient groups. It is interesting to note that men and women had the same three groups as their first most salient bird groups, only in a slightly different order (*mbul, tidit, kwom* for women; *mbul, kwom, tidit* for men). There was no statistical difference in the frequency of mention of the birds on men and women's lists (Mann-Whitney U = 114.0, SE= 25.23, $p > 0.05$). However,

the difference in the average ranks of each species on the lists were statistically different for men and women (Mann-Whitney U= 69.0, SE = 25.30, $p < 0.05$).

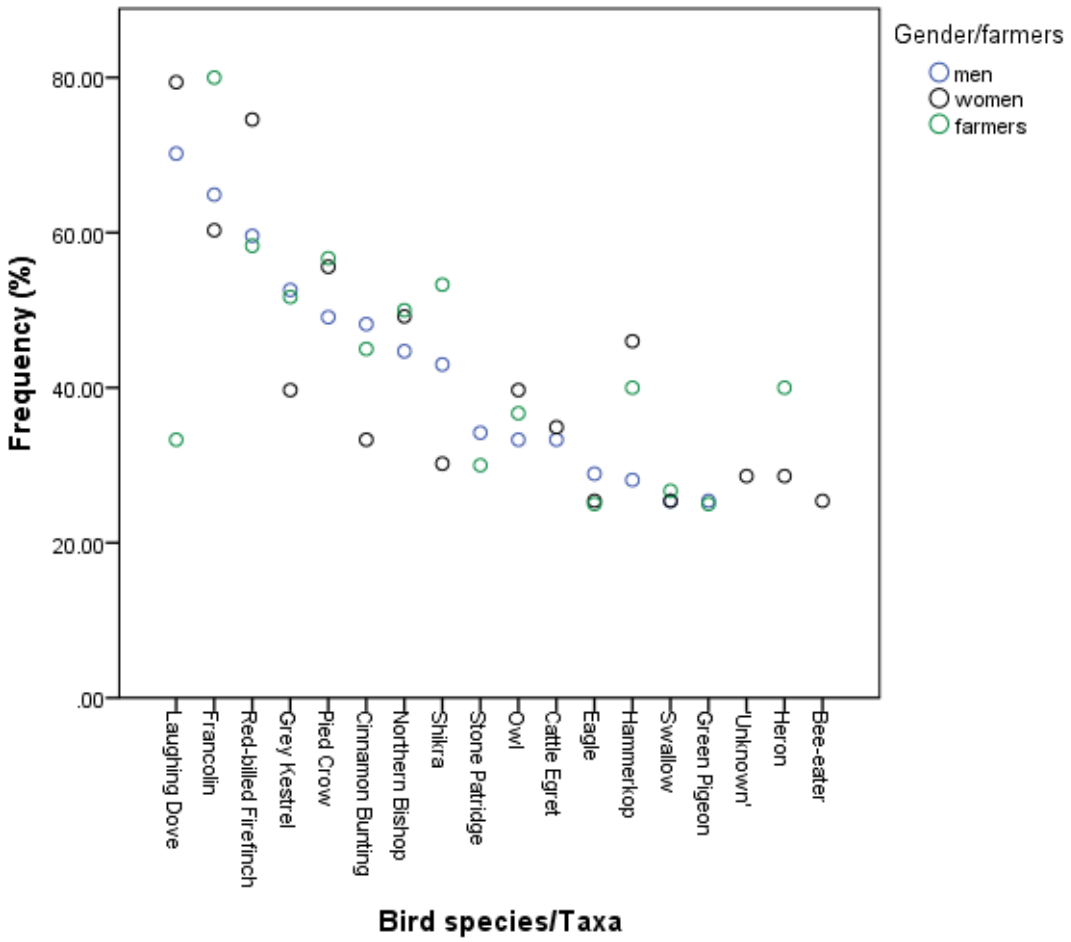

Figure 4.4: Graph Showing the Frequency of Mention of Culturally Salient Species of Men, Women and Farmers

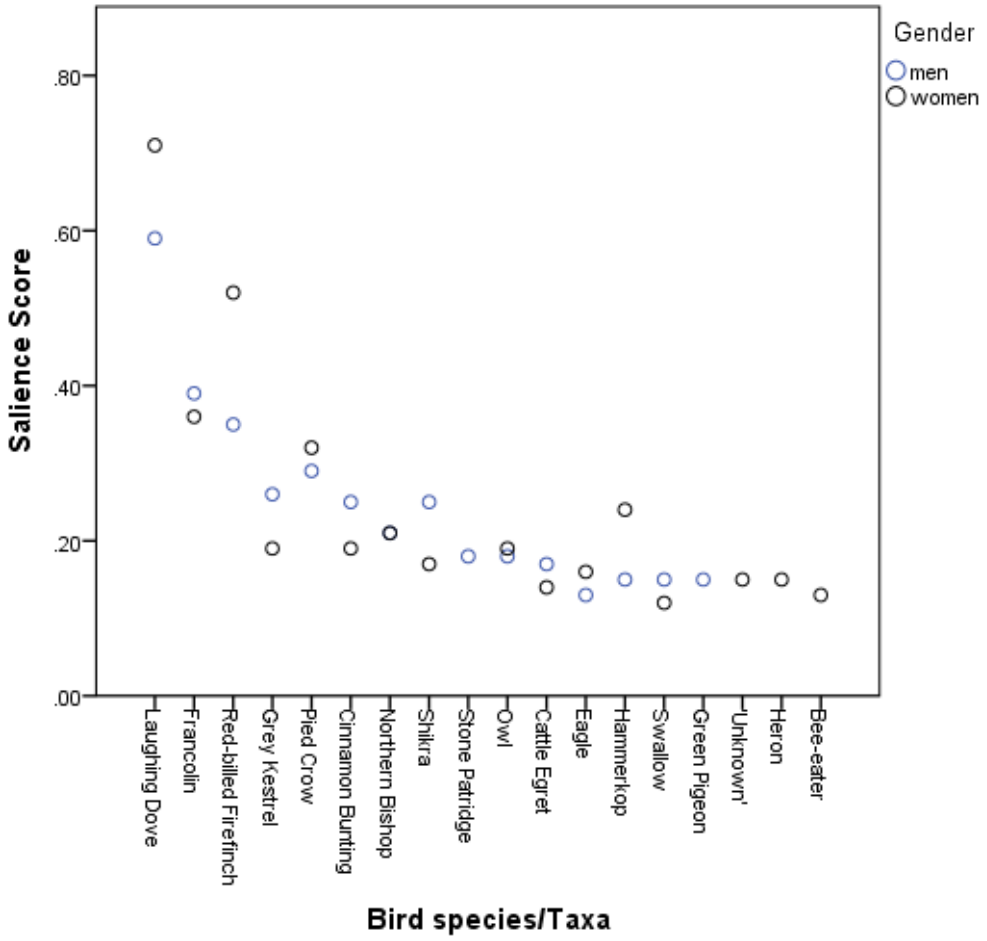

Figure 4.5: Graph Showing the Salient Scores of Culturally Salient Species mentioned by Men and Women.

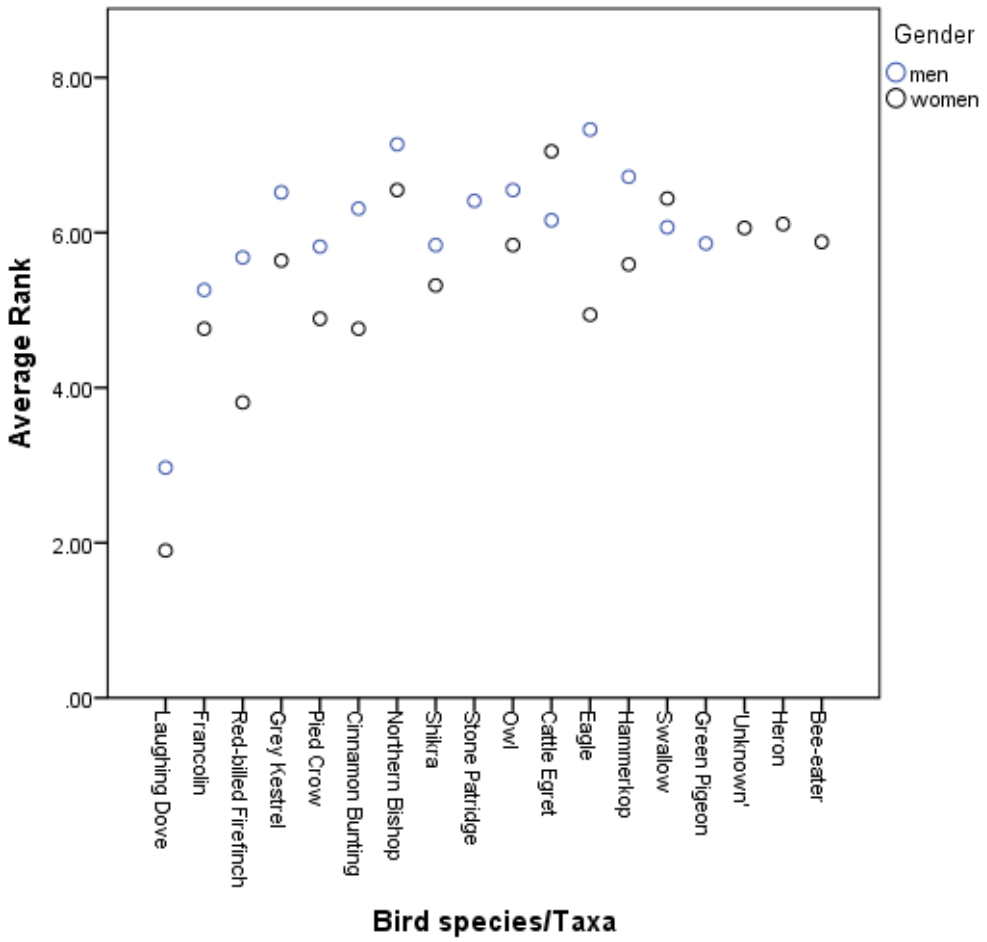

Figure 4.6: Graph Showing the Average Ranks of the Culturally Salient Species Mentioned by Men and Women

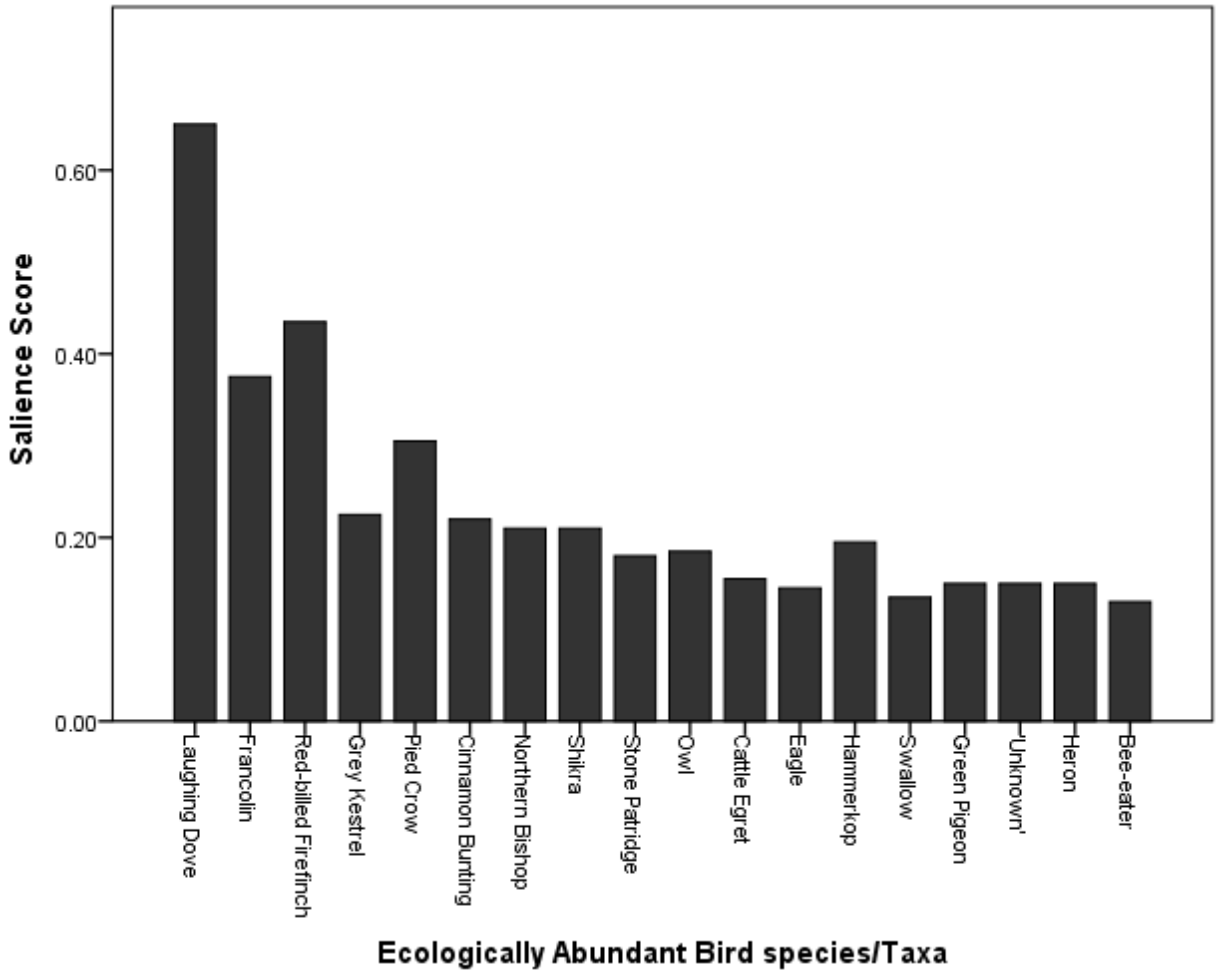

Figure 4.7: Graph Showing the Relationship Between the Ecologically Abundant Birds and Respondents' Salience Scores.

4.3.5 Analysis of Birds (and others) in Language Literature Composition in Mushere and a comparison with Mupun, Mwaghavul And Ngas Languages

The results of the analysis from the Mushere book of proverbs and idioms revealed that birds were mentioned 83 (8%) times. Forty-two (50%) were fowl/chicken/hen, 'birds' accounted for 13 (15%), hawks were 10 (12%), bird eggs, 8 (9%), bird feathers, 4 (4%), vulture, 4 (4%), Pied Crow, (1%), Cinnamon Bunting (1%), and Swallow (1%). The results also showed that other animals other than birds, were mentioned eighty-seven times, with dogs having the highest frequency 52 (60%), followed by sheep/goats/ram 22 (25%), snake 18 (21%), monkey/baboon 15 (17%), cow 13 (15%), lizard 11(13%), bush cat 10 (12%), toad, 9 (10%), hare 9 (10%) and animal 9 (10%). Figure 4.8 gives summary of the results.

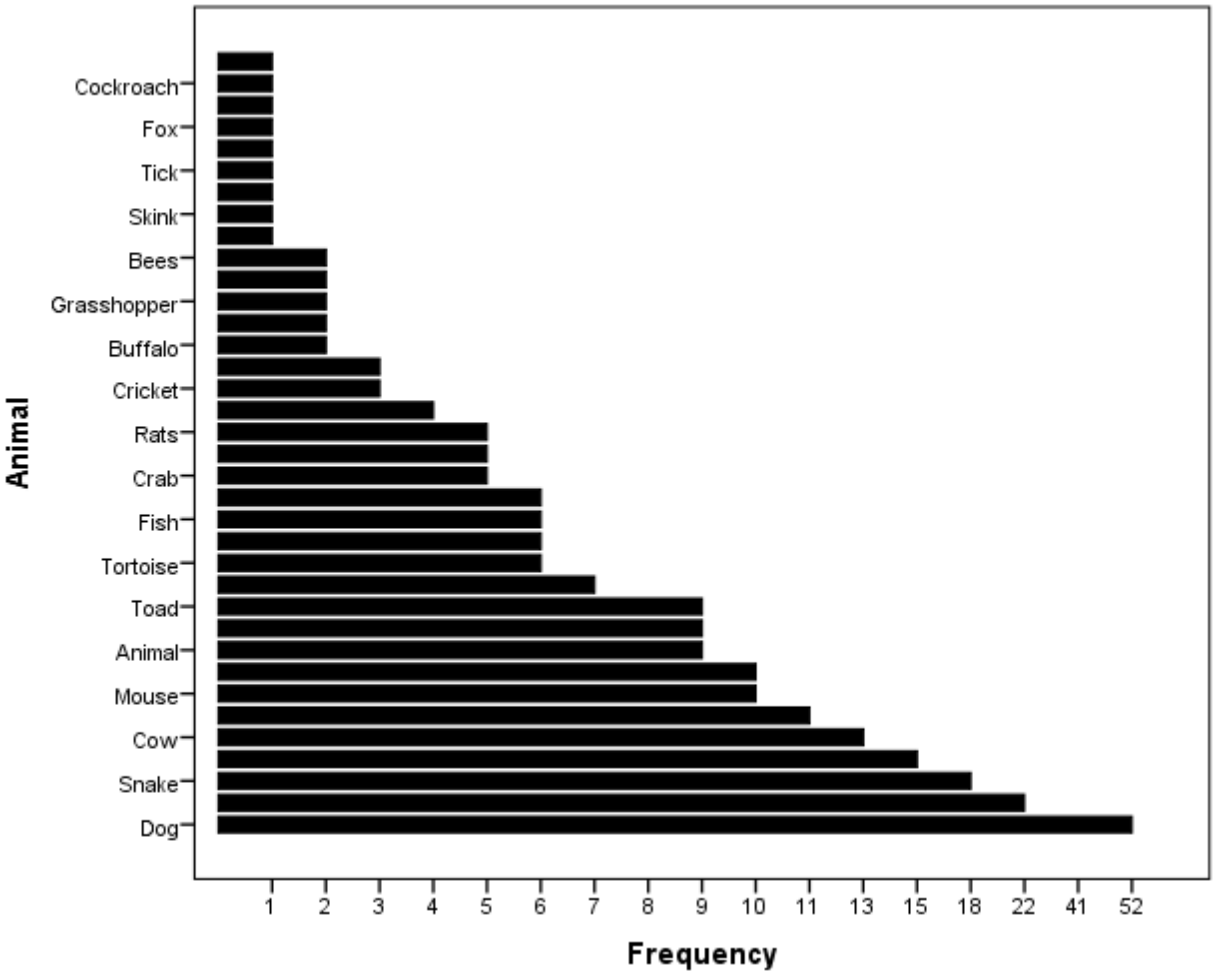

Figure 4.8: Graph showing Frequency of Animals other than Birds in the 1001 Mushere Idioms and Proverbs

In addition, the results from the plant analysis revealed that twenty-two plants were mentioned in total. 'Trees' had the highest frequency 16 (73%), specific tree species were not mentioned at all in the proverbs. The category 'grasses' had the next highest frequency 12 (55%). No mention was made of any specific grass species. Cocoyam which is grown locally as a staple food had the third highest frequency 11 (50%) followed by palm nuts for making oil, and their fronds for making brooms 10 (45%). The other crops, which were mentioned in frequencies less than 10 are shown in figure 4.10.

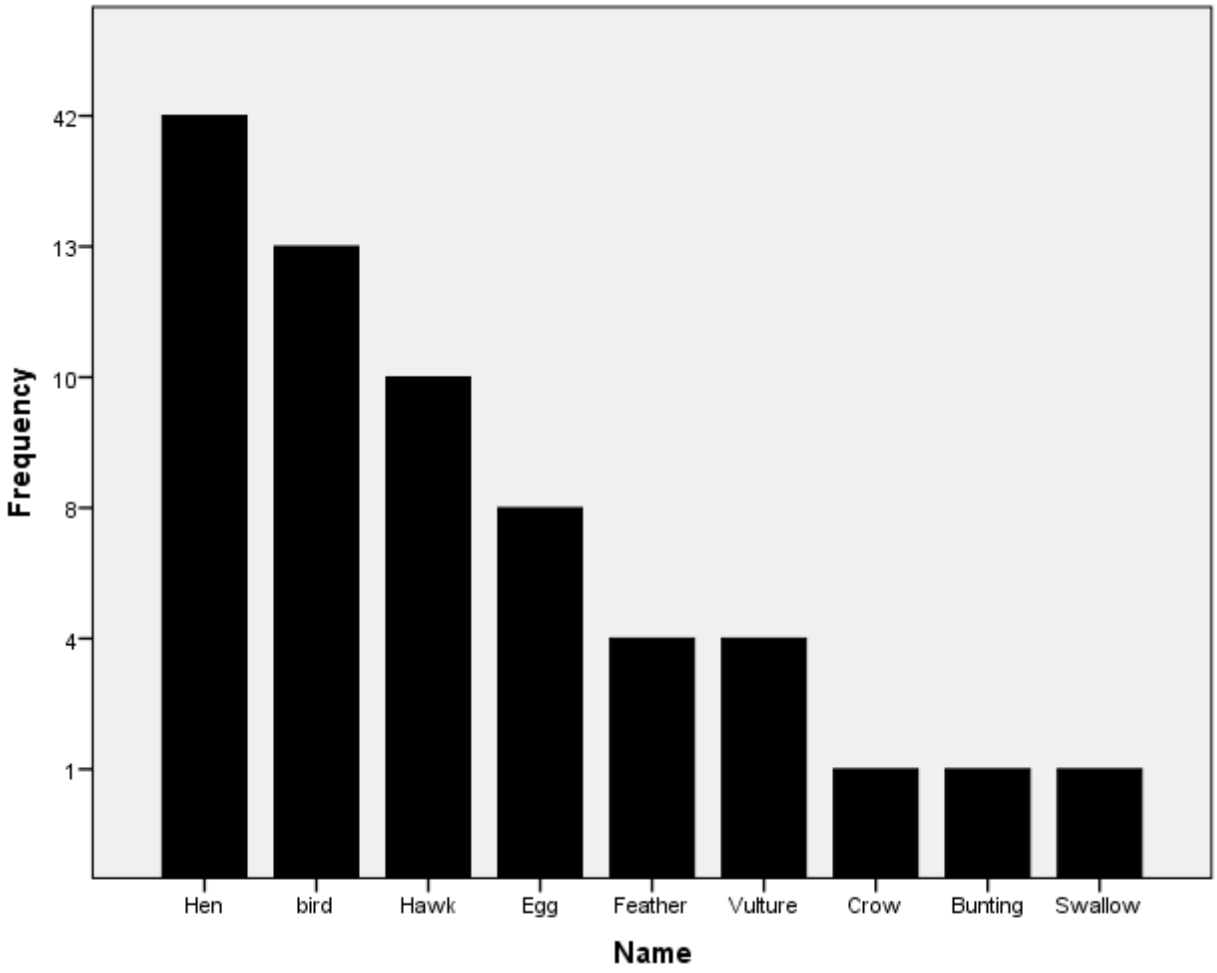

Figure 4.9: Graph Showing the Types and frequency of Birds/Bird Material Mentions in the 1001 Mushere Proverbs

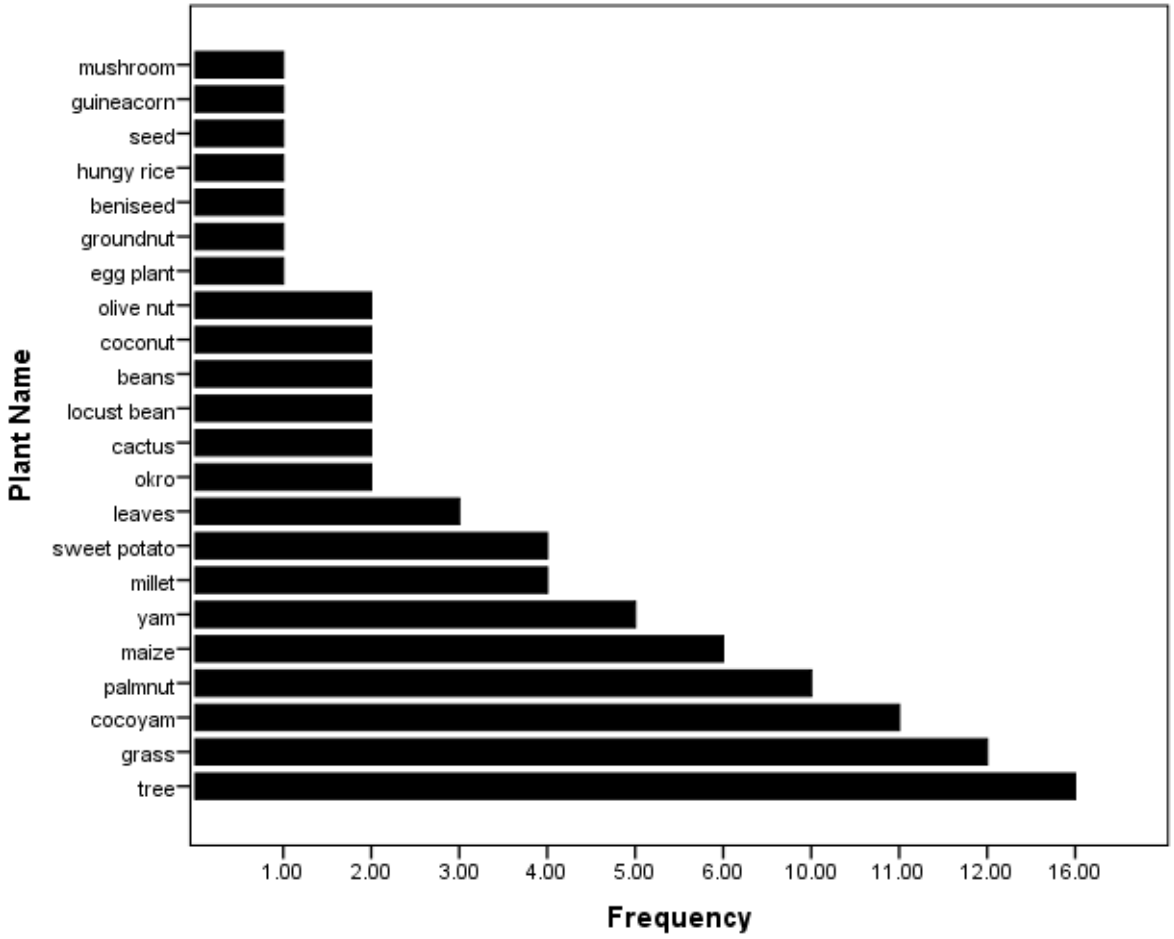

Figure 4.10: Graph Showing the Number and Types of Plants Mentioned In the 1001 Mushere Idioms and Proverbs

4.3.6 Comparison of Birds (and others) in Mupun, Mwaghavul And Ngas Language Dictionaries

In the Mupun dictionary, eighty-seven species of animals were mentioned, out of which 22 (25%) were birds (10 specifics, 12 generics). These were the Vulture (there were five different names for this bird), Guineafowl, Cock, Kite, Cattle Egret, Bush fowl, Crowned Crane, Indigo finch, Doves, Duck, Weaverbird, Finches, Pied Crow, Woodpecker, Black-winged Oriole,

Stork, Hawk, Whydah, Black-bellied Bustard, Yellow Wagtail, Bird, Eagle. Mammals, 28(32%), insects 20 (21%), fish, 2 (2%), amphibians, 2 (2%) and reptiles 7(8%).

There were in total, sixty-six plants mentioned in the Mupun dictionary. Specific tree species made up close to half of the plants mentioned 32(49%), specific shrubs 9 (14%) and many other edible and cash crops, weeds and leguminous plants making up less than 10% were mentioned.

The Mwaghavul dictionary revealed one hundred and fifty-four animal species. Birds made up 53 (34%) of the total. Twenty-four (16%) were specifics while 29 (19%) where generic terms for birds. The specific birds mentioned were Marabou Stork *Leptoptilos crumenifer*, Senegal Coucal *Centropus senegalensis*, African fish Eagle *Haliaeetus vocifer*, Red-billed Firefinch *Lagonosticta senegala,* Black- crowned Crane *Balearica pavonina*, Standard-winged Nightjar *Caprimulgus longipennis*, Abdim's Stork *Ciconia abdimii*, Northern Red Bishop *Euplectes franciscanus*, House Sparrow *Passer domesticus*, Village Weaver *Ploceus cucullatus*, Bateleur Eagle *Terathopius ecaudatus*, Hadada Ibis *Bostrychia hagedash*, Pied Crow *Corvus albus*, Grey Parrot *Psittacus erithacus*, Grey Heron *Ardea cinerea*, Yellow-billed Oxpecker *Buphagus africanus*, Black Kite *Milvus migrans*, Red-cheeked Cordon- bleu *Uraeginthus bengalus*, Helmeted Guineafowl *Numida meleagris*, Abyssinian Roller *Coracias abyssinicus*, African Paradise-flycatcher *Terpsiphone viridis*, Hamerkop *Scopus umbretta* and the Yellow-mantled Widowbird *Euplectes macroura*. The general terms were used for the following; Chicken/Cock, Kite, Duck, Kingfisher, Bird, Heron, Bustard, Eagle, Long-tailed birds, Black birds following cattle, Canary, Quail, Bush fowl, Pidgeon/Dove, Yellow birds, Lovebirds, Hornbills, Owls, Small Owls, Woodpecker, Sunbirds, Swallows, Wagtails, Water birds, Lark, Quelea and Cuckoo.

There were 35 (23%) insects mentioned some of which were specifics, mammals 34 (22%), Reptiles 9 (6%), fish (1%) and amphibians (1%). Birds therefore had the highest frequency in

the Mwaghavul dictionary, followed by mammals. Of interest, also is the fact that all the animal categories had quite several organisms recognised to the species level.

In total, 57 plant species were mentioned. They consisted of mainly crop plants 29 (51%), economic trees 8 (14%), grass (1%) and bamboo (1%) respectively.

The Ngas dictionary consisted of ninety animal counts out of which birds accounted for 20 (33%; 4 specifics, 11 generic, 5 unidentified). The specifics included Abdim's Stork, Abyssinian Roller, Helmeted Guineafowl and the Black-crowned Crane. The generics included vulture, chicken, hawk, falcon, kite, swallows, patridge, dove, crow, bird, ibis, and owl. Mammals accounted for 32 (36%), insects 19 (21%), amphibian (1%), reptiles 12 (13%; snake spp made up 5 (41%).

There were 80 plant counts out of which trees made up 36 (45%), weeds made up11 (14%), general reference to plant spp, 7 (9%), edible crops 25(31%) and bamboo (1%).

4.4 Discussion

4.4.1 Occupation, Gender, Age, Education and Environment

Most studies often find a negative correlation between years of formal schooling and TEK (e.g., Shen et al 2012; Zent 2001; Tibuhwa 2012; McCarter & Gavin 2011; Vandebroek et al 2011; Sinclair et al 2010; but see Reyes-Garcia et al 2010 for a positive correlation). but this result proved otherwise, respondents' level of literacy was not a significant factor in village adults local bird knowledge. I observed that although respondents claimed to be educated at various levels, their levels of comprehension and engagements with the tasks required did not seem to differ with those who claimed they were not formally educated. The fact that most of these seemingly educated respondents were village subsistence farmers might be an indication that their formal schooling might not have been very productive, regardless of the self-reported years spent schooling, which might account for their worldviews and perceptions, and so might explain the lack of significant difference in local knowledge.

Local, non-literate farmers were expected to be more knowledgeable because of their engagement in the fields where they naturally should encounter more birds and be interested in the potential roles that birds play in their occupation, such as being crop or livestock pests. It is not clear why farmers in Mushere did not exhibit such knowledge than non-farmers, but I argue that the domain of birds might not be an important or interesting cultural domain for the Mushere, for if it were, we should find more knowledge among farmers who spend most of their time out in the fields. In addition, farmers' lists should have crop/livestock pests as salient species, which was indeed the case, as their freelists revealed that their most salient species were those that affected them as farmers. *Kwom* (Double-spurred Francolin *Pternistis bicalcaratus*) was the most salient bird species for farmers, it was also the first bird species the Mushere mentioned to us on our first visit, asking of ways they could control the birds' menace

on their crops. It was therefore not surprising that farmers' lists had *kwom* as the most salient species.

Species that had cultural associations related to farming were next in importance in farmers' lists. For example, out of the fourteen culturally salient species on farmers' lists, eight are regarded as crop pests *(kwom Pternistis bicalcaratus, tidit* Estrildidae; *nilip* Northern red Bishop *Euplectes franciscanus, nanaan* Cinnamon-breasted Bunting *Emberiza tahapisi, njakan* Ardidae, *mbul* Columbidae, *gopeng* Stone Patridge *Ptilopacus petrosus and mbulkan* African Green-pigeon *Treron calvus*) while three attack their animals (*fyen* Shikra *Accipiter badius* or Grey Kestrel *Falco ardosiaceus* and *keleng* Black Kite *Milvus migrans, pukul* African Hawk Eagle *Aquila spilogaster). Ngoro* (Pied Crow *Corvus albus*) and *chilchap* (swallows and martins; Hirudinidae) both announce planting times, while *yiyi* is the dreaded Owl (Tytonidae) and *kuljem* is the Hamerkop *Scopus umbretta*, which they usually encounter around water bodies. Looking closely at their lists therefore reveals that birds which have direct significance to their lives as farmers constituted the culturally significant birds.

In most rural communities and cultures, gender roles differ between men and women, with men and boys performing the roles of farming and hunting etc., while women and girls care for the home and perform other domestic chores such as planting gardens (Bonta, 2003). These differential gender roles expose men and women to quite various parts of nature (e.g., Sinclair et al 2010; Moller et al 2004) and to different challenges, so that the two genders hold different sets of environmental knowledges (Reyes-Garcia et al 2010; Voeks 2007; Bonta 2003; Hoffman 2003; Turner et al 2000; Berlin et al 1981). The Mushere situation was no different. Men exhibited more traditional knowledge of folk names than women did, which suggests that women might be less interested in birds than men, or that due to the difference in roles, men tend to be exposed to birds and knowledgeable about them than women are because "… '*in spite of the fact that women have ample opportunity to observe birds on a casual basis, their*

roles do not train them to become 'bird watchers'" (Berlin et al, 1981). Another reason might be that the cultural relegation of women to the background has also affected their confidence and interest levels in the world around them making it hard for them to share their experiences or even dare to ask questions about their observations of the natural world, as learning in local contexts seemed to learner-initiated (Zent, 2009) due to curiosity or interest. It could also be a combination of these factors. Women held more in-depth knowledge of the ecological interactions of birds than men exhibited, as observed elsewhere by Bonta (2003). However, when I held focus meetings with both genders present, the women became more reserved and made little contribution even when I made efforts to encourage everyone to participate. Women became more silent in the presence of men, because they belong in a patriarchal culture where they are forbidden from being outspoken in the presence of men, and a subtler belief is that men know better. Thus, even when the men seemed not to mind women sharing their views, the women still could not contribute as much as they had when I held meetings with only women. This kind of deeply seated challenge might also have contributed to the women's interest in knowing about their environment (i.e. birds).

Before discussing the results on age, it is important to mention that both the young and older respondents were mostly unsure of their real age, even for those who seemed to have been born in the last two decades. The ages presented here therefore were mostly approximations, revealing the formal literacy condition in the study communities. The approximations may have also been biased because in villages, individuals usually look older relative to their city counterparts due to their rigorous lifestyles, further making it harder to determine an individual's true age.

Theoretically, older individuals are expected to hold more ethnobiological knowledge than younger generations, because it is assumed that knowledge accumulates as individuals get older (Berlin, 1992). As expected, older respondents (50 years and above) held more TEK than the

younger respondents did. Although most researchers have found this to be a common pattern, termed the 'wisdom of the elders' (Koster et al 2016), it has been argued that there could be other aspects to the relationship between knowledge and age other than the linear one mostly reported, suggesting that an individual's strength and agility in subsistence acquisition might also be a factor (e.g., Somnasang & Moreno-Black, 2000; Ladio & Lozada, 2004; Reyes-Garcia et al, 2005). In the case of the study population, older respondents may have been more knowledgeable because of accumulated experience about a different type of nature than that experienced by the present younger respondents, and a combination of a change in priorities and interests between the generations. It could reveal that since birds do not seem to account for most of the protein needs of the present Mushere, even among children who are major hunters of birds, there might be no need adapting such knowledge to foraging, (which would perhaps have encouraged more knowledge among the younger age groups), as such the knowledge might not be readily discussed or practiced in social settings, as taxonomic and utilitarian knowledge have been found to be inter-dependent to some extent (Zent 2009). One of the oldest respondents (over 80 years old) in the study was pleased about his participation in the research, according to him, it had challenged him to remember bird names he had not recalled in a long time and their cultural associations. He claimed to have lost most of the knowledge due to lack of use, as he was no longer strong enough to go to the fields or the forest, and hardly saw his grandchildren who live in the city, he missed the story-telling days and the songs which he had forgotten. Whether the knowledge he refers to would have been substantially more than what he shared remains unknown. It is important however to bear in mind that this is a 'snapshot' of the bird knowledge of Mushere people at a given time, and so we are faced with more questions than answers arising from these findings. The questions, which now need answering, are many and include; what was life like in the past for Mushere people both socio-cultural and economic? What are the ecological changes that have taken

place in the environment? What was the relationship of the older Mushere like with nature or was there ever a strong relationship between the Mushere and their environment? What are the changes at the family and community level that might be drivers of this loss? These might help us understand better the present state of the relationship between the Mushere and birds. In a similar study, (Zent 2009) reported findings on the plant knowledge of two different communities; one which had been influenced by Christian missionaries and was undergoing acculturation, and a more traditional community which had resisted such influences. He observed a comparable situation to my observations on the Mushere among the non-traditional community of Joti people. Their young adults exhibited an active de-learning phase, while the elders exhibited what he termed a static-learning phase i.e. the young adults held little local plant knowledge, while the elders were not increasing their knowledge. The reasons he suggested for these observations included:

1. Young adults were spending more time with their peers and less time with elders because of the modification of the environment which provided more safe spaces where they could interact without adult supervision and interference.
2. Individuals spending less time in traditional subsistence activities and instead utilizing such time to engage in other activities such as church events and attending school.
3. Attaching less significance to many of the wild resources they used to depend on as supplementary food and medicine and relying on the modern alternatives and agriculture
4. People were less concerned about local knowledge of plants because of the replacement of herbal medicine with modern pharmaceutical drugs.
5. Greater socio-economic value is attached to western ways of knowing especially among young adults who see it as an opportunity for a better life (higher status and material gains). These observations accurately describe the situation I observed in Mushere, but due to a lack of data on the ecological changes that have occurred, and information on the settlement history of the

Mushere in their present location, I am limited in making conclusive comparisons between the past and present situations.

Respondents living in the non-forested villages were more knowledgeable than those living close to the Dulu forest, rejecting the hypothesis that those living close to forest would hold more TEK. I propose two arguments in explaining this result. First, the respondents living in the non-forested villages did not show any ill-feelings towards the research, as they did not perceive any threats to their natural resource, unlike respondents living close to the forest. This might have caused them not to engage more with the research. Although my experiences working with them and building a strong relationship caused most of them to be more positive towards the research, there might have still been some individuals who still were not convinced, and it might have affected their output. Secondly, most of the respondents from the forested villages were not as literate as those from the non-forested communities, and since illiteracy levels usually affect how individuals comprehend issues, this might have affected their engagement with the research. Both assumptions would however need further verification, through research.

4.4.2 Methods of TEK Acquisition and Transmission

Oral transmission of knowledge, vertical and oblique transmissions were the predominant methods/modes of TEK acquisition and transmission reported in this study. These methods corresponded with the theoretical methods and modes of cultural acquisition and transmission of knowledge reported in literature (e.g., Cavalli-Sforza et al, 1982; Lozada & Ladio, 2006), especially for subsistent communities. TEK is usually handed down to younger generations by cultural transmission mainly through oral methods (Ng'weno 2010), observation of older adults, or through practice by working with elders i.e., experiential (Tidemann et al 2010; Sinclair et al 2010; Moller et al 2004; Berkes 1999). This was also the case reported at Mushere,

most respondents reported learning about birds through oral transmission, and few through personal observation and practice using methods such as parents telling them the name of a bird or its uses and cultural significance, or through a story or song, even though they had very limited stories and song to share in support of their claims, others reported learning from engaging in practices such as hunting birds. I observed that it was difficult for respondents to say how transmission occurred, and my local assistants and I had to try to break down what we meant so they could better comprehend. Most responses centred around individuals following their parents to the farm, or forest, or parents pointing out birds to an individual, or very rarely, someone would say I learnt by picking an interest in birds myself. This kind of observations were also reported by Zent (2009) in his work among local Indian communities in the Venezuelan Amazon, the Joti. In his study area, most respondents learned through oral transmission, observation and practice, and like the Mushere, were unable to explain how learning occurred, and the very thought of the question puzzled them. They only said how they took the children along with them on their camping or hunting activities (Zent 2009). He explained this to suggest that the local learning process occurs in an unconscious non-deliberate manner, with almost all respondents reporting having learned about birds at an early age (see Lozada et al, 2006)

Parents, especially fathers were mentioned as the main sources for TEK acquisition. This finding corresponds with similar findings elsewhere (Berkes 2012; Zent 2009; Hickey 2006; Mazzocchi 2006; Ohmagari & Berkes 1997). For wild plant knowledge, it has been reported elsewhere (Hewlett and Cavalier-Sforza 1986) that female family members are usually the main transmitters of such local knowledge since their roles as gatherers of family vegetables and plants makes them more knowledgeable about plants. Quinlan et al, (2016), Lozada et al, (2006), and Little & Lancy (2016) have cautioned on being careful in accepting such self-reported sources of learning, as individuals are prone to mentioning parents when asked how

they learn because that seems to be the logical and most convenient answer, especially when, as noted above, learning occurs unconsciously. The implication for the reported form of transmission (vertical), and mode of transmission (oral) as observed by Cavalli-Sforza et al, (1982) and Hewlett & Cavalli-Sforza (1986), is that due to the conservative nature of vertical transmission, it hinders innovation in the population where it is the predominant method, while oral tradition is vulnerable to decay and transformation mainly due to globalization (Lozada & Ladio, 2006). Other methods and modes of transfer and learning need to be in place to encourage an appreciation of bird knowledge in the local case of the Mushere.

4.4.3 Ecological Salience

The results of the salience revealed that the most abundant species (ecologically salient) were also the most culturally salient species. I however observed that other less abundant, and more restricted species went unnamed and unidentified (see appendix 2 for the bird lists), and the species named and identified differed based on respondent's age, gender and occupation, as theoretically proposed. There were also some small, dull or colourful bird species which were common in the Mushere general area which were unknown by the Mushere, some they claimed to see around, but had no known names for them. Perhaps, unimportant species are those which do not serve subsistence values or any practical cultural value, whether positive or negative. Hunn (1982), and others (e.g., Berlin 1973) argued that western intellectualist have reduced such observations among local folks to mean that they only consider an item or species important if it has utilitarian value, when in fact, most local people are practical, and their knowledge is usually applied ethnobiological knowledge, they are not intellectuals interested in theory. These differences should be appreciated and should direct discussions around their so-called interest or disinterest in different domains of knowledge. An example is Ellen's (1993) observation of the Naulu people of the coastal lowland forest of Seram who could not

offer names and ecological information on frogs because frogs were a culturally *unimportant* domain, but had extensive knowledge in other relevant aspects of folk biology.

In Hunn's observation, such salient species may differ for men and women. My results however did not follow this pattern. There was much overlap in the salient species of men and women. The major difference being in the order and frequency in which men and women mentioned the bird species. It should also be noted that there was a lengthy list of other less salient bird species, which were mentioned by one or two respondents in both men and women's lists did not make the cut-off score for salience. It therefore seems that for the present Mushere surveyed, ecological salience is a major factor in their knowledge and naming of birds.

4.4.4 Drivers of TEK Loss

Although the Mushere did not exhibit vast TEK of birds, drivers of TEK loss reported corresponded to those reported for local communities elsewhere (e.g., Tsimane Reyes-Garcia et al 2013; Gomez-Baggethun & Reyes-Garcia 2013-Tsimane and Donana; Mccarter & Garvin 2011; Zent 2009; Hickey 2006- Vanuatu; Turner et al 2000; Brookman et al 1997-Aborigines; Anderson 1996) including a lack of interest in nature, lack of cultural transmission from older adults to the younger generation, socio-economic changes such as change from local to global market economy, acculturation and formal education and influence of modern religion were some of the reported drivers of TEK loss. These factors work either in isolation or as a complex to erode TEK in cultures and societies. McCarter & Gavin (2014), and Reyes-Garcia et al (2007) also noted that drivers of TEK loss work interactively and as a complex, and they vary in space and between TEK domains (Godoy et al 2007- market economies and TEK loss, Quinlan & Quinlan 2007; Reyes-Garcia et al 2005- Educational attainment and TEK Loss).

However, measuring the effect of each factor on Mushere people's TEK, and how they interact to cause TEK loss was beyond the scope of this work, but will be an interesting aspect for further research in the future.

4.4.5 Perceptions and Valuing of TEK

I did not limit people's perceptions of TEK to birds when respondents were asked about their perceptions and valuing of TEK. I made it clear to them that it included every local knowledge they held of their environment. The Mushere's predominant perceptions of TEK was that it was eroding, while a few others perceived it to be increasing, although they could not justify why they thought so. Still few others perceived that it was still actively being transmitted especially to the younger generations. When asked how they thought this was happening, most respondents would consider it an amusing question, and then after some thoughts, explain how they try to encourage their children and young adults to be interested in nature by taking them along to the fields, and by sharing their local knowledge with them. Most respondents however talked more about their plant knowledge, none specifically referred to birds without being guided in that direction by the researcher, or my local assistants. Even on local knowledge of plants, they shared that only few knowledgeable people held such knowledge, and it was kept a secret shared only with selected few who were either apprentices or family members. Almost all respondents perceived TEK as a highly valuable resource, even in the present generation. The predominant perception was that TEK was important for the preservation of their traditional knowledge and culture, not restricting their responses to bird knowledge. The second important reason why they perceived TEK as valuable was because they needed to transmit the knowledge to future generations of Mushere. Lastly, they thought it valuable because it will help their future generations to know the place of birds in the Mushere culture.

However, six respondents perceived that TEK was no longer needed in the present generation because it has become obsolete and cannot help in meeting the present socio-economic challenges that people face daily. Thinking highly of TEK among the Mushere is a positive indication that where such knowledge exists, they would be glad to have it appreciated and incorporated into a working framework for the conservation of the forest.

These responses had a central theme: the valuing of tradition and culture. Care of the land and its biodiversity for the sake of future generations seems to be an important attribute to local people (Turner et al 2000; Houde 2007). TEK is important as a form of cultural identity, and the Mushere recognized that. I therefore argue that any conservation project among the Mushere might succeed if we recognize these aspects that matter to the people and emphasize them in our approach. For example, drawing upon their desire to pass on their heritage to subsequent generations, we could engage them in a moral dialogue on their responsibility to future generations in ensuring the sustainability of the forest biodiversity, and the negative effects on the environment caused by over-exploitation of the forests' resources. This could appeal to their consciences and serve as a motivation to take active measures in mitigating the on-going destruction of the forest. In fact, conservation itself has been recognized as a moral, emotional, and even spiritual issue (Anderson 1996; Hunn 2004). As Hunn (2014) argued, '*we should not expect people to conserve biodiversity for its own sake... our most intense emotional engagements will be with particular animals, plants and the landscape*' people will conserve only what they think is important to them (Stoke 2007). We will need to find what aspects of the natural environment appeals most to the Mushere and emphasize that otherwise, it will be almost impossible to get them to sacrifice their short-term interests for long-term benefits as is common with humanity (Anderson 1996).

Suggestions for the acquisition, retention and transmission of TEK included some practical activities that can be incorporated in the conservation activities for the Mushere project such

as educational outreaches (organizing outdoor nature events such as bird watching, organizing school outreaches to nature, and the documentation of TEK that is part of this thesis). Other suggestions proffered could be incorporated in partnership with the locals such as putting together existing local bird stories to be taught in Mushere to children. I found the suggestions to be highly informative and I hope that EDEN could work with these suggestions in the development of its Mushere conservation project.

Overall, the Mushere reported an appreciation for TEK, even though the reasons for such valuing had little or nothing to do with the preservation or conservation of the biodiversity in this case birds. However, in their responses, there is hope that using what they have and where they are now, we can start to engage with them from those perspectives and hopefully, we will get more of their attention to do conservation work with them.

4.4.6 Language and Vocabulary

The results revealed that the category, domestic chicken (*Gallus gallus*) was the most mentioned category in Mushere, along with eggs and feathers, which were even mentioned more than wild bird species. Hawks, which predates on chicks were also mentioned more than most other wild bird species, suggesting the importance of utilization in the naming of birds to the Mushere. The other four wild species mentioned (Vulture Accipritidae, Pied Crow *Covus albus,* Cinnamon-breasted Bunting *Emberiza tahapisi* & Swallows Hirudinidae) are closely associated with human settlements, and as will be shown a later chapter, are used in folklore and song, and associated with some cultural events. An important observation is the Cinnamon-breasted Bunting *Emberiza tahapisi* which seems to occur in Mushere memory and culture, because they associate its black and white stripped head-design with the braids of women. Likewise, the Pied Crow is mentioned not because of its ecological importance as a carrion eater, but because of the white around its neck, which goes with the proverb ‘like

father like son' (literal translation from Mushere), referring to the young birds and their parents having the white 'collar'.

An analysis of the animals mentioned revealed a similar pattern to birds. Domestic animals and those that cause different levels of threat or harm appeared to be more salient, while monkeys and baboons which are usually hunted for food and attack crops, appeared to also be salient. It seems safe therefore to conclude that utilization seems the predominant determinant of Mushere knowledge and naming of organisms.

In addition, the results from the plant analysis was not different. The category 'grasses' useful as livestock feeds and material for housing etc, was referenced many times, although no mention was made of any specific grass species. Cocoyam which is grown locally as a staple food, palm nuts for making oil, and their fronds for making brooms were also high on the list, further revealing the importance of utilization in cultural salience. A dictionary of words should reveal important plant groups in the language based on how often reference is made of them in daily usage and conversation.

In comparing knowledge of plants, animals and birds in Mushere, this analysis suggests that birds might not feature prominently in the Mushere culture, although they seem to be more recognized than other animal categories other than dogs, because they ranked second to dogs in frequency of mention in the reference document, but this suggestion will require further verification.

Compared to the Mushere, the Mupun, Mwaghavul and Ngas languages were richer in their naming of birds, which suggests a deeper knowledge of birds, plants and animals as evidenced by the more number of specific birds referred to in their dictionary, and the overall number of times birds appeared in the dictionary relative to other animals except mammals.

It is hard to understand the reasons behind these observations, mainly due to two reasons: Firstly, I do not know the methods used in data collection for the three dictionaries, but the author of the Mwaghavul dictionary (Roger Blench,) in addition to being a linguist, is also interested in ethnoscience (www.rogerblech.info), and was careful to include these categories in his work (He categorized the contents of the dictionary into plants/animals/birds). The other two dictionaries Mupun and Ngas were based strictly on Linguistic analysis of words. It is therefore important to bear this in mind in the interpretation of the results. Secondly, the Mushere document consulted (Lyang Lu: one thousand and one Mushere proverbs and idioms) and the dictionaries for the other languages were two dissimilar materials collected for very different purposes. These might be reasons for biases in the comparison. Despite these reasons, the analysis has given an idea of the place of birds in Mushere language, relative to other neighbours in the area.

4.4.7 Conservation Implication of Findings

Although TEK is usually localized and adapted to a specific place, the findings of this study revealed that cultural transmission occurs in similar ways in local cultures. Oral tradition, observation, and practical engagements in everyday activities and routines enable individuals to acquire TEK in different ways depending on their gender, and other factors which social anthropologists and ethnobiologists have identified. One key contribution from this study was the finding that education does not always lead to TEK loss, TEK can only be affected by an individual's education where such knowledge exists and is a relevant cultural domain which is being disregarded because of several modern factors such as habitat modification or loss, and globalization. Secondly, the results of this study have revealed the important role that interest in nature or a domain plays in cultural transmission of ethnobiological knowledge. Any domain that is not culturally significant, nor of interest to a people might not receive attention and

detailed observations. The importance of ecological salience as well as cultural utilization has also been strengthened by the findings of this study. Thirdly, the results on the importance of a biological domain as reflected in language has provided a stronger support for the theory on encapsulation of important biological domains in language, and finally, the perceptions study reflected the understanding of changes to the natural, socioeconomic and cultural environments by the locals, and further agreed with previous findings on local perceptions of TEK.

From a conservation perspective, these results revealed the challenges that conservation in Mushere might face, considering the local bird knowledge in Mushere. The report that oral tradition and vertical transmission were the methods of transfer was an important finding in this study, as it shows how different methods of learning and transfer affects the preservation of TEK. TEK is secured in place, as a result, changes to the environment affects not only the biodiversity, but the stories, language, songs, people, and the traditions (cultural heritage) which were built around it also get lost (Houde 2007). There is a need for the appreciation of language and culture in dealing with the local people by conservation practitioners. Also, the observation that knowledge of forest-dwelling species seemed to be either absent from the cultural mind or lost, suggested an elevated level of degradation of the Dulu forest implying that the forest has been greatly degraded, such that forest birds are lost along with the loss of knowledge on such birds. In all our exploratory visits to the forest, we have not recorded any forest specialist except the Green Turaco *Tauraco persa*. This poses a challenge to the proposed conservation plan of the forest: There must be a forest restoration plan if the forest is to return to a state where all types of birds inhabit it. Also, the awareness of the factors driving the attitudes and behaviour of the Mushere to nature such as the socio-economic and cultural changes need to be fully comprehended and the effect of each weighed to appreciate fully the context of the relationship of the Mushere and the environment. Ways of working to encourage

conservation and bird appreciation must be structured to take into cognisance the totality of the effects of these drivers on the lives of the Mushere.

In conclusion, this chapter has contributed evidence to discussions on the theory of the cultural transmission of TEK, by providing empirical evidence in support of how these factors are important in the transmission of cultural knowledge. It has further shed light on the role of language in the transmission and preservation of cultural knowledge, and the role of cultural significant domains in the acquisition and transfer of ethnobiological knowledge. The negative association of education with TEK was not observed in this study

CHAPTER FIVE

Mushere Urban-Dwellers Knowledge

Researcher with Urban-Resident Mushere Men and Women

3/8/14. Photo Credit: Moses Daben

Abstract

The study was aimed at surveying the urban Mushere population and comparing the various aspects of their TEK to the village population, mainly to determine the effect of urbanization on TEK. Variables considered were age, occupation, education, childhood environment and years spent in the city, sources of TEK acquisition and method of TEK transmission. Methods included the use of semi-structured questionnaire and free-listing exercises. Generalized linear model (GLM) was used in data analysis, together with thematic content analysis.

Results revealed that none of the variables tested were statistically significant in determining the TEK of respondents. However, a pooled data of village and city respondents to compare the effects of age, occupation, gender and education and environment showed that the variables environment (village/urban), gender, and occupation were statistically significant. Bird knowledge of urban respondents was significantly more than villagers ($p < 0.05$), men held more knowledge in both situations ($p \leq 0.001$), and other categories held more knowledge than other farmers ($p < 0.05$). Transmission of TEK was mainly through oral means, while acquisition was mainly oblique. Comparing both data sets (village/urban) revealed that transmission was mainly vertical, while the most reported method of learning was oral transmission Finally, city respondents shared similar culturally salient bird species with the villagers. I conclude that urbanization does not seem to have affected the bird knowledge of the city-dwelling Mushere respondents significantly relative to the villagers' knowledge, and that knowledge already gained in childhood seemed to be the main determinant of their TEK.

Introduction

Several factors have been linked to TEK loss, one of which is urbanization. In this chapter, the effect of urbanization, among other factors was investigated. Ethnobiologists and anthropologists interested in TEK have linked urbanization to loss of culture (Wahab et al, 2012) and TEK because of acculturation (Beals, 1951; Gomez-Baggethun & Reyes-Garcia, 2013), suggesting that urbanization has a negative effect on TEK (Quinlan & Quinlan 2007; Inglehart & Baker 2000; Naofusa 1999), although Teshome-Bahiru (2005) reported both positive and negative effects of urbanization on traditional healers in Ethiopia. Most of these studies are based on the plant or medicinal knowledge of local people, which are said to be vulnerable to erosion and change because of urbanization/globalization (Lozada et al, 2006). For instance, Reyes-Garcia et al (2013), found changes in plant TEK of the Tsimane living closer to urban areas, than their counterparts in more rural communities. Similarly, Turner & Turner (2008), found that urbanization played a role in the loss of plant TEK among British Columbians. However, Gomez-Baggethun & Reyes-Garcia, (2013), and Reyes-Garcia et al (2013), argue that the dynamic nature of TEK, means that while it may indeed be getting lost, urbanization may be leading to a new adapted knowledge suitable for life in a rapidly changing environment, while Pieroni et al (2004), Gomez-Baggethun et al (2010), Olsson & Folke (2001) and Calvet-Mir et al (2011) have found evidence of TEK persistence in both developed and developing areas, despite changes due to urbanization. They argue that we need to instead understand the processes involved in TEK loss. Knowledge which locals perceive as obsolete, and no longer useful in the present socioecological and cultural context have been seen to be replaced with new knowledge, revealing the dynamic and adaptable nature of traditional knowledge (Gomez-Bagghetun et al, 2013).

The conceptual and theoretical frameworks for this chapter are based on the cultural transmission theory (Cavalli-Sforza, 1982), as such, understanding factors which affect transmission of knowledge i.e., age, gender, education, occupation, urbanization (Lozada et al, 2006; Begossi et al 2002; Garro 1986), and patterns of knowledge transmission including vertical, horizontal and oblique patterns of transmission; oral, observation, practical methods of knowledge acquisition (Lozada et al, 2006; Boesch & Tomasello, 1998; Cavalli-Sforza et al, 1982), formed the objectives of the study. From this theoretical viewpoint, I wanted to investigate the influence of urbanization on TEK of city-dwelling Mushere adults, by measuring variables such as length of stay in the city, frequency of visits to villages, and an individual's childhood environment among the urban dwelling population and relate their knowledge to the village population. Theoretically, urban dwellers should hold less TEK because of their environment which does not predispose them to the use of TEK. Alternatively, if bird knowledge is not a cultural domain, then both city and rural respondents will not differ in their TEK. A second objective was to find out the culturally salient bird species of the respondents and compare that with the results from the villages.

5.1 Methods

5.1.1 Urbanization and Participant Selection Methods

Urbanization was defined as the 'act of taking on the characteristics of a city', while an urban area is 'an area of high human population density, and infrastructure of built environment' (www.wikipedia.org, 2017)

Participants were selected using a non-random, purposive sampling method. Selection of participants was not restricted to the six selected study sites, as this would have further limited the sample size. Selection was achieved through the help of local informants who

aided in the process of initial rapport-building and consent seeking from community leaders of the city-residents.

I visited the men and women on two separate days (Sundays) in 2014 when they were each having their usual monthly tribal meetings to conduct the interviews and free-listing exercises. The process involved an introductory session where the researcher was introduced to the groups by the local research assistants, followed by an explanation of the research objectives and data collection methods. Participants were allowed approximately 60 minutes, time taken to round up their meeting, to reflect and decide on whether to participate in the exercise or decline.

5.1.2 Sampling of Male Respondents

A total of twenty-five men were present at the meeting, twenty-two were willing to participate, while three declined. A further four asked to go home with their forms to be filled by proxy. They were advised to carry out the naming tasks independently, between 15-20 minutes. Because all respondents who filled out their forms and free listed on site were literate, they were given between 15-20 minutes each to do their free-listing exercises and then subsequently to fill in questions that had to do with the socio-demographic, ecological/cultural knowledge of birds and the conservation aspects of the research. Respondents were encouraged to carry out their individual exercises in isolation to avoid bias to the data. Eventually, only two individuals returned their completed forms, I therefore had a sample size of eighteen men in the final analysis.

5.1.3 Sampling of Female Respondents.

A similar approach to men was used in data collection, as explained above. There were more women in attendance at the meeting (n=30), but ten were non-Mushere women, married to Mushere men, and so were not qualified for inclusion. Further, of the remaining twenty

women, five declined participation because they had no knowledge of birds to share. Another ten women chose to fill their forms by proxy, and only five forms were eventually returned, such that the final sample size for women was ten.

Likely sources of bias which may have arisen from this method includes the omission of potential Mushere men and women who do not attend meetings. This could not however be controlled because there was no detailed data on such likely individuals and where they could be in the city. Another likely bias could be that respondents who completed the task by proxy may not have done so independently, but the researcher has no reason to doubt the integrity of the respondents, as there was no obvious difference in the results to suggest that.

5.2 Data Analysis

Data were entered an excel spreadsheet, and subsequently analysed using SPSS statistical software version. A generalized linear mixed model (GLMM, main effects) was used to determine what factors were influential in determining the TEK of individuals, because such test statistics relates explanatory variables (age, gender, occupation, childhood environment, years in city) with response variable (number of bird names mentioned), and can describe patterns of the association. Age categories were grouped (based on social categorization) into young adults (18-29 years), middle-aged adults (30-49 years) and older adults (50 years-above). Educational category was grouped into two; educated and non-educated respondents, occupational categories were grouped into civil servants and others, while growing up environment was grouped into Mushere village and others (non-Mushere village). Furthermore, years spent in the city was grouped in the following; 1-10 years, 11-20 years, and > 20 years. All factors were grouped into few categories to minimize the confounding effects of unequal sample sizes. Basic descriptive statistics (frequencies and percentages) were used in analysing data on methods of TEK acquisition and transmission. Responses were grouped

into themes and coded prior to analysis. For sources of TEK acquisition, responses were classified into six themes according to conceptual framework categories for TEK acquisition into vertical transmission (i.e. father, mother, or both parents), oblique transmission (grandfather, grandmother or both), horizontal transmission (siblings, friends, i.e. peers) and unrelated others (teacher, community, etc). Some respondents reported learning from a combination of sources e.g., parents/peers (vertical/horizontal), parents/grandparents (vertical oblique). Methods of TEK transmission were also grouped into six, based on respondent's responses into oral transmission (word of mouth e.g., story, or instruction), observation (individual interest in observing birds), practice (hunting for birds), oral/observation (a combination of instruction/personal interest), oral/practice (instruction/hunting) and oral/observation/practice (a combination of three methods mentioned by an individual).

5.2.1 Freelists Data Analysis

Respondents' freelists were analysed using Anthropac software. The frequency of mention of an item, its position in the list relative to others, and its salience were calculated, and the results compared with the data from villagers.

5.3 Results

5.3.1 Data Distribution

Twenty-eight adult respondents were surveyed, 18 (64%) were men, while 10 (36 %) were women. Eight (28%) belonged to the age group 18-29 years, 17 (61 %) were between the ages 30-49 years, while 3 (11 %) belonged to the age group 50 years old and above. Sixteen (57 %) were civil servants, while 12 (43 %) made up the 'other' category which was made of students (3), farmer (1), business persons (8). For the education category, 27 (96 %) were educated

(primary, secondary and tertiary), only one respondent had no formal education. For years spent in the city, 7 (25 %) had spent between 1-10 years, 15 (54 %) spent between 11-20 years, and 6 (21 %) had spent above 20 years in the city. Likewise, 19 (68 %) of respondents grew up in a Mushere village, while 9 (32%) reported growing up in a non-Mushere environment.

5.3.2 Effects of Gender, Age, Occupation and Education And TEK

None of the factors gender, education, age, occupation and variables measuring the effect of urbanization (years spent in the city, and childhood environment were statistically significant table 5.1.

A pooled data of village and city to compare the effects of age, occupation, gender and education on both data sets showed that the variables environment (urban/village), gender, and occupation were statistically significant. Bird knowledge of urban respondents was significantly more than villagers ($p < 0.05$), men held more knowledge in both situations ($p \leq 0.001$), and farmers held more knowledge than other occupational types ($p < 0.05$). Age and education were not statistically significant factors ($p > 0.05$), table. 5.2.

Table 5.1: Generalized Linear Model Showing the Relationship between Independent Variables (age, gender, occupation, education and urbanization) to Bird Knowledge.

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test
			Wald-Chi-Square	df	Sig.
(Intercept)	10.000	5.9717	2.804	1	.094
[age=18-29]	-2.125	6.2493	.116	1	.734
[age=30-49]	-5.245	6.1249	.733	1	.392
[age=50-above]	0[a]	.	.	.	.
[Gender=men]	5.453	2.8430	3.678	1	.055
[Gender=women]	0[a]	.	.	.	.
[occupation=civ/ser]	-4.507	2.7783	2.631	1	.105
[occupation=others]	0[a]	.	.	.	.
[childhood environ=Mushere]	3.890	3.5327	1.212	1	.271
[childhood environ=other]	0[a]	.	.	.	.
[years city=1-10]	-3.105	4.0229	.596	1	.440
[years city=11-20]	1.850	3.2422	.326	1	.568
[years city=>20]	0[a]	.	.	.	.
[education=educate]	4.081	8.0276	.259	1	.611
[education=none]	0[a]	.	.	.	.
(Scale)	35.661[b]	9.5308			

a. Set to zero because this parameter is redundant.

b. Maximum likelihood estimate.

Table 5.2: GLM Result of Village vs Urban respondents' knowledge by age, gender, occupation, education.

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test
			Wald-Chi Square	df	Sig.
(Intercept)	10.220	2.2459	20.707	1	.000
[environ=vil]	-2.456	1.1259	4.758	1	.029
[environ=urban]	0[a]	.	.	.	.
[age=18-29]	-1.490	1.4603	1.041	1	.308
[age=30-49]	.107	1.4379	.006	1	.941
[age=50-above]	0[a]	.	.	.	.
[gender=men]	3.230	.9611	11.297	1	.001
[gender=women]	0[a]	.	.	.	.
[educat=educated]	1.285	2.0982	.375	1	.540
[educat=none]	0[a]	.	.	.	.
[occupat=farmer]	2.114	.9234	5.243	1	.022
[occupat=others]	0[a]	.	.	.	.
(Scale)	25.379[b]	3.0553			

a. Set to zero because this parameter is redundant.

b. Maximum likelihood estimate.

Respondents gave several reasons why they migrated to the city, these were grouped into six categories fig. 5.1

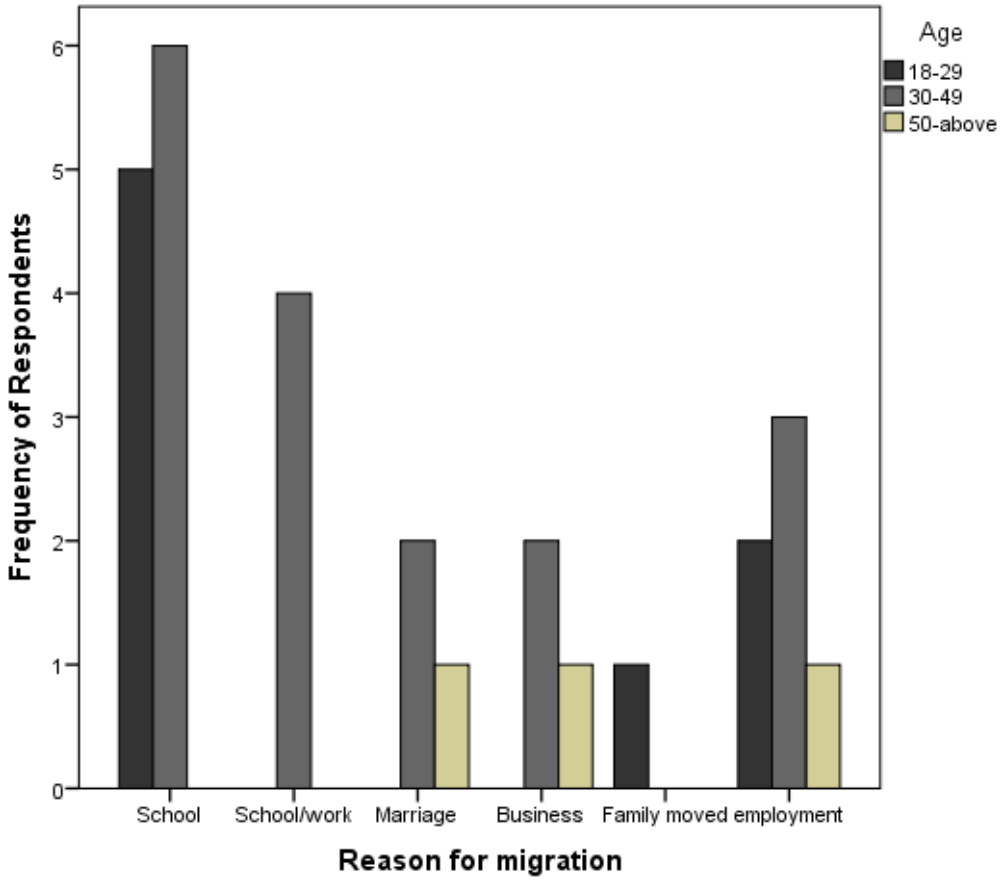

Figure 5.1: Respondents' Self-Report on Reason(s) for Migrating to the City

5.3.3 Sources of TEK Acquisition/Transmission Methods

The predominantly reported source of TEK acquisition was through oblique transmission (Grandparents; 11 (39 %), and vertical (Parents 8 (28.6%). Other sources are summarized in fig. 5.2. When both village and urban data was analysed, the predominant source of TEK acquisition was through vertical means (parents), followed by oblique (grandparents). The difference in acquisition sources was statistically significant between urban and rural respondents ($\chi^2 = 56.73$, df = 5, $p < 0.001$), with urban respondents mentioning oblique transmission more, while rural respondents mentioned vertical transmission more (fig. 5.4).

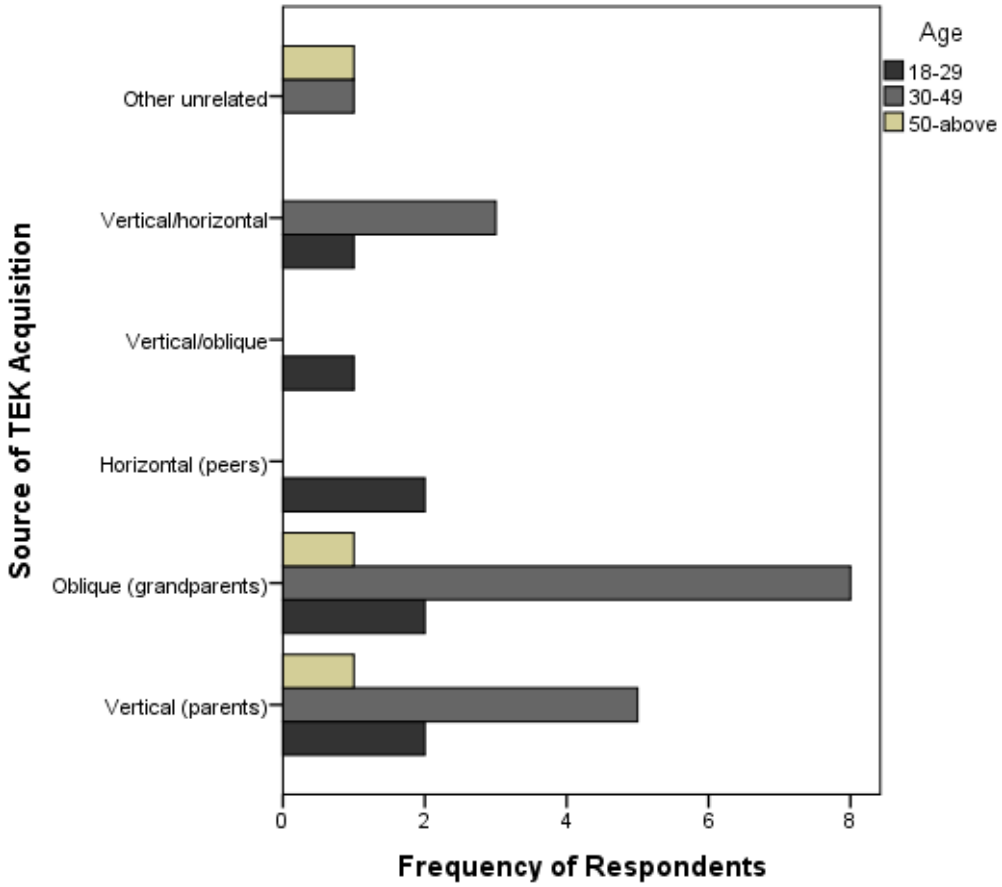

Figure 5.2: Self-Reported Sources of TEK Acquisition by Age

On the methods of TEK transmission, half of respondents 14 (50%), reported learning through oral transmission. Figure 5.3 gives a summary of the other methods of TEK transmission. When comparing methods of rural versus urban respondents, 46 % (village=105, urban=13) reported oral method of transmission, 5 % (village=11, urban = 2) reported observation. These reported methods of TEK transmission between the rural and urban respondents was statistically different ($\chi^2 = 16.48$, df = 6, $p < 0.05$), Figure 5.5 gives a summary of the results.

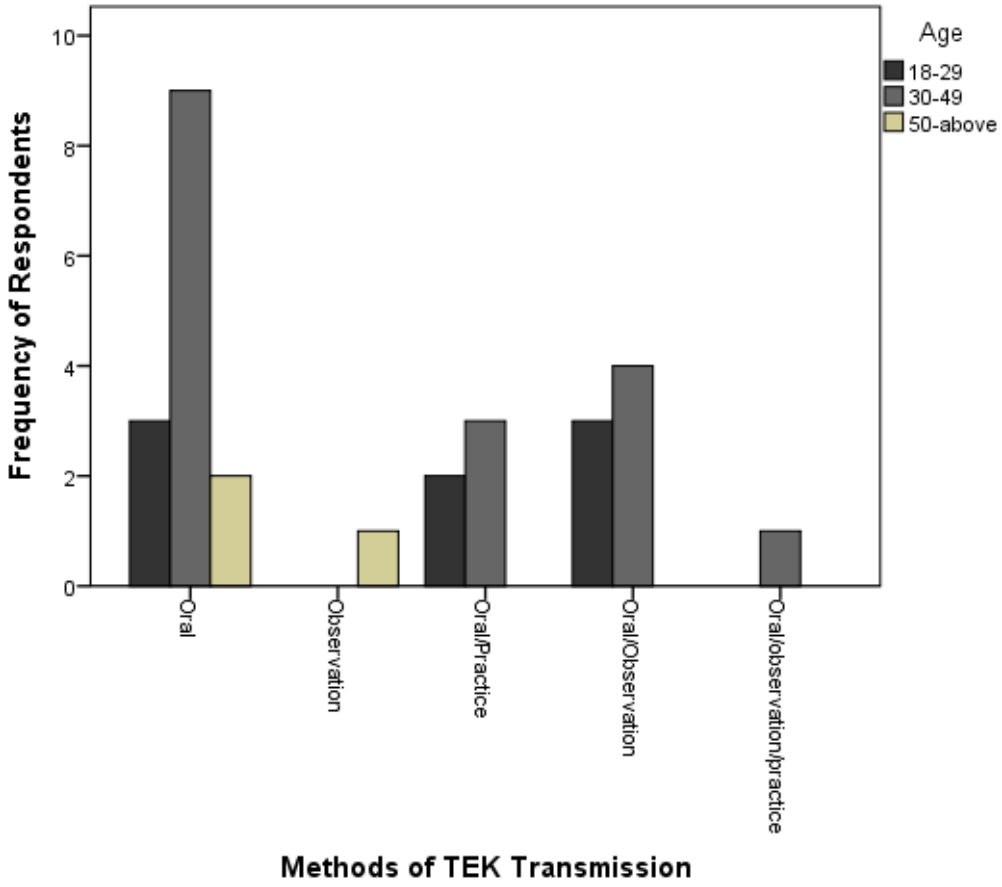

Figure 5.3: Self-Reported Methods of TEK Transmission

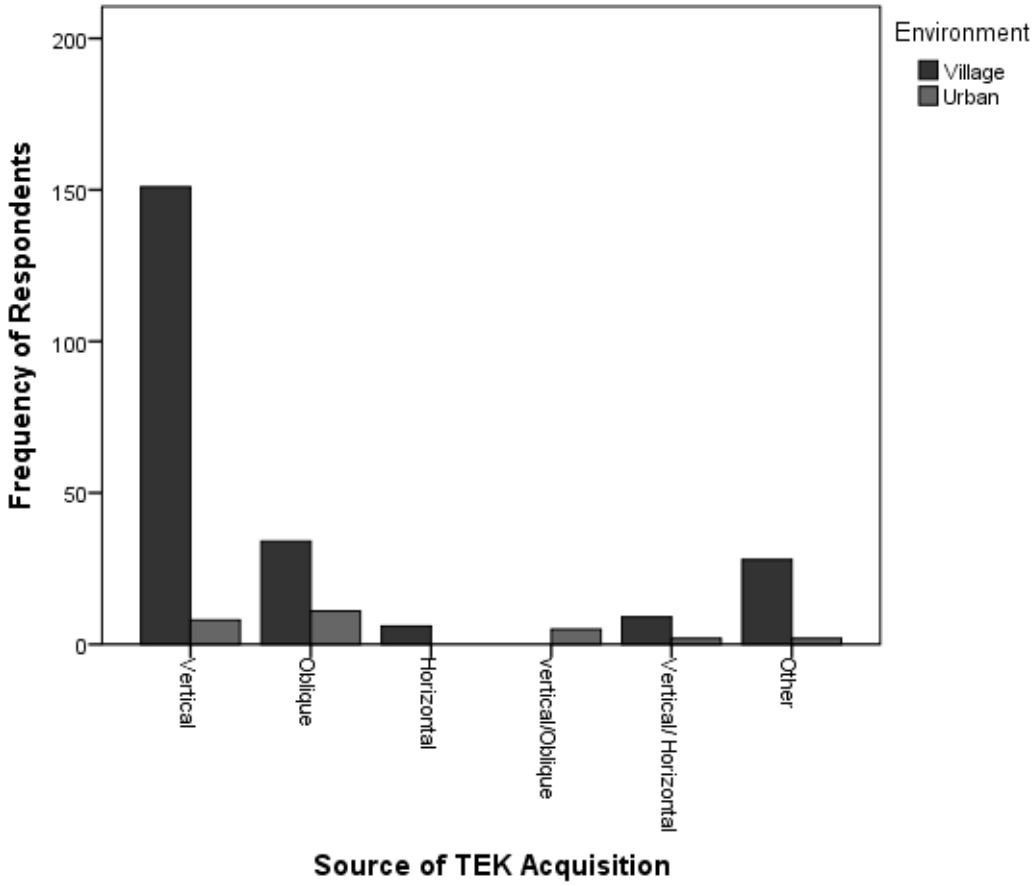

Figure 5.4: Sources of TEK Acquisition of Village and Urban respondents

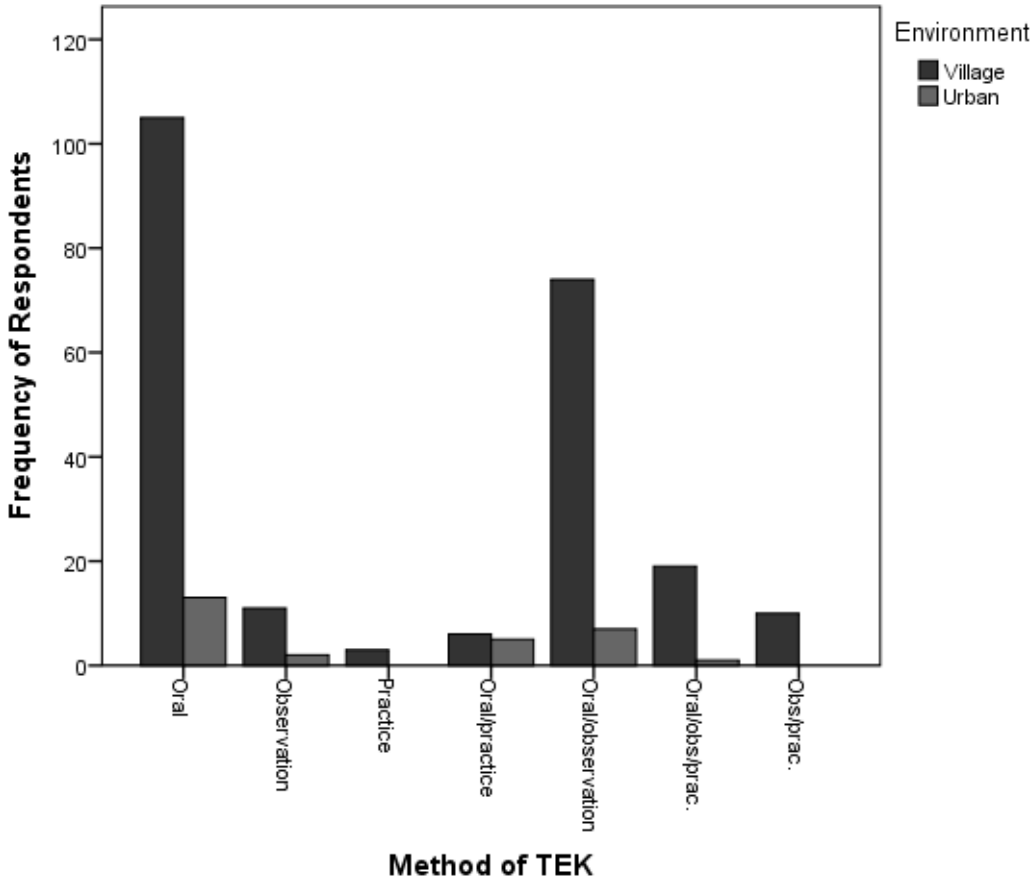

Figure 5.5: Methods of TEK Transmission of Village and Urban Respondents.

5.3.4 Free-lists Result

Culturally salient species/groups from urban-dwelling respondents (18) were like the villagers' list. The difference in frequency of mention was not statistically significant (Mann-Whitney U = 84.00, SE= 27.64, $p > 0.05$). The difference in the average rank of each item on the lists of each gender was however statistically significant (Mann-Whitney U = 47.00, SE = 27.66, $p \leq 0.001$). Figure 5.6 shows the frequency (%) of mention of culturally salient birds for both urban and village respondents. *Tidit* (Estrildides) were the most culturally salient group having the highest frequency and saliency score. This was followed by the two-raptor species *keleng* (Shikra Accipritidae) and *fyem* (Common Kestrel/Kestrel Grey Kestrel Accipritidae). Species considered culturally salient were cut-off at the 32.1 % frequency mark, beyond this point,

items mentioned were by one or two respondents (no cultural consensus) and were therefore not included in the overall results.

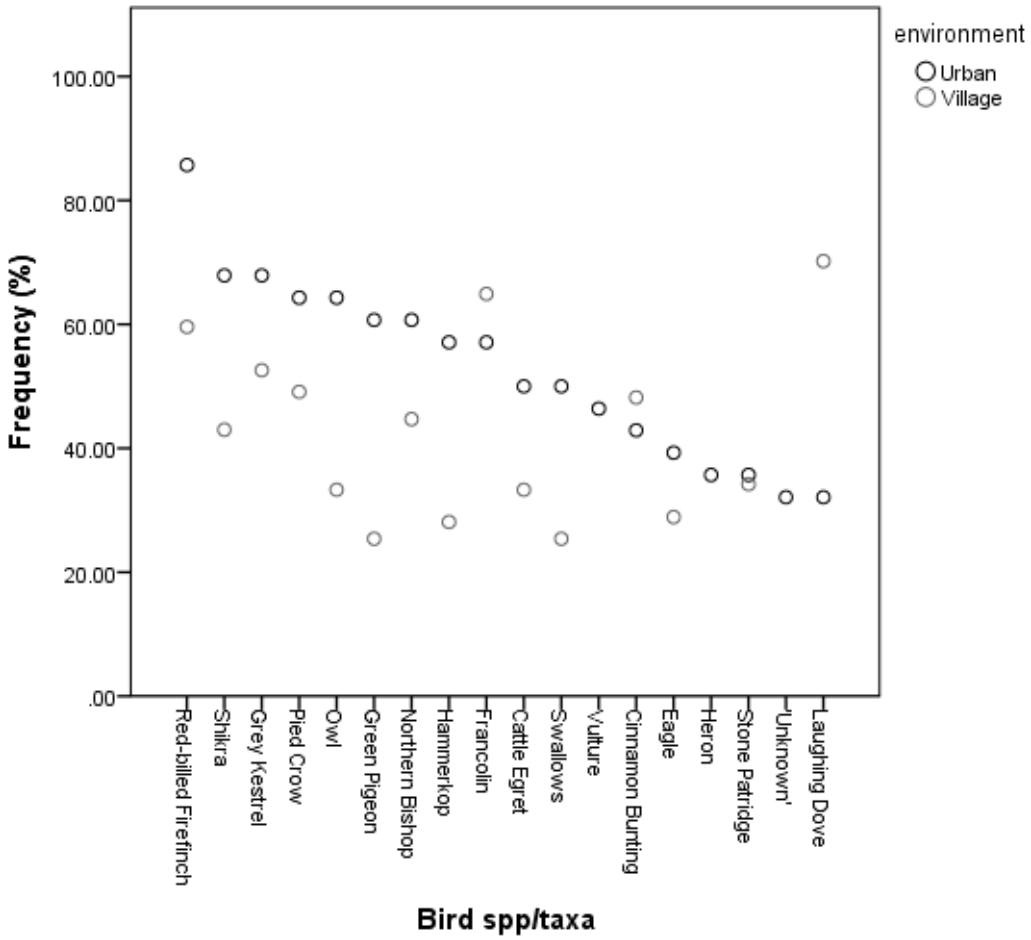

Figure 5.6: Graph Showing the Frequency of Mention of the Culturally Salient Species/Taxa Urban and Rural Respondents.

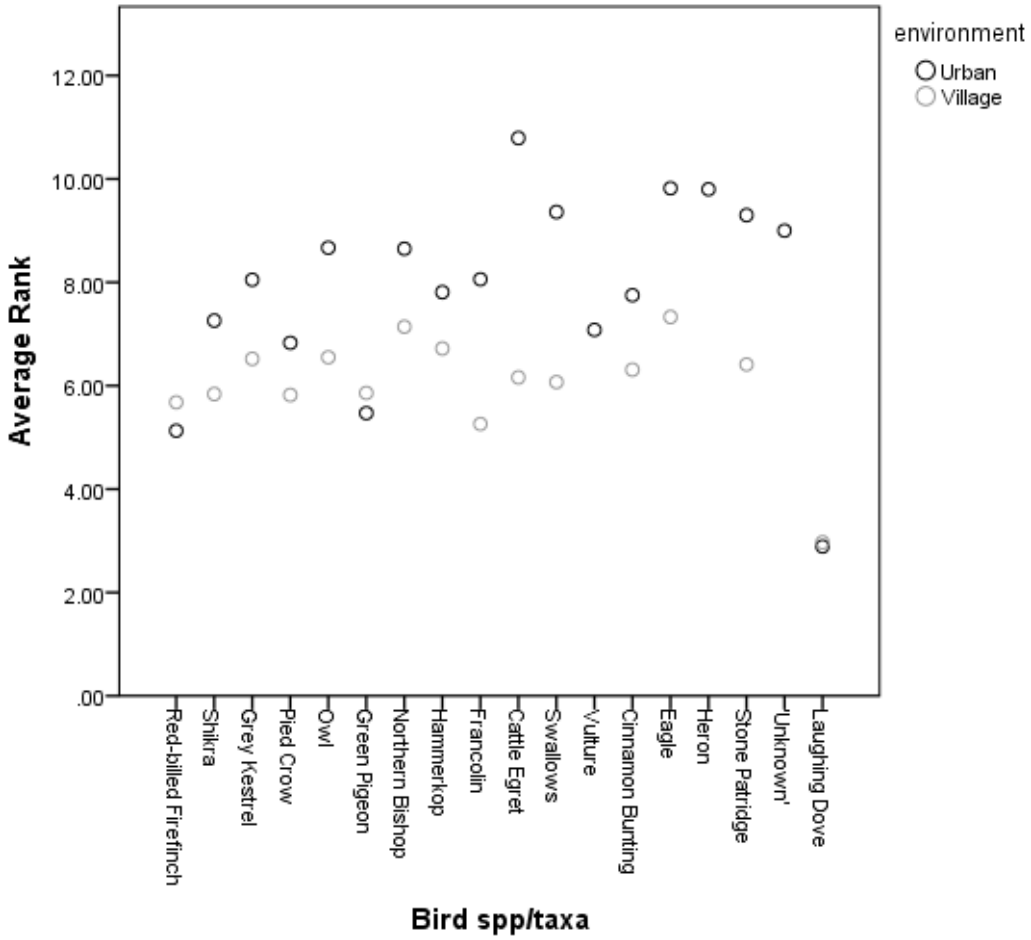

Figure 5.7: Graph Showing the Average Rank of the Culturally Salient Species/Taxa of Urban and Rural Respondents.

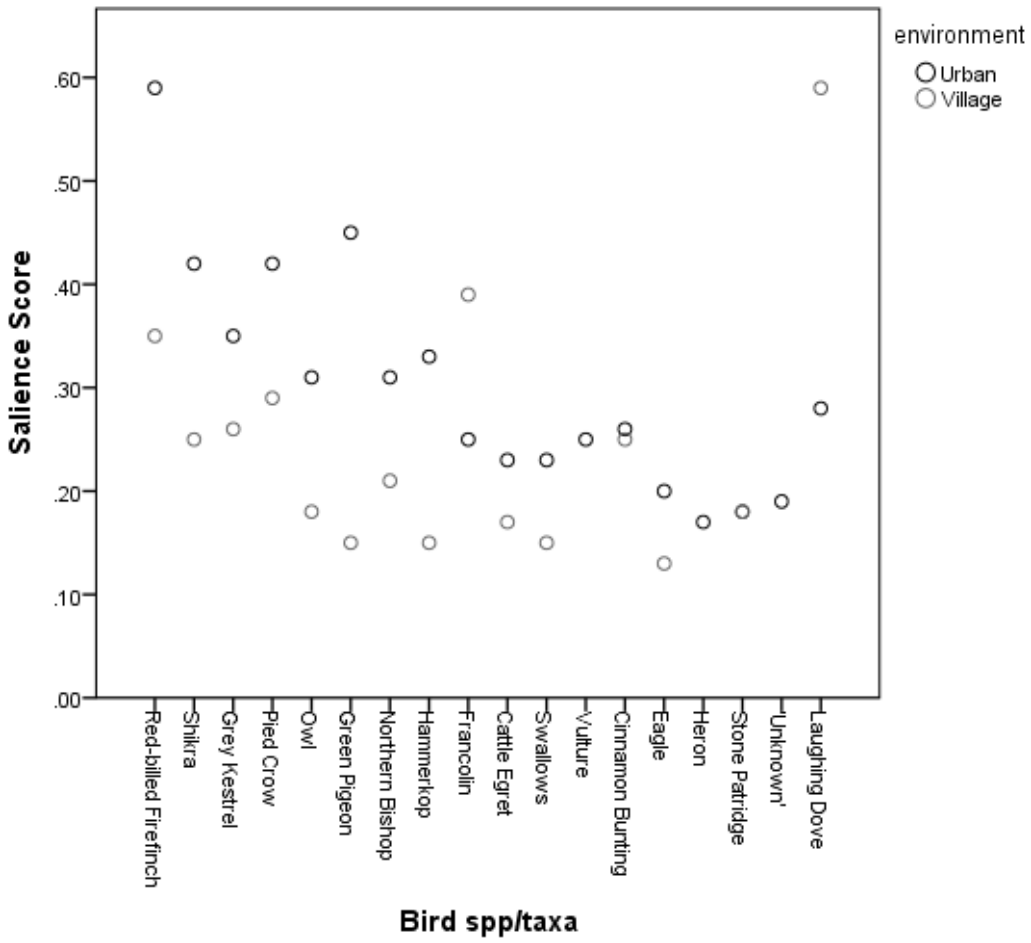

Figure 5.8: Graph Showing the Salience Scores of Culturally Salient Species/Taxa of Urban and Rural Respondents.

5.4 Discussion

5.4.1 Urbanization, Age, Occupation, Gender and Education

Like villagers, men in the city held more TEK than women did, and this has been discussed fully in Chapters five. Age, was not statistically significant among the urban population, like villagers. This might have been a result of the small sample size, which could confound the effect of age on knowledge, but results from the pooled data proved that age indeed might not be a significant factor. Occupation also had no statistically significant association with TEK among the city respondents, probably because they mostly possessed a similar level of

education (tertiary level). It however shows a statistically significant difference when the result is compared with that of the villagers, revealing that farmers had more knowledge of birds than other occupational categories.

Education remained statistically insignificant when both data sets were compared, although the educated still held more knowledge. As observed in chapter five, the lack of formal education or the quality of the education obtained seemed to influence the understanding and engagement of the villagers with the research, I also think from my observations and knowledge of the general region, that the culture and pattern of upbringing supresses one's curiosity and ability to explore anything outside of the norm while young, which those who experience formal schooling are encouraged to cultivate. These attributes may have played out in the results, but will need further validation. I therefore think that educational level of the city-dwellers was an advantage, it seemed to have affected their understanding and engagement with the research and might have been partly responsible for the observed differences. It was clear from my qualitative data that the city respondents also felt the same about birds as the villagers did i.e. exhibited indifference, but they could understand better and appreciate my interest in birds and the research process, hence were willing to engage in the activities, and to think harder about birds they knew than the villagers were willing to do.

Overall, the difference in knowledge between the two categories was however not profound, but I would argue that the slight difference was probably more linked to education. Although it seemed the most salient factor which explains the TEK of city respondents was the knowledge of birds already gained while in the villages, a respondents' level of education might have helped to make such knowledge more meaningful to the individual. It was however interesting to observe that despite the duration respondents spent in the city, they were very much in touch with their villages and spoke the language well and at every given opportunity.

Holding tribal meetings was itself a means of keeping touch with their roots. This might have helped in the preservation of their TEK.

5.4.2 Urban versus Village Respondents' Knowledge

Urban-dwelling respondents exhibited more TEK than their village counterparts. This is interesting because it does not support my initial hypothesis that urban-dwellers should have less TEK than their rural counterparts because of urbanization and education and the lack of available natural environments for connecting with nature in the city. An interesting observation is the case of respondent 11, male, 34 years old with a secondary school education, and self-employed, who grew up in a Mushere village and has been in the city for the past 12 years. He claimed to visit the village weekly, and was the only respondent in both village and city who could give 23 bird names. Even though he could not give ecological information about the birds, he knew much on their cultural uses and associations. He claimed he had learnt from his parents through oral/observation means. Although his parents contributed to his knowledge, he was self- motivated and observed birds on his own, which is a very vital factor in learning.

Ethno-biologists and anthropologists have also made similar observations that nature learning is a combination of several factors one of which is familial motivation and personal interest (Zarger 2010; Hunn 2002; Daugherty 1978). This reveals how TEK would have been more than the observed level among the Mushere if birds were an important cultural domain. If they were celebrated culturally, perhaps more individuals would have held more TEK like this respondent in the city.

5.4.3 Sources and Methods of TEK Acquisition and Transmission

Like Villagers, respondents reported their parents and grandparents as the main sources of TEK acquisition. Methods of transmission was also like the villagers, with oral transmission being the predominant method of TEK transmission, while other methods such as observation, practice and a combination of all three methods were very rarely mentioned. Detailed discussions on these patterns have been discussed previously in chapter five.

5.4.4 Free -listing.

The free-list results for city dwellers revealed that the twenty most culturally salient species/groups from the village adult free-lists were also the strongly salient species/group for city-respondents. This suggests that these species might be the key important or culturally relevant species to the Mushere, and so have survived transmission from one generation to the other. These eighteen-salient species/groups seem to be the ones that were imbedded in their language and culture, and seemed to be known to the average Mushere. The species/groups can be classified under three headings; 1. Those that affect their crops and livestock (pests) 2. those that indicate natural phenomena especially planting and harvest times and daybreak (indicators) and lastly, 3. those that have strong cultural associations and beliefs (such as the Owl, Vulture and *ngagak*- the announcer of death). It is clear from this that mostly species that have some utility (Hunn 1982; Ellen 1993) are considered important, although Hunn (1982) states that cultural knowledge is adaptive, it is not only about utilization, but about how it relates with people in their everyday lives, such that what has no known effect may not be known or named, whereas what has a positive or negative effect will be known and named. I discuss more on this salient species in Chapter eight.

5.4.5 Summary /Conservation Implication of Findings

The findings of this chapter reveal that urban-dwelling Mushere TEK of birds was more than that observed in the villagers, and that TEK did not seem to be affected by urbanization, education and age among city-respondents, further strengthening the suggestion that birds might not be a culturally important domain. It suggests that there are certain bird species/groups which are culturally prominent among the Mushere and whose knowledge is shared by the majority as seen by the culturally salient species/groups of the urban-dwellers and the villagers. The conservation implications of these findings reveal the importance of possessing a positive cultural relationship with nature, which predetermines the valuing and possible appreciation of any conservation initiative among local people. Secondly, the results do not agree with the hypothesis that urbanization has a negative effect on TEK, although the small sample size and the lack of robustness within the sample limits the ability to draw strong conclusions on the findings. As a preliminary assessment however, it has opened an area for further investigation. There is also an opportunity for partnership with the Mushere urban community in designing the appropriate methods for engagement as they are better positioned to serve as mediators between practitioners and the rural dwellers.

CHAPTER SIX

Preliminary Investigation into Mushere Children's Bird Knowledge from Three Communities

'...something wonderful happens between children and birds: a depth of feeling and experience that often fades with adulthood, perhaps to be recaptured in old age.'

Mark Bonta 2003

Mushere Boy with Catapult (10/10/2015), and Children Enjoying their First use of Binoculars 29/11/15 Credit: Grace Pam

Abstract

Mushere children's ethno-ornithology was surveyed from October to November 2015. The central questions involved finding out the cultural transmission methods of TEK including acquisition methods, and how knowledge is distributed along gender and age categories, and to find out how much knowledge children had of birds, relative to adults, what birds children knew and why they knew such birds, and their general perceptions on the cultural uses and valuing of birds including drivers of such knowledge. Methods included picture elicitation exercise, free-listing and semi-structured interviews. The results revealed a relatively low knowledge of birds in Mushere children; bird knowledge was gendered, with boys naming and identifying more birds than girls, age was not a significant factor in determining children's knowledge. A mixed TEK transmission pattern among boys and girls was also revealed. Girls learned mainly through observation, while boys learned through practical bird-related activities. Learning was mostly horizontal for boys but vertical/oblique for girls. Farmland and

garden birds were the most mentioned species/taxa, with birds in the family Columbidae and Estrildidae having the highest salience and frequency of mention, the children also had a limited knowledge of cultural beliefs and uses of birds, with use of birds as food being the dominant cultural use and reason for valuing birds, reflecting the significance of utilization as a driver of knowledge. I argue that how much children will know and learn about any biological domain will be determined by the cultural attitudes and perception of that domain and the importance attached to it. I conclude that the relative low knowledge of birds in Mushere children reflects the general low cultural relationship with birds, reflected by the low cultural views and perception of birds. I suggest a consistent and deliberate conservation education program that will work towards encouraging ornithophilia the love of birds, and biophilia, the love of nature in Mushere children.

Introduction

As the hope and future of any society, and the future custodians of the earth, children are an essential focus for conservation education and engagement. How children perceive the world around them is, therefore, crucial to the role they will play in the future when they are faced with the challenges and responsibilities for its management (Hunn, 2002). Many studies have shown that children's environmental knowledge is declining as more children spend time away from nature (e.g., Singer et al 2009; Louv 2008; Charles and Louv 2009), resulting in several behavioural, emotional and psychological phenomena which Louv has collectively termed *nature deficit disorder* (Louv 2008). While one might expect this phenomenon to be more widespread in urban settings and less in rural areas, study after study is revealing the same pattern of knowledge loss in children in both urban and rural situations (e.g. Reyes-Garcia 2006; Clements 2004; Somnasang & Moreno-black 2000). As Turner et al (2000) observed, young people in many cultures nowadays are far less knowledgeable about the traditional ecological knowledge of their environment because modes of transmission of knowledge have been threatened by more modern lifestyles and choices.

Given the significance of birds in promoting biodiversity conservation, I wanted to assess the potential of using children's ethno-ornithological knowledge as the foundation for encouraging

children's engagement with nature and participation in its conservation. To understand children's bird knowledge, it is important to understand the processes involved in the cultural acquisition and transmission of such knowledge. There is good evidence that the close association with nature found in many cultures around the world often translates into their children having considerable TEK of plants and animals while still very young, as they actively engage with their socio-ecological and cultural environments, especially through familial relationships (Rogoff, 2016; Rogoff et al 2003). For example, the Tzeltal-Maya of Mexico are known to have great depth of knowledge of their plants, with their children knowing over 100 plant names as early as nine years old, because of their roles and contributions in daily subsistence activities (Hunn 2002; Casangrade 2004).

The theoretical framework follows the cultural transmission theory. Consequently, what ecological components and domains children will know, and the depth of their knowledge will depend on the cultural relevance of that domain to the culture (Daugherty 1978), and the social interactions that exists between adults and children, and between children and their environment (Tian, 2017). Cultural transmission theory predicts that knowledge is usually unevenly distributed, usually differentiated along gender and age among other factors (Albuquerque et al 2014; Reyes-Garcia et al 2010; Bates 2009; Zent, 2009; Ayantunde et al 2008;). These differences arise from the roles that boys and girls play in societies which exposes them to different knowledge types. Most studies relating to children's ethnobiological knowledge have centred on their ethno-botanical knowledge (e.g., Grasser et al 2016; Zarger & Stepp 2004; Garcia 2006; Martinez-Rodriguez 2009; Wyndham 2010; O'Brien 2010; Guimbo et al 2011). Few studies have looked specifically at the ethno-ornithological knowledge of children, (e.g. Bonta 2003), and to the best of my knowledge, no theoretical framework exists for considering what birds children know, how they learn about birds and

probably why they know certain species and not others. I hope to contribute in this area by providing new data on the bird knowledge of village children in Mushere.

Based on these premise, I asked the following questions in relation to traditional knowledge of birds among Mushere children; 1. How does cultural transmission of TEK of birds occur in Mushere children with relation to the various aspects of transmission; age, gender, education and methods of knowledge acquisition and transfer? These questions are central in understanding the place of birds in Mushere culture as it relates to children, if bird conservation is to be successful among them. Secondly, will the methods of TEK acquisition and transfer differ from that predicted in the cultural transmission model for a small-scale subsistence community, which predicts a more vertical transmission? will the pattern of transmission follow the predicted theoretical model? Are Mushere children as knowledgeable as the theoretical assumption that rural children are generally knowledgeable about their environment? Will children's bird knowledge be similar or different from adults and will their value for birds be similar or different from that of the adults? Understanding these aspects of children's TEK is important for the effective involvement and engagement with them in bird conservation.

6.1 Methods

The study was conducted in the three non-forested villages (Garah, Kawel, Ik'ngwakap). These villages were selected because the schools are in them, as there is no secondary school within the forested villages and the samples were collected during term time, which meant that the forested villages were devoid of children of secondary school age, who usually attend school outside their villages. I hoped that I would find some children from the forested villages among my sample population, but none was represented in the sample, despite being specific about asking for children from those villages.

Six schools were selected, two from each village, based on the most populated schools. schools were selected purposively, based on the criteria of willingness to participate, and having a mixed representation of students from different villages, although each school was mostly populated by children from the community. Participants were also purposively selected (Tongco 2007; Bernard 2000), on the criteria of willingness to participate, of Mushere descent, and the possession of the desired knowledge. Possible biases to the selection method includes the likelihood not sampling possible knowledgeable individuals because of the set criteria, as individuals could refuse participation either due to shyness or lack of interest, but I do not think this was the case as the children were generally eager to participate in the research. Another likely source of bias is a lack of representativeness of the knowledge of forested village children within the sample also limits the strength of the results, although I do not think that their presence would have changed the results significantly, based on my informal observations and interactions with children in the forested villages. Thirdly, the relatively small sample size, limits the strength of generalizing. The unequal distribution of boys and girls could not also be controlled with the purposive sampling method, which is also a likely source of bias, since the data had more boys than girls. Participants were selected from each school at the start of the day and permission to have the children stay behind after school was sought from parents and school authorities, so that students did not have to miss any of their lessons because of the exercise.

Permission for inclusion of children in the survey was obtained first from the University of Oxford Central University Research Ethics Committee (CUREC), prior to the start of the survey, subsequently, permission was sought from schools and parents by making prior visits to schools and seeking consent from the authorities, getting approval for the exercise, and setting a day for the activity. Parents on the other hand were consulted through the churches in all three villages, by sending out notices through my local assistants who visited these churches

to inform parents of the intended activity. This was not a problem as the communities were already aware and involved with my activities. As mentioned earlier in chapter 3 (methods), parents did not fully understand why permission was being sought from them to question their children, they felt once I had been trusted to work with their community, it was dependent on the child and school to either participate or decline participation. So, I had no problems interviewing children. The churches were good meeting places because sending out consent forms was not a good alternative for the culture I was dealing with.

On the selected days, children who indicated interest were then interviewed in isolation during the exercise. It was important to complete the exercise for each school on the given day to avoid participants sharing their experiences and knowledge with potential participants. This was also a limitation to the number of participants in each school, as it would not have been possible to conduct the exercise beyond the few hours given for the exercise with numbers greater than what we had within the apportioned time. There was the possibility of returning to continue, but that would have increased the chances of pseudo-replication in a community setting where children meet to discuss events as neighbours and friends after school. All participants were compensated for their time and contributions with drinks and snacks so that they were not unduly stressed while they waited for their turn.

Semi-structured, open-ended questionnaires were used to collect demographic, cultural and ecological information and knowledge of birds, while free-lists were used to collect data on bird naming ability (appendix 7).

From literature, it has been suggested that children's knowledge of wild plants is usually developed from the age of 12 years (Hunn 2002; Zarger 2002a, Wyndham 2010) so only children between the ages of 12 to 16 years where included in the survey. The choice of this age group was based on my previous interaction with children younger than this age group and the observation that it was almost impossible to get any meaningful contributions from them.

This I attributed to two reasons; first being that most of the children below age 12 did not have the confidence and the courage to express their views and shied away from discussing with me (see Wyndham 2010; Au & Romo 1999 for a similar observation).

Secondly, those who were willing could not contribute meaningfully (see Gallios et al 2015 for a similar observation) as the intellectual maturity of these village children cannot be compared with their peers in cities due to the levels of exposure of city children to strangers and better schools. Time spent with each child during interviews was between 30-45 minutes. The interview protocol involved spending the first 3 minutes learning about the background of the respondent, and going over our interest in birds and conservation, and the reason and procedure of the research, and what I hoped to do with the results. This helped the respondents to relax, and become better settled for the interview, their initial approach to the interview was as if they were undergoing an academic examination exercise, showing some nervousness. I worked on helping them relax by I explaining to the children why I was interested in learning about their local knowledge of birds, and pointing out that in the context of the exercise, I was the student, and they my teachers, as they held information and experiences I was interested in learning about. This was important and effective because it immediately helped them to relax, and at least reduce the effect of feeling inferior or superior by either of us.

Each respondent was then showed pictures of the twenty-one (21) bird species (Appendix 6). Children were then asked to share everything they knew and could recall about the local name, ecology, uses, cultural associations and stories related to any bird they were shown and to share any bird related songs they knew. The responses where written down in my field notes, and later transferred into an excel spreadsheet, making sure that each respondent had a unique identification code. I hypothesized that transmission of knowledge should result in children having a good knowledge of at least the culturally salient species.

Figure 6.0: Bird recognition exercise with a participant from one of the schools. Photo Credit: Haggai Ezekiel

6.1.1 Data Analysis

The data was analysed using simple descriptive statics after coding the data, depending on the variable type, and an ANOVA test was used to determine variation in knowledge between boys and girls, while Chi-Squared tests were used to determine difference in transmission/ acquisition responses of boys and girls. Where respondents were asked about their views on various aspects of birds, such as their perceptions on valuing of birds (whether an individual thought they liked birds or not), and why they held such views, their perceptions on the cultural uses of birds, the methods of knowledge acquisition, sources of such knowledge transmission, perceptions of Owls, and reasons for such perceptions, thematic-content analysis method (Albuquerque et al 2014; Vaismoradi et al 2013; Bernard 2000; Braun & Clarke 2006) was used to analyse the data. The method involves analysing the contents of respondents' responses to the different questions, generating initial codes, searching for common themes, reviewing the themes and assigning/defining the themes (Braun & Clarke 2006). For example, some of the children liked birds because 'they are food' or I eat them' or 'their meat is sweet', these responses were classified as "Food', Further, when asked why a child liked or disliked birds responses ranged from 'I love their songs', 'they are beautiful', both were grouped as

‘aesthetics’ because they both relate to something creative that appeals to the sense of beauty or arts in the respondent. Responses such as ‘they are crop pests’ and’ they because diseases’ were classified as ‘harmful use’ because the respondents’ responses revealed a negative perception of harm that birds can cause. When asked why they thought birds were either important of not, children’s responses included the following seven themes; food (any response that referred to eating birds), pleasure (‘hunting birds is fun’), Harmful use (‘some carry diseases, some destroy our crops’), companionship (we use some as pets), food/money (‘I eat them/sell them, sell them), anthropocentric (‘birds have no use, birds are not human’). Response to the question ‘how do you learn about birds’, ranged from ‘I have a catapult’ to ‘I go hunting for birds’ in this case, both were categorized as reflecting a practical way of learning, and was classified under the theme ‘Practice’. On the other hand, responses such as ‘I watch my elders’, or I listen to my parents talk about birds, or I learn when I am on the farm with my.’ were categorized as passive methods of learning and were classified as ‘observation’. Where an individual reported using both active and passive methods such as ‘I like to look at birds, and I go hunting also, or I learnt it myself by looking at birds’, I grouped such responses under the theme ‘Observation/Practice’.

In finding out who children gained their knowledge from, all responses that mentioned one or both parents were classed under the theme ‘parent (s)’, while a response that included one or both siblings was grouped under ‘sibling’, also, where a respondent claimed to have learnt from a combination of one or both parents/grandparents, it was classified under the theme ‘parent(s)/grandparent(s)’. Where one or more individuals within the same age group were mentioned, it was classified under ‘peers’ where a respondent mentioned others within the community such as teachers, school, community, it was classified as ‘community’. Responses of perceived cultural uses of birds were categorized into ten themes. Those who responded with ‘sell birds’, and ‘use them as pets’ were grouped as ‘companionship/cash’, a combination of

'eat birds' and 'sell birds' was grouped under the theme food/cash', 'they sing songs', and 'they are beautiful' were grouped together as 'aesthetics', 'they destroy crops' and other such harmful economic uses were grouped as 'harmful' while those who combined their responses into 'eat birds, they are beautiful and they destroy crops' were grouped together as 'food/aesthetic/harmful'. Responses such as birds are eaten were themed as 'food' 'while they are pets' was themed 'companionship'. All responses of I don't know were classified as 'none'. Freelisting data was analysed using Anthropac software, and frequency of each bird group or species mentioned, the average ranking of the species in the list, and the salience score for each bird group or species were measured.

6.2 Results

6.2.1 Data Distribution

Out of 56 children surveyed, boys made up 34 (61%) while 22 (39 %) were girls. Twenty-four (43 %) of the children were 12-year olds; 22 (39 %) were 13-year olds, five (9 %) were 14-year olds, and another five (9 %) were 15-year olds. More than half; 50 (89 %) were born in a Mushere village and grew up there, the remaining 6 (11 %) were born elsewhere, but claimed to have grown up in Mushere. This meant that the study sample consisted entirely of children who had spent all their growing years in the Mushere community.

6.2.2 Freelists Result

Out of 38 folk names generated from children's freelists i.e. a compilation of all the bird names recalled (appendix 10), 15 (40 %) species were culturally salient, i.e. had high to medium frequency of mentions (defined as having between (16 % to ≥ 90%). The species with the highest frequency of mention was *mbul* (Columbidae), 92.9%), followed by *tidit* (Estrildidae,

78.6 %), and African Green-pigeon (Columbidae), *Treron calvus* (58.9%) for both girl's lists and boys' lists. The difference in the composition of culturally salient bird species in boys' and girls' lists was not statistically significant (Mann-Whitney U = 99.50, SE = 24.10, $p > 0.05$) Fig 6.1. It contained 13 (87%) of the same species, with four species specifically salient to boys (*gopang Ptilopacus petrosus*; yerdang *Colius staitus; nanaan* Cinnamon-breasted Bunting *Emberiza tahapisi*; yiyi Owls Tytonidae) and one species specific to girls (*Nigiya* Hooded Vulture *Necrosyrtes monarchus*). These species, although present in the freelists of both boys and girls were not culturally salient to one group, because due to a lack of consensus (low frequency of mention).

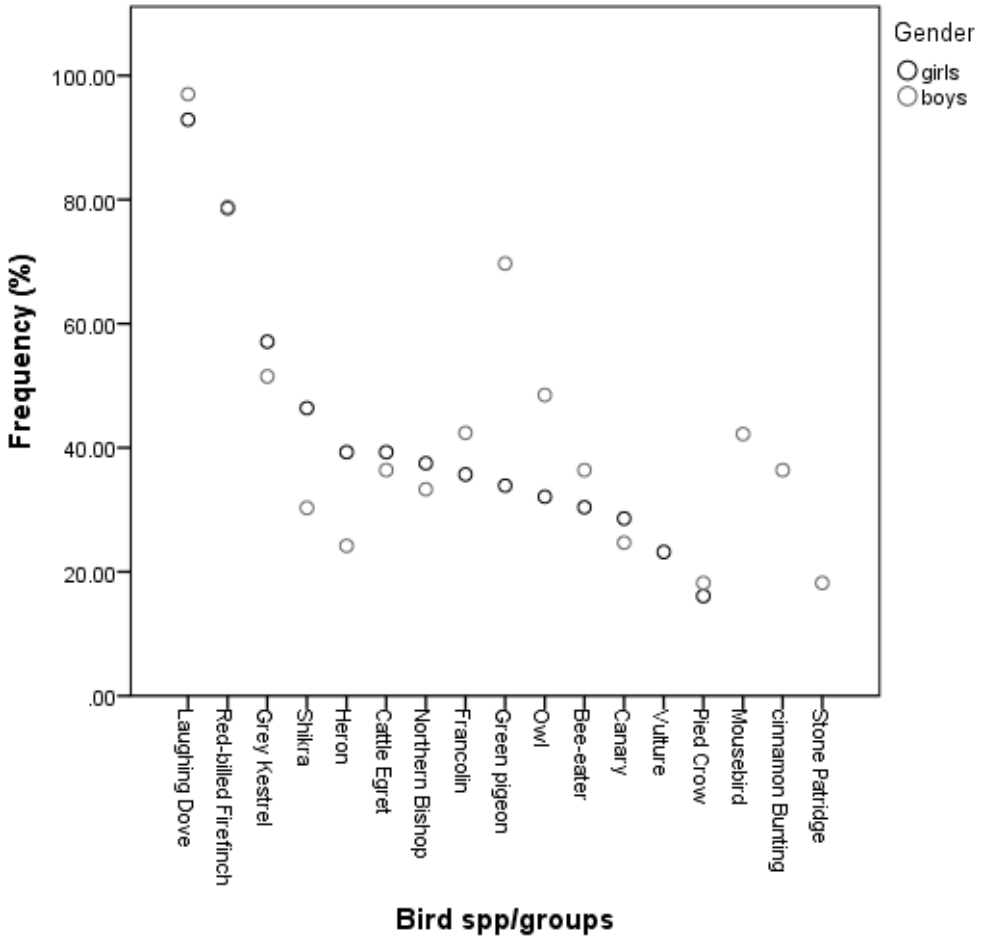

Figure 6.1: Graph Showing Frequency of Mention of the Culturally Salient Birds of Boys and Girls

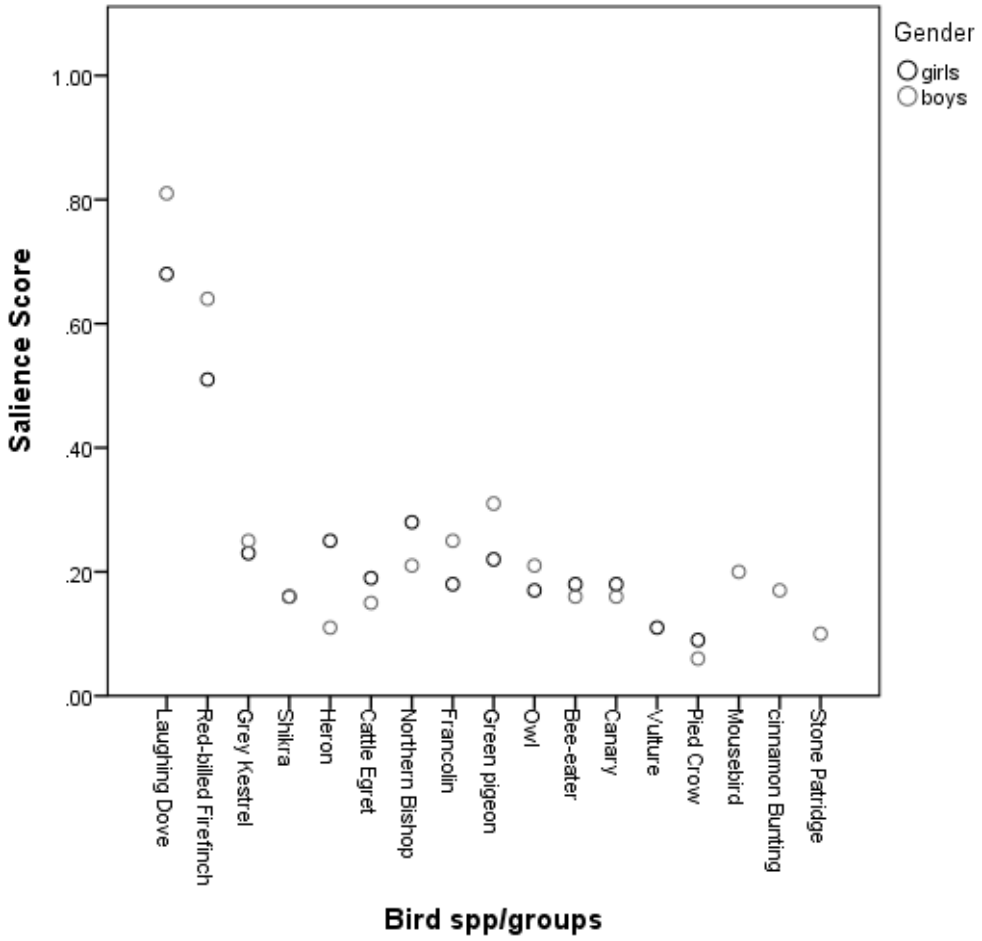

Figure. 6.2: Graph Showing Children's Culturally Salient Birds and the Relative Salience of Each Species.

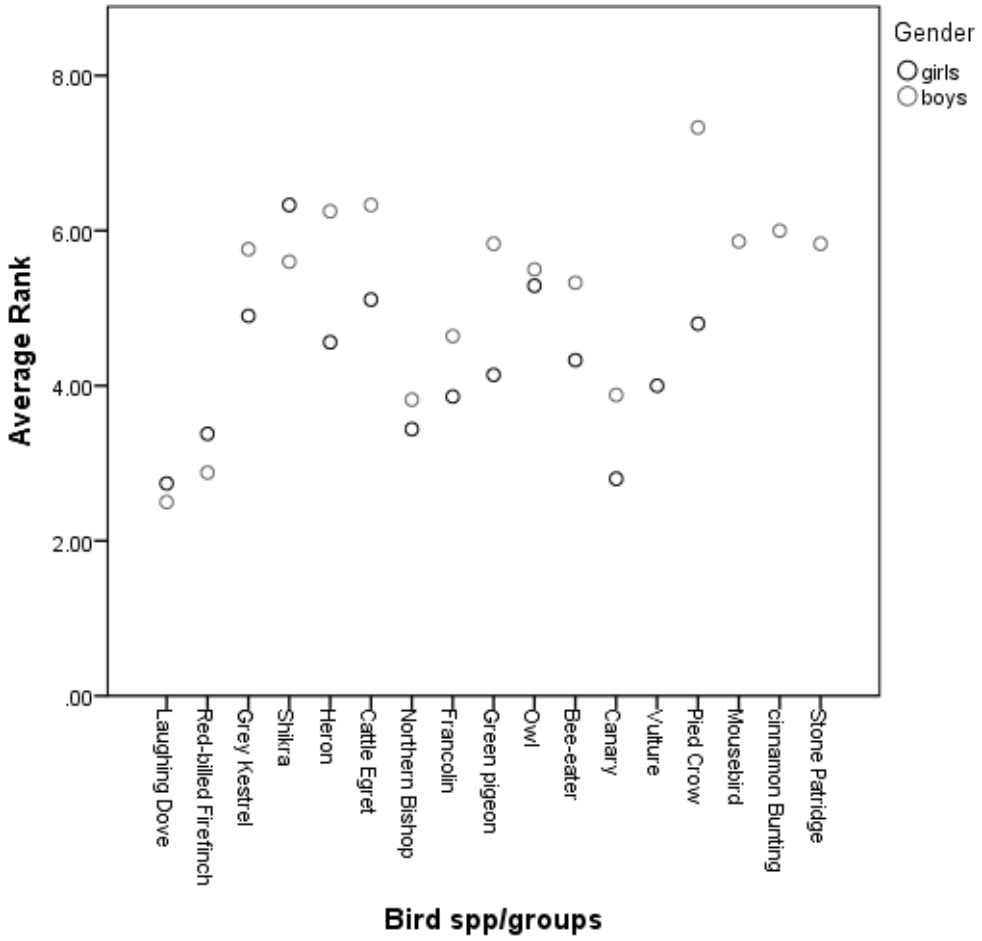

Figure 6.3: Graph showing Average Rank of Each Bird in Boys' and Girls' Lists.

There was no significant difference in the frequency (%) of mention of the salient birds between girls and boys (Mann-Whitney U=116.01, S.E =24.02, $p > 0.05$), however, the difference in the ranks of the birds in both lists was statistically significant (Mann-Whitney U= 164.50, S. E= 24.10, $p < 0.05$). A complete list of bird species mentioned, and their corresponding scientific and common names is given in appendix 4, and a list of the bird species used in the picture elicitation exercise are given in appendix 5.

6.2.3 Children's TEK Verses Adult TEK

None of the children interviewed showed any ethno-ornithological knowledge beyond the ability to name a local name (see questionnaire, appendix 6), unlike adults who could give some aspects of the ecology of certain birds. They were also less knowledgeable about cultural uses and associations of birds, although they were knowledgeable about the birds that are eaten among the ones they mentioned (91% of birds mentioned) and those which were forbidden (9%), and had a negative cultural belief associated with them such as the owl, a similar pattern observed with the adults. There was a significant difference in knowledge of boys and girls (χ^2 = 11.76, SE = 0.61, $p \leq 0.001$) table 6.1, with boys having longer lists than girls. The mean number of bird names boys recalled was 9 ± 2.40 SD and girls had 7±1.90 SD. Boys also had significantly higher recognition scores than girls (Mann-Whitney U = 185.50, SE = 59.38, $p < 0.05$), except in three species where girls scored slightly higher than boys (Bronze Manikin *Lonchura cucullata*, Helmeted Guineafowl *Numida meleagris* and Village indigobird *Vidua chalybeata*), appendix 6. The mean recognition score for girls from the bird identification exercise was 8.23±3.3SD; while boys had a mean recognition score of 11.32±3.2SD. Age was not a significant factor in the naming ability of children, the mean number of birds recalled for children age 12 years was 8±2.5 SD, while it was 7±2.6 SD for age 13 years, 14-year olds had 9 ± 2.6 SD and those age 15-year olds had 9±1.2 SD. While gender was a significant factor in TEK of boys and girls.

The difference in knowledge between village adults and children was highly significant (Mann-Whitney U=3,236.50, S. E=436.18, $p < 0.05$). Only 18 (33%) children could recall a local bird story (the same stories were repeated all the time, about *mbul* exchanging its bill with another bird with a bigger and longer bill, the 'other bird' differed in the versions narrated) and no bird related folksong was recorded, except when 15(27%) children mimicked the calls of the

Laughing Dove *Spilopelia senegalensis* when asked about a bird song (Kuruk kuruk-kuruk), while 8 (14%) gave the calls of a different bird as a song.

Table 6.1: Generalized Linear Model of the Effects of Age and Gender on Children's Knowledge.

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Wald Chi-Square	df		Sig.
(Intercept)	6.900	1.1453	36.294	1	.000	
[Age=12]	-.371	1.1001	.114	1	.736	
[Age=13]	-.777	1.1009	.498	1	.480	
[Age=14]	.640	1.3902	.212	1	.645	
[Age=15]	0[a]	.	.	.	.	
[gender=boy]	2.100	.6126	11.757	1	.001	
[gender=girl]	0[a]	.	.	.	.	
(Scale)	4.682[b]	.8848				

a. Set to zero because this parameter is redundant.

b. Maximum likelihood estimate.

6.2.4 Children's Valuing of Birds

When children were asked if birds were important to them (appendix 7), 50 (89%) claimed that birds were important, 5 (9 %) reported that not all birds were important, and only one individual did not think birds were important. When further asked the reasons for their responses, 73% (28 boys, 13 girls) claimed birds were important because they are food, 25% (7 boys, 7 girls) liked birds for their aesthetic value, while 2% (1 girl) disliked birds because they are harmful. On the cultural uses of birds, 73 % (27 boys, 14 girls) reported the use of birds as food, aesthetic value made up 9 % (3 boys, 2 girls) while 7 % (1 boy, 1 girl) mentioned the harmful uses of birds. Further, 2% (1 girl) reported the use of birds as companions, 7 % (3 boys, 1 girl) reported the use of birds as food/ for money while 5 % (1 boy, 2 girls) did not like birds for anthropocentric reasons (birds are not human, they have no usefulness).

There was a general dislike for owls by the children (98 %), only one child who had never seen or heard about owls before or the beliefs surrounding owls thought it was a beautiful bird from the picture exercise. Their perceptions on why they disliked owls included the belief that owls are witch-birds, 43 (77 %), bad/evil birds, 10 (18 %), look evil (2 %), devils (2 %). The only respondent who thought they were beautiful also perceived it must be a good bird. When children were asked to explain further why they disliked owls, their responses were categorized to nine unique groups, but the main themes were physical features (large, scary eyes, long talons) and vocalization (eerie call), Fig. 6.4.

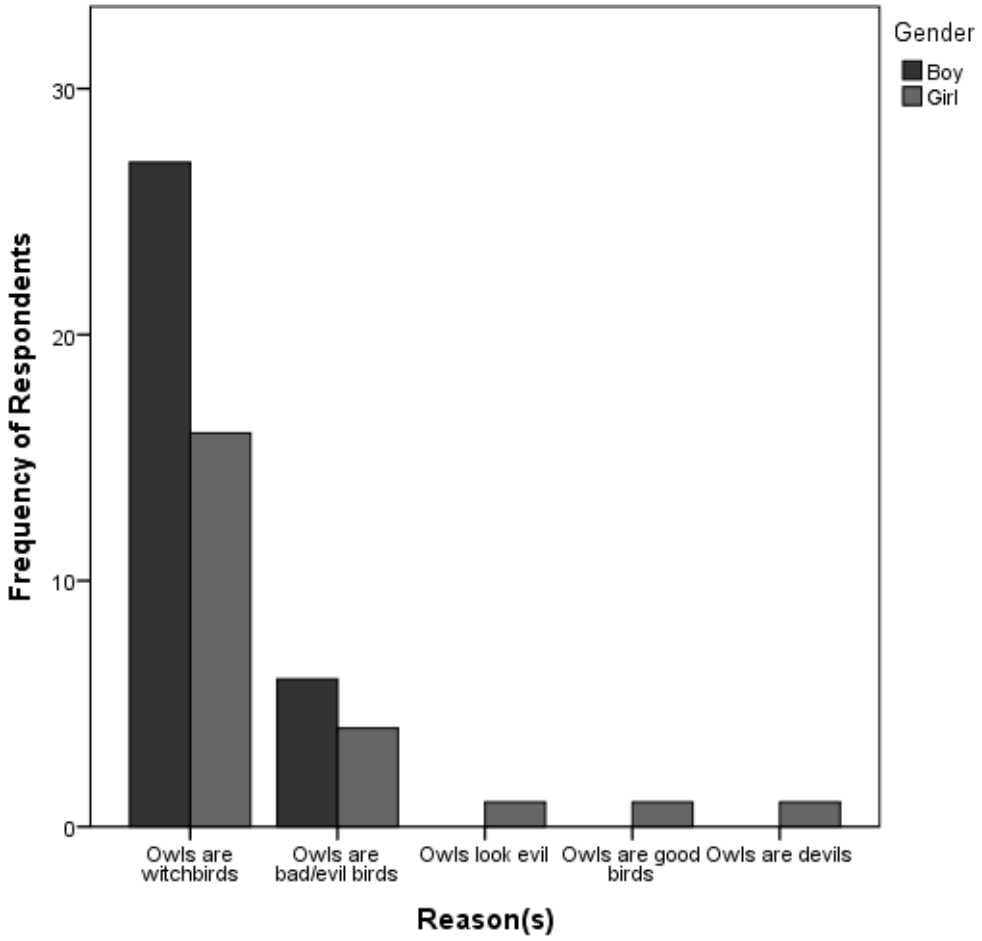

Figure 6.4: Children's Perceptions on why They like or dislike Owls by Gender.

6.2.5 Methods of TEK Acquisition and Transmission

Girls reported learning through vertical and oblique transmissions (one or both parents, one or both grandparents) while transmission was more horizontal for boys (older siblings and friends) although some boys reported learning from their fathers. These gendered differences in transmission methods were highly significant (Pearson $\chi^2 = 32.71$, df=7, $p \leq 0.001$). None of the male respondents reported having learnt about birds from his female relatives or friends (fig. 6.5). All the boys had catapults, which they use at playtime, or use in hunting for birds, hence most boys reported learning through practice. Girls on the other hand learn from their mothers or grandmothers and sometimes their fathers by observation (fig. 6.6). There was a statistically significant difference in the methods of TEK acquisition reported by the children by gender (Pearson $\chi^2 = 37.41$, df=1, $p \leq 0.001$).

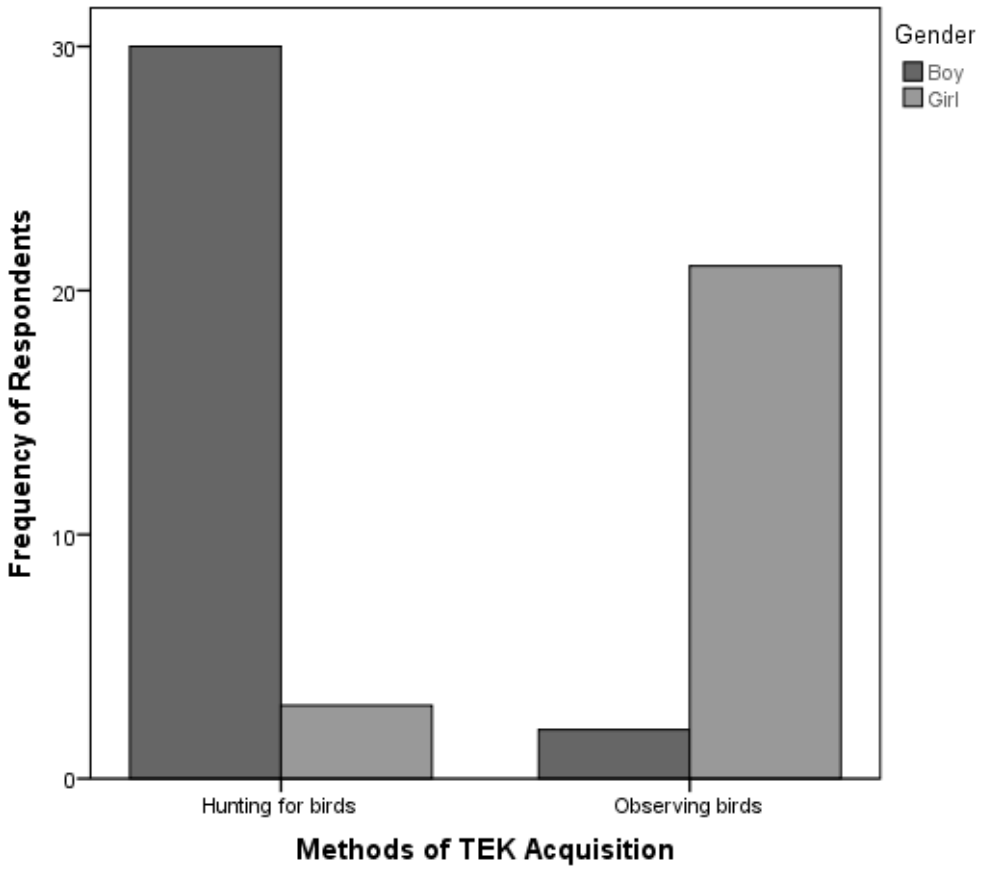

Figure 6.5: Children's Gendered Responses to Methods of TEK Acquisition

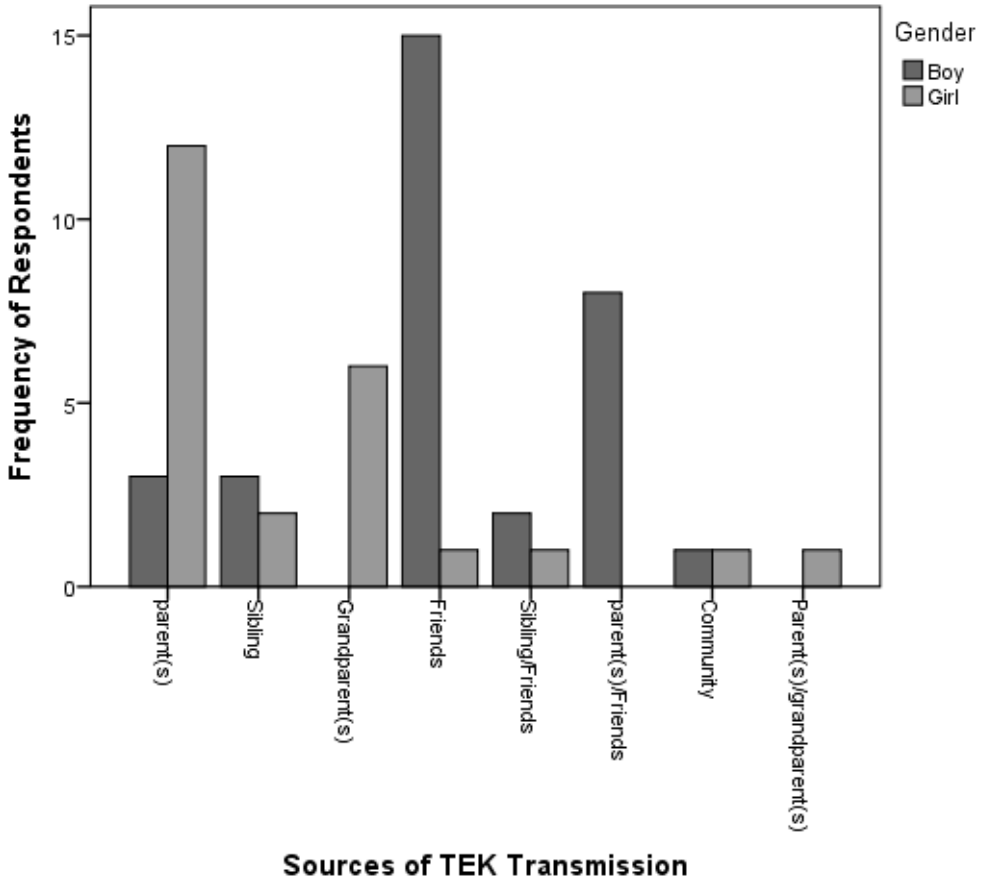

Figure 6.6: Children's Gendered Self-Reports on Sources of TEK Transmission

6.3 Discussion

6.3.1 Children's Free-lists and TEK: What birds do Children Know and Why?

Children's knowledge comprised of common garden and farmland birds found commonly in their immediate environment, and the most culturally salient species. The Laughing Dove (and other Dove species all called *mbul*) and the Red-billed Firefinch (and most other grass finches all termed *tidit*) were the predominantly mentioned species, and hence more culturally salient. Why was this so? One possible explanation is that these are some of the most ecologically abundant species, and culturally salient, as revealed by the number of individuals who recalled a bird story associated with the two species, and the mimicking of

the call of the Laughing Dove as a bird song by a significant number of children. This shows the role that oral tradition of story-telling plays in knowledge preservation and transmission (Sugiyama 2017; Tuwe 2016; Maffi 2014; Scroggie, 2009; Lekoko 2007; Mundy & Compton 1991) as Scroggie (2009) stated, *'Stories are the essence of a culture. Whether they teach how to live in a hostile or fragile environment, represent the collective memory of people, encapsulate the values or promote a hero, storytelling is at the heart of cultural identity and social life. It is the recounting of myths, folklore and other forms of oral narrative that maintains group solidarity and identity. Story has the power to transform, reform and re-ignite. Once stories are no longer told and re-told, the culture dies, and the people are lost'.*

Secondly, they are also the ecologically abundant species, which might explain why they would be most readily recalled, since encounters with them are frequent (Hunn 1999). Furthermore, it would have been interesting to compare these findings to similar studies elsewhere so as to determine what birds children know and if the results presented here corroborated or deviated from any theoretical framework of children's bird knowledge but literature on this topic is lacking except for example, Melson et al (2015); Kubiatko et al (2011); Huxham et al (2010); Prokop et al (2008, 2007); Prokop & Rodak, (2009); Randler, (2008); Randler & Bogner (2002) and Beck et al (2001) all conducted by education and psychology disciplines, whose main goal was associating children's nature knowledge with learning, goals different from those of ethnobiological studies such as this one, but giving some insights nonetheless to birds that children know. To the best of my knowledge, no study has been conducted specifically targeted at understanding birds that children know and why, by conservation scientists and ethnobiologists (see Zarger 2002b for a similar observation). This presents another major gap in our knowledge and understanding of the relationships between children and birds which needs to be filled to have a better understanding of this important aspect of human-bird relationships.

There are however, indications that children's bird knowledge globally may consist predominantly of common bird species found in their gardens and around their homes, these are sourced from information provided by environmental educators such as some online teaching aids that relate to children and nature. Such materials emphasize common garden birds as a start for building bird knowledge in children (e.g., woodland trust, www.woolandtrust.org.uk; duckstars www.ducksters.com/birds.php; RSPB-Unwin & Whittley 2006; Kiddopedia, www.youtube.com/channel/ucFU1/UbzLA8uRt-SMA). These references to common garden birds in relation to children's bird knowledge suggests that these might be the types of birds children know mainly because they encounter them often. If this is true, then children might know birds that they encounter on a regular basis, and which are culturally relevant. It will also depend on the spaces that children occupy and the activities they carry out in those spaces. If they do not spend considerable amounts of time in spaces where other types of birds are found, they will be limited in the birds they encounter and hence their knowledge of such birds. Hummel et al (2015) carried out a cross-cultural work on children's interests and attitudes towards bird and found that economically lower societies had children with more interest in birds, stronger beliefs about bird myths, but were less knowledgeable about bird than children from economically richer societies. My results corroborates these findings, as Mushere children showed interest in birds, but were not so knowledgeable about them.

Overall, the results revealed a relatively low TEK of birds in children, when compared with ethnobotanical knowledge results of children elsewhere (Grasser 2016; Quinlan et al 2016; McDade et al 2007; Lozada 2006; Zarger & Stepp 2004). However, when the results are compared with children's bird knowledge around the world, a similar or even worse pattern is observed, with children knowing few birds. For instance, a study of British primary school children's knowledge of birds revealed that fifty-five percent of children could not name three

of Britain's most common garden species, while a quarter could not identify birds like robins and sparrows (Smith, 2016). Another UK research on children's nature knowledge (Balmford et al 2002) revealed a similar trend, where children in primary schools between the ages of 4-11 years could hardly name common British plants and animals including birds, but could name precisely, Pokeman characters from a Pokeman flashcards. Likewise, in Switzerland, Lindemann-Mathies & Bose (2008) found that when over 6000 young people (8-18 years) where asked to name organisms in their immediate environments, they could only name an average of five plants and six animals, and most of these were unspecified taxa such as birds, grasses and trees across all the age groups.

This suggests that the results from this study are not surprising, as they seem to fit into the widely globally observed trend in children's bird knowledge. Indeed, Ballouard et al (2011), Lindemann-Mathies & Bose (2008, 2002), Bebbington (2005) and Balmford et al (2002) had made similar observations, remarking that the public's ability to identify organisms was limited. Even though certain researchers claim that children from developing worlds are usually more knowledgeable about nature and hold superior ecological understanding than children from developed worlds (e.g., Patrick & Tunnicliffe 2011; Bang et al 2007), these results do not completely agree with this assertion, as the observation seems to be context dependent, it might be true for some areas of the world, but not true for others. Patrick & Tunnicliffe (2011) observed that in countries where children and adults are not in touch with nature, there seems to be a general low awareness about environmental issues and a general lack of interest, care and even apathy for the environment. This study has exposed a knowledge gap in literature on both ethnobiological studies and conservation in general on aspects of children-bird interactions/relationships that is worth noting and investigating in the future.

None of the children interviewed exhibited any ethno-ecological knowledge of the life histories of the birds mentioned, beyond the ability to name a few local bird names, which further revealed a low knowledge of birds, as it is possible for individuals to learn about these names from discussions and not recognize or identify the bird in practice, although the picture elicitation task does not support this, as the children recognized most of the birds. However, they had much lower ecological knowledge than adults and exhibited limited knowledge of cultural utility and associations of birds. This is like the observation of Setalaphruk & Price (2007) on children's wild plant knowledge in a village in Thailand, where children had knowledge of plants, but exhibited a low TEK in the practical application of such knowledge. Defining how knowledgeable an individual's TEK is, may therefore depend on measuring the depth of understanding about birds and the number of birds one can name, because only knowing a long list of bird names without a corresponding depth of knowledge of the general ecology of the bird might not be a good assessment of bird knowledge, an individual who has a depth of knowledge concerning a few birds might be considered to hold more knowledge of birds, than an individual who knows only bird names.

The results of this research might be a reflection of changes in socio-ecological, cultural and economic lifestyles which might have affected the knowledge of birds through the modification of landscape, old traditions of story-telling as a method of preserving information and knowledge of birds, and the lack of active participation of children in subsistence activities, which then offer opportunities for children to observe and learn from adults (Wyndham 2010; Setalaphruk & Price 2007; Tuan 1978), although a lack of baseline data and information on previous TEK history means these thoughts cannot be presently verified. However, the inability of adults, especially elders to recall many bird-related stories, gives weight to this suggestion. Alternatively, it could be that children lacked the descriptive ability to share such knowledge with me, because I found that discussing nature and asking about descriptions of

birds were quite challenging to the majority, although I doubt this may be the reason for the observation. Zent (2009) found in his studies of Joti people that the process of TEK erosion was revealed as 'an ever-widening generation gap', leading to the importance of understanding the dynamics involved in TEK acquisition and transmission.

6.3.2 Acquisition and Transmission Of TEK

The results from this study differed from the predicted vertical transmission of knowledge in small-scale agricultural societies (Acerbi & Parisi 2006; Hewlett & Cavalli- Sforza 1986). However, as Calvet-Mir et al (2016) and Demps et al (2012) observed, transmission methods usually depend on the knowledge type being learnt or transferred, and the age in which knowledge is acquired. While Tian (2017) observed that knowledge transmission is usually not a linear relationship, but a complex of several interactions at various levels within and between generations. The results revealed bird knowledge transmission among boys was predominantly horizontal and not vertical as often reported for similar studies (e.g. Lancy, 1999; Lozada et al 2006).

This is an interesting finding, as it reveals a change from how the older generation reported learning about birds, which might suggest a change in daily activity patterns over time, with fathers probably spending less time with their sons in nature, than previous generations. Boys' methods of knowledge transmission strengthen the findings from adult knowledge, that birds might not be a domain that the present Mushere men in the study communities engage with making the transfer of such knowledge among boys mainly peer-influenced, relative to how adults gained their knowledge (vertical/oblique). Learning about birds is therefore mostly left to peer-influence, as hunting for birds was also reported to be children's activity. None of the boys reported having learnt about birds from his female relatives or friends, revealing how gender-based the domain of bird knowledge is in the study communities. All the boys

interviewed had catapults, which they used at playtime to hunt for birds. Such activities therefore give boys, the advantage to know and encounter birds differently than girls do, hence boys had longer lists than girls. The boys reported learning about birds during hunting, mostly from their older siblings and friends whom they spend their playtime with. By 'comparing notes' when they make a catch, they learn about the various birds in their environment. Sometimes, though, they take the bird home, and their parents help in identifying the birds. Girls' transmission method was predominantly vertical and oblique, like the predicted pattern for learning by participation of the cultural transmission theory. What is interesting in this finding is the mixed methods of transmission reported for a single biological domain (Lozada et al 2006; Ohmagari & Berkes 1997). Girls claimed they acquire or learn mostly by observation, especially when a bird comes to the house, or when they are out in the 'bush' (referring to the woods) collecting firewood, or farming. They claimed that at such times, they had opportunities to learn indirectly from listening to adults converse about a bird or by asking questions when they see one, implying that girls' learning is more passive than that of the boys.

This pattern of learning is quite like that reported by Bonta (2003) in Honduras, where girls learn primarily from their mothers through observation, knowing mostly garden birds that frequent their homes, while boys learn through more practical methods of engagement in bird-related activities which are strictly for males such as hunting (also Lozada 2006; Setalaphruk and Price 2007; Gallios et al 2015; Quinlan et al 2016). Other researchers have reported similar methods of learning e.g., Zent (2009) found that Joti children learned primarily through focused observation and peripheral participation in related activities (see also Tuan, 2012; Rogoff et al 2007; Katz 1986, 1989). Zent (2009) also reported that children in Joti only learned about plants when they asked questions from their parents, older siblings or grandparents during subsistence activities, a method he referred to as learner-initiated or motivated learning, or by merely

observing and listening to what parents and older siblings or others said or did as they carried out their subsistence activities.

Children's reports of who they learn from however needs to be taken cautiously, as there is a high tendency to mention parents especially fathers and mothers when people are asked to tell who they learn activities from, especially when they are unsure of how they had obtained the knowledge (See Quinlan et al 2016; Lozada et al 2006). Children also reported transmission methods of TEK to be like that reported by Zent (2009), mainly through learner-oriented approach which involves the learner asking questions and showing interest in learning about a bird. Throughout my two and a half years of active engagement with the Mushere, I did not observe any consciously planned parent-child teaching about birds, except when I observed children driving away finches from grains spread out in the compounds and some observations of boys with slingshots (catapults).

Of interest, also was the observation that during the picture elicitation task the children did not identify certain birds they named during the free-listing exercise. While it can be argued that birds in pictures could be hard for children to identify, I do not think this was the case, as almost every bird picture was clear, and they did not show signs of difficulty in recognizing birds they knew from the pictures. It could be that some birds are known to the children only by name, but cannot be identified in the field.

One species, the Black -crowned Tchagra (*Tchagra senegala*) although a common bird species in the Mushere environment, was not recognized by both boys and girls, an observation like that of the adults who could only recognize it by its call. Although it was culturally salient in adult's free-lists, it did not feature on children's free-lists even though some adults had cultural stories associated with the species which should have made it appear in children's lists. Since I did not play bird- calls for the children, I could not verify if they would have recognized the

bird from its call. Another species that the children could not identify in the exercise (except for eight respondents; three knowing its name only in Hausa Language) was the Hooded Vulture *Necrosyrtes monachus* (*Nigiya).* Even though some had mentioned it in their freelists (two girls), it was not surprising that they could not identify it because vultures have become very rare sights and are of global conservation concern due to their continued decline. This finding shows the seriousness of the decline as most of the children did not know vultures, had never seen any before.

Two bird species had names that were used only by children; *dadak* for the Speckled Mousebird *Colius striatus* and 'bitree' for the Grey- headed Sparrow *Passer griseus*. None of the adults was familiar with these names and had no idea what they meant, but all the children recognized these species by these names even though they could not say the meaning of the names, or how the names came about, it is a children's creation of a bird's name, a similar observation was reported by Gallios et al (2017) who studied the TEK of Baka children and found that certain TEK of small mammals and birds which were exclusively children's culture (Wyndham 2014, pers.comm). The Mushere children in the study did not also know the local name for the Canary *kwala*, it was the only bird which they knew by its vernacular/common name. the general sense of fear of owls observed in the children, and the lack of such fear in a child who was unaware of the cultural beliefs surrounding owls is interesting. It reveals the effect that cultural beliefs have in shaping the perceptions of individuals and groups in cultures. It is interesting that the only child who was not affected by the knowledge of the negative beliefs about owls also claimed that it was a beautiful bird when she was shown a picture of the bird. All other children thought owls were evil or bad birds, and when asked why they thought so, It is important to state that the free-listing method may be partly responsible for the extremely low bird naming ability recorded here, because it requires that an individual call to mind all the items within a given category of interest spontaneously, the likelihood of forgetting many items

known to the individual is very high (Bernard 1998), although I doubt the children knew significantly more. Perhaps free listing works best to identify salient items in a salient category. Therefore, in interpreting the results, it is important to bear these in mind.

6.3.3 Is Bird Knowledge Children's Knowledge?

Overall, the results suggest that bird knowledge may not be children's knowledge. Although 14-15 years old children seemed to recall slightly more bird names, it is not possible to draw conclusions as to whether they were more knowledgeable or not due to the limited sample size, and the fact that all participants belonged in a similar age category. Children knew relatively little about local bird names and nothing about bird ecology such as habitat associations, feeding and nesting/reproductive behaviour. Whereas adults knew a little more than bird names, children could not give information on birds beyond local bird names. Although it could be argued that adults are generally more knowledgeable because of the advantages of age and experience (Wyndham 2010), I think that bird knowledge in Mushere may not be considered children's knowledge or indeed it may not be anyone's knowledge, as both adults and children's knowledge revealed.

This difference in knowledge between adults and children could be because of the general sense of indifference, that I will henceforth refer to as ornitho-apatheia (after Bonta's 2003 ornithophobia and ornithophilia hypothesis) observed in adults towards the bird domain, whom children invariably rely on for gaining information/experience leading to knowledge, as it has been observed that the importance of a biological category in a people's culture is reflective of the attention or indifference towards the domain (Dougherty 1978). It could also be the result of a lack of interest in children themselves to learn about birds and nature (Wyndham 2010), since as earlier mentioned, learning is mostly initiated through a learner-initiated process, alternatively, it could reveal a lack of strong cultural relationship between the Mushere and birds, since there were hardly any precocious learners (Hunn 2008) in the sampled communities, or it could be revealing a generational knowledge transmission gap. If birds are not culturally significant, there would hardly be discussions and stories, or culture formed

around them, and this can limit a child's curiosity from developing in that direction. This can be one basis for the observed ornitho-apatheia, which in turn leads to a limited interest and hence knowledge of birds. Adult individuals at separate occasions expressed their ornitho-apathic feelings towards birds, and commented on the fact that one must be willing and interested in a thing to want to learn about it, but observed on a more general note the lack of interest in nature by the younger generation, who seem to be more interested in endeavours that will fetch ready cash, and in formal schooling (Wyndham 2010; Eyssartier et al 2008; Ladio & Lozada 2003).

It has been shown that knowledge of nature is learned by children in an environment of social, experiential, and observational learning; being actively involved in out-door nature activities along with family and friends (Wyndham 2010; Lancy 1996; Hewlett & Cavalli-Sforza 1996; Ohmagari & Berkes 1997; Chawla 1988; Rogoff et al 2007; Zent 2009; Wyndham 2010; Zarger 2010; Gaskins 2010; Niskac 2013; Gallios et al 2015). Hunn (2002) showed that learning natural history comes readily to children, particularly when there is reinforcement of what they are learning from older members of their community. The physical environment in Mushere where these children grew in is what could be described as 'bush', meaning that they are surrounded by nature, such that children are free to explore their environment. However, what they learn, and how they learn it will depend on the cultural and familial relationships that exist, itself being a result of the local maintenance systems (Wyndham 2010; Whiting & Whiting 1975). Also, as observed by Timyan (1988), in many West African rural settings, children are expected to forage for 'children's food', which includes wild birds, and she noted that such behaviours are not taught by adults, (who do not consider these things food) but are learnt from peers. She also observed that older siblings play significant roles in teaching younger ones. This corresponds with the findings of this study, as boys mostly mentioned learning from peers and older siblings during hunting for birds.

Another reason for the relatively low knowledge of birds in Mushere children could be a result of a change in the social, economic and even biophysical environment from that which their parents experienced. Adults in Mushere are in the present faced with the demands of a global economy, and the desire to have their children receive formal education, which is seen (and rightly so) as the ticket to a brighter and better future. TEK may not seem like a useful resource any longer, nor is spending time in nature observing it, and sharing their knowledge with the younger generations considered worthwhile.

6.3.4 Conclusion and Conservation Implication of Findings

In this chapter, I argued that children's ethno-ornithological knowledge reflected the socio-cultural environment of learning in Mushere, and the cultural perceptions and values placed on birds. In answer to the question of what birds children in the study knew, this finding revealed that children's knowledge was mainly about bird names of common species (mainly garden birds), and I argue that this is because these species represent birds that children encounter regularly both in their physical environments and in social/cultural discourse.

Although children exhibited a relatively low TEK of birds, it was not different from observations made of children's bird knowledge around the globe. As other environmental and conservation practitioners and researches have suggested, encouraging outdoor learning and activities might help to improve children's interests in nature and birds , especially when there is reinforcement from mentors such as family members or other older members of the community. The results of the cultural transmission methods have revealed the patterns of transmission and acquisition of bird knowledge among children in the study communities to be different for boys (horizontal) and girls (vertical and oblique), lending support to the differential knowledge transmission theory which segregates knowledge by gender, and age, (although age was not a significant factor in this study), with transmission method(s)depending

on the domain being transmitted. This finding is an important aspect of knowledge transmission because it reveals aspects that need to be understood if a for example, a successful educational program is to be implemented for children.

Children's cultural knowledge of birds was more towards utilitarian values (both harmful uses and productive reasons) of birds, but there was an appreciation of birds for aesthetic reasons. It is possible to engage the Mushere children in biodiversity conservation, even though their most cited reasons were utilitarian in nature. Children are teachable and usually enthusiastic about innovative ideas, unlike adults who might not be interested in innovative ideas. Children's lack or limited knowledge of birds presents an opportunity for engaging them in diverse bird-related activities which will motivate and inspire some towards developing an interest in birds, which might even be transferred to their parents (Damerell et al 2013), as Wyndham (2010) and Hunn (2008) observed, community knowledge is not usually evenly distributed among various cohorts, but there are usually a few 'talented learners' in a community, targeting such potentially interested and motivated children is the key to engaging children in bird conservation. Indeed, as part of my community engagement, EDEN and I carried out nature education campaigns, and shared the fascinating life of birds with the both adults and children through diverse activities. It was a priceless experience watching the reactions of different individuals, both adults and children as they handled a pair of binoculars for the first time and viewed birds through them. I believe that with a sustained approach in conservation-related education, there could be a shift in the perceptions and attitudes of the children towards birds and nature. In a study comparing attitudes of adults and children towards wildlife in the US, Kellert (1985) found that children showed a more naturalistic attitude towards wildlife than adults, whose attitudes were more utilitarian. This study results lend support to this finding, because children were more interested in learning more about birds during this research. Kellert also observed that those children who engaged in bird watching or

hunting, or who belonged to wildlife clubs were more predisposed and knowledgeable towards nature. His finding suggests that it is possible for Mushere children to improve their present knowledge by building on what they already know through nature educational activities. If a child learns to enjoy nature through birds, this change can then affect others within her sphere of influence and eventually the world, as she grows up to be a nature-conscious individual, who not only influence nature-love in others, but who treats nature as a gift and not only as a resource. In conclusion, if we are to encourage conservation in Mushere using birds, I suggest targeting children as the main focal group because not only are they curious and eager learners, they have the potential to affect others with their knowledge, and indeed, because they are the future leaders of the community.

CHAPTER SEVEN

Mushere Adults Ethno-Ornithology: Bird Folk Names, Cultural Associations and Uses of Birds.

Abstract

The ethno-ornithology of the Mushere people was surveyed with the goal of documenting their human-bird relationships. The central questions for the research were whether an agricultural community without a close relationship with forest shows 'ornithophilia', the love or affinity for birds, and if such feelings can be potentially useful in engaging the Mushere in nature conservation. Does their knowledge of birds reflect utilization, or is it a reflection of salience (cultural, perceptual, ecological or phenotypic)? We used semi-structured questionnaires to generate free-lists and information about bird names, cultural uses, beliefs and associations from 228 adult respondents, and used focus group meetings to enable discussions and help verify information gathered using the questionnaires. Overall, we found an indifference towards birds, which we termed ornitho-apatheia, although they showed an awareness of the presence of birds, some knowledge about them, and an interest in a few species. We also found a strong ornitho-phobia for owls. Utilization, cultural and ecological salience seemed the most important drivers of bird knowledge. We conclude that Mushere ethno-ornithology is strongly utilitarian, that there is a general sense of ornitho-apatheia, suggesting that birds are not a significant cultural domain and might not be an effective domain in encouraging conservation.

Introduction

Berlin's classic theory of folk biological classification (Berlin 1992) identified two schools of thoughts; the universalists/intellectualists who claim that some living things are so perceptually salient that it is hard for them to be missed, in his words '… *they are crying out to be named'.* The second school of thought, the cultural relativism/utilitarian school of thought, believes that people name organisms because of the uses they derive from such organisms (Conklin 1962; Hunn 1990; Bentley & Rodriquez 2001). For instance, Hunn (1990) reported that the Sahaptin of the Columbia River hold great taxonomic knowledge of edible plants but do not have such names for hundreds of flowering plant species considered 'culturally insignificant' a dismissed as 'just flowers'. Also, Bentley & Rodriquez (2001), argued that 'cultural importance and the

ease of observation of animals morphology influences which species are named, and which are lumped into residual categories, which are confused, and which are ignored in ethnobiological systems'. To proponents of this theory, two factors are key in folk classification viz; cultural importance and morphological attributes. Some authors e.g., Diamond & Bishop (1999) found a contrary result in their work among the Ketenbang people, Indonesian New Guinea. These locals although living in forested areas were able to name and identify almost every bird recorded in the forest by scientists, at some point, even distinguishing species which scientists had thought to be the same species, recognizing and naming even seemingly economically unimportant species. In Nigeria, Weliange et al (2015) found a strong relationship between Omo-aro and Labaka communities in South-western Nigeria, and were able to provide local names and ecological information on common resident bird species. Also, in Sri Lanka, the Veddah people have been found to have good knowledge of birds, as reflected in their local bird taxonomy, ecology and cultural uses (Dandeniya et al 2015)

The main objectives of this chapter therefore were to relate the naming and identification of birds in Mushere to this conceptual framework, by testing these hypotheses in the Mushere case. Specifically, I ask three specific questions: a) do the Mushere have substantial traditional ecological knowledge (TEK) of birds. B) Is there evidence of *ornithophilia* in the Mushere? Finally, I ask c) whether such knowledge might be an aid to nature conservation.

7.1 Methods

As stated in earlier chapters, six Mushere villages for this study. They are Garah, Kawel, Ik'ngwakap, Kaban, Nawula and Njemut. Selection criterion was mainly the presence or absence of forest. The first three villages (Garah, Kawel and Ik'ngwakap) are mainly grassland savannah habitats, Nawula and Njemut are in guinea savannah woodlands with forest in valleys (Fig. 2.1). All six communities have similar social and cultural characteristics and are a

homogenous society. We therefore have no reason to doubt that our study communities and sample size are representative of the Mushere in the context of bird knowledge. I used the terms folk generic and folk specific after Berlin et al (1973) description who in summary, described folk generic taxa as follows:

1. Most generic taxa are immediately included in one of the few higher taxa (life forms).
2. They are usually recognized by several criteria which include nomenclature (they are generally labelled by primary lexemes, e.g., oaks, Robins, etc)
3. They are usually the fundamental basis of all folk taxonomies, as they represent the most commonly referred to groupings of organisms in the natural environment, they are usually also the salient ones psychologically and are likely to be the first ones learnt early in life.

Most of the methods used were described previously in chapter three. Data for this section is part of the information gathered from the freelists generated from adults (both village and urban-resident adults, Appendix 8). The data represents all the villages included in the study (Garah, Kawel, Ik'ngwakap, Kaban, Naula, Njemut and Jos city). Data was gathered using a semi-structured questionnaire which had three sections, a demographic section, a freelists section and a knowledge section where respondents could share their TEK of the birds they named (Appendix 8).

In each of the villages, individuals were selected purposively, using both through snow-balling, and visiting households, and attending gathering such as market days to locate individuals who otherwise might not be reached. Participant inclusion was based on an individual's membership of a Mushere community by descent, willingness to participate, and on the premise that they held some bird knowledge which they were interested in sharing. Sample sizes differed significantly in each village by gender, as men were more willing to

participate in some villages e.g., (Naula), while there was total rejection among men in Njemut for example. In Kaban, more women were willing to participate than men, based on these two criteria, and in the last village (Njemut), there was a general lack of acceptance of the study, as men of the village refused to participate due to suspicions explained earlier in chapter three. As a result, the sample size from that village was smaller than all others, with only a few women's knowledge represented here. Mixed methods were used in data collection using semi-structured interviews and questionnaires (appendix 8). The interviews contained three main parts; the first part contained information on the demographic aspects of the respondents, the second section was Freelisting, where respondents were asked to name the birds that they knew within a period of 10 minutes. Thirdly, they were asked to describe the named birds, and share knowledge of its ecology (i.e. habitat, feeding behaviour, reproductive behaviour, calls, etc). Subsequently, respondents were asked to share any folk stories or cultural associations and/or beliefs about the birds they named. Overall, between 30-45 minutes were spent with each respondent, depending on the literacy level of the individual i.e., respondents who could write out their responses filled out the forms themselves, while I interviewed those who could not write. My local assistant was always at hand to help with translations from Mushere to English or Hausa where the need arose. The final aspect of the methods was the focus group meetings described in chapter three, participants were selected by community leaders of each village to participate in the harmonization and verification of information gathered, and to help in identifying certain bird names which were mentioned by some respondents without descriptions that could aid in identifying the birds. The selection of participants for the FGDs was done by the communities themselves, using the criteria I gave the leaders for the selection were to invite knowledgeable members of the community, and secondly, to ensure fair representation of men and women. I also emphasized the need to include younger members of the communities whom they knew held such knowledge. It that was beyond the researcher's

ability to control how these selections were affected, but the results from the FGDs suggested that participants were representative of the communities. The FGDs in each village took four hours of discussing, harmonizing and verifying information gathered from the various aspects of the instruments used. At the end of the exercise, the researcher gave financial compensation to every participant for their time and involvement. This was done at the end of the whole exercise, so as not to influence the selection process by villages which were yet to hold their own FGDs, because such information could potentially get to them and bias the selection process. Data were analysed using SPSS descriptive statistics for quantitative aspects of the data (cross tabs and frequency distributions) while thematic content analysis was used in determining the various categories that respondents' cultural information depicted of the species information provided. Birds which were named at a general level e.g., *mbul* for most species of Doves, were classified under folk-generic levels, while birds which had specific names like the species-level of scientific taxonomy were classified as folk-specifics.

7.2 Results

7.2.1 Data Distribution

One hundred-twelve men and 116 women participated in the surveys from the six communities (Figure 7.1) from four different occupations types; Farmers 157 (69%), Civil servants 15 (7%), Students 34 (15%) and Business persons 22 (10%). Respondents' ages ranged between 18-50 years and above.

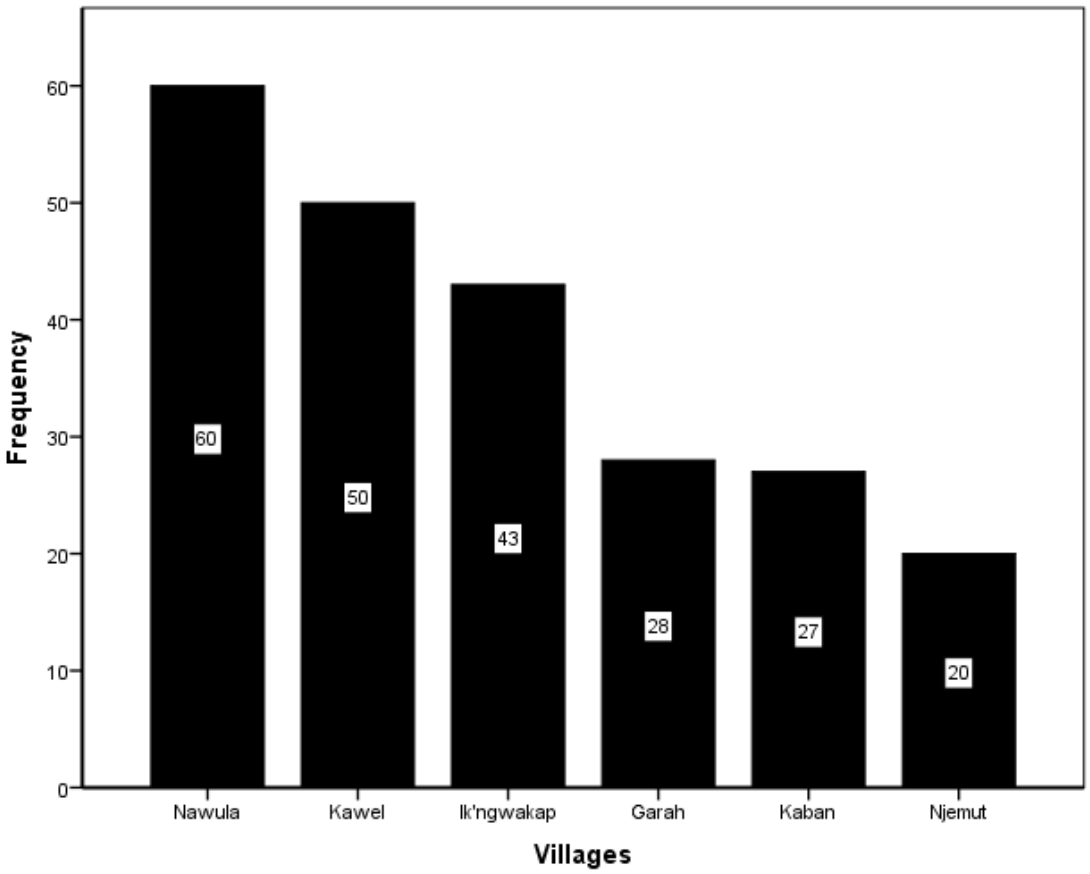

Figure 7.1: Summary of Distribution of Respondents by Village

I collected one-hundred-five folk bird names from free-lists. Forty-three (40.95%) were identified to either species or generic level, while 62(59.1%) were unidentified. 24 (55.8%) of the identified birds were at the folk generic level, while 19 (44.2%) were named at the species level. 85 birds (95.5%) are edible, while only 4 bird species (4.5%) are not eaten. Only 27(30.33%) birds mentioned had cultural associations. Only 31 bird species and bird groups were mentioned that corresponded with those on our inventory list (appendix 2). Four bird names were onomatopoeic, the bird names reflecting their calls (Sunbirds -*kepkep* from their calls kep, kep, kep, the Bearded Barbet *kinhokk* in Kaddim from its call; hok, hok, hok, *ngagak* from its call ngak, ngak, ngak*)*. It is important to note that some of the birds had more than one names because I surveyed two Mushere dialects: the Mushere speakers and the Kaddim-Mushere speaking people of Kaddim-bisa (Naula, Njemut communities). All the birds

mentioned were farmland and woodland birds except for the Green *Turaco Tauraco persa* which is a forest species. The main cultural associations of birds have been grouped under thirteen themes. These are presented below:

7.2.1 Indicators of Seasons

Nilip (Northern Red Bishop *Euplectes franciscanus*): This bird is said to be obvious during the rainy season. No one seemed to be aware that it usually carries a dull plumage during the non-breeding season. Most respondents think that it appears during the rainy season and remains throughout the harvest period, because that is when the male puts on the bright red and black breeding plumage. As such, it is culturally believed to be an indicator of the start of the farming season. Eaten

Ngoro (Pied Crow *Corvus albus*): Once the bird is breeding, it is believed that it is an indication that the rains will be delayed. Also, if the bird lays its eggs during the rainy season, it will not have its food requirements (an ecological observation) and so it breeds just before the rainy season. Naturally, as farmers, the Mushere see delays in rain as a bad omen, and so they habitually break the eggs of *ngoro* so that the rains can start. One respondent said that 'we go to the extent of felling trees where the eggs are laid, or we use a long pole to push down the eggs since it lays its eggs on very tall trees, so that the rains can fall'.). Loves palm trees and poles. Found in the villages and old settlements. It feeds on nuts, flesh, left-over food. It builds its nest on palm trees especially barren ones. Clutch size usually two Not eaten

Mbulkan or *chirek* (*chekerek* in Kaddim: African Green-pigeon *Treron calvus*): These are indicators of seasonal change from farming to harvest seasons. Eaten

Guryem (Abdim's Stork?): It is believed that this bird appears when the rains are at hand. It announces the start of the farming season. I was unable to identify this bird, as descriptions of it were unclear enough (large, white, long legs, long bill). Eaten

Njakan (*lat* in Kaddim; Herons Ardidae): These are considered friendly birds. Their presence indicates a good harvest. Found mostly around water bodies. They nest on very tall trees and feed on fish, frogs, snakes. They reuse nests repeatedly for many seasons. The birds are usually found singly or in pairs. Clutch size unknown. Eaten

Yer-fwan (literal meaning: bird of rain; unidentified): The sighting of this bird signifies the approach of the rainy season. This bird must not be harmed, as that could drive away the rains. Its presence and call during hunting signifies success in the hunt. Not eaten

7.2.2 Time-Keeper Birds

Kangkakat (kangkalat in Kaddim; Western Plantain-eater *Crinifer piscator* and Green Turaco *Tauraco persa*): These birds are believed to call hourly. Eaten

Rumjan (Violet Turaco *Musophaga violacea*): Believed to call hourly. Eaten

Chilchap (*wulek or kumbang* in Kaddim; Swallows and martins (Hirudinidae) and Swifts (Apodidae) are lumped together): They build their houses in the roofs of homes, and wake people up early in the morning with their calls. They announce daybreak. Not eaten

Ko'o (Domestic chicken *Gallus gallus*)*:* This bird wakes people early in the mornings, and calls when it's time to come home from the farm (2am, 4am, 2pm, 4pm). Eaten

Kwom (*nayakar* in Kaddim; Double-spurred Francolin *Pternistis bicalcaratus*): calls early in the mornings waking farmers up, and late in the evenings telling farmers it is time to return home from the farm. Eaten

Yer-bis (*dikolom* in Kaddim Jos Plateau Indigobird/Village Indigobird *Vidua maryae/V. chalybeata*): Indicators of time, mostly around 5pm. Not eaten

Yokmar (Black-crowned Tchagra *Tchagra senegala*): This bird is considered a loquacious bird. It is said to 'speak the language of all birds', it usually warns other birds of the arrival of the farm owner when they are feeding on his crops, and mocks humans with a call that is interpreted in Mushere to mean 'who is that coming?' which it sings when it notices an individual walking alone. Also, when a thief comes to steal crops from a farm, the bird deceives the thief with the same call it gives to other birds frightening the individual about the farmer's approach. It calls mostly in the mornings and mid-day. It is mostly identified by its call. Found in bushes, especially close to water. Nothing is known about the feeding, or nesting behaviours. Moves singly Eaten

Gopang (*go'ek* in Kaddim; Stone Partridge *Ptilopachus petrosus*): The ancestors used to keep time by listening to this bird. It calls hourly. Found around rocky areas. Its call is wit-wit-wit. The first note in the call is usually the flight note but when they are all together, they sing the tuwit-tuwit-tuwit melodious notes, they move in flocks. They feed on grains. The clutch size is usually between 6-10 eggs laid on the ground in grassy areas. The bird leaves about 2-3 eggs above the grass, but buries the majority in the soil. Eaten

7.2.3 Agricultural Pests

Fyem and Keleng (*feng* in Kaddim; the Common Kestrel *Falco tinnunculus* and Grey Kestrel *Falco ardosiaceus/keleng= Shikra Accipiter badius* that are common in the area): Feeds on domestic chicks causing losses to the farmers who keep free-ranging domestic birds. They consider this to be a very bad bird because it 'steals'. Found in open savannas, close to settlements and farmlands on tall trees. Move in pairs and feed on other small animals such as young of other birds and lay 2 eggs. Eaten by some, not all

Ngoro (Pied Crow): This bird destroys crops planted in the fields such as groundnuts, grains and maize. Its flesh is said to have offensive odour. Not eaten

Tem (*dem* in Kaddim; Helmeted Guineafowl *Numida meleagris*): Destroys crops in the fields. Found in forest areas and farmlands. They are ground nesters laying up to 20 eggs which are spotted, they use leaves to line the ground before placing their eggs. They move in flocks of up to 20 during the dry season, and move in pairs during the rainy season. They usually behave as though they do not mind an approaching human, they hardly fly until you get close. They move as a family when they have their young. Breed between October-December.
Eaten

Mbulkan (African Green-pigeon *Treron calvus*): very destructive to maize crops planted in the farms. They usually eat and destroy the young tender maize cobs. Eaten

Dibin (*ndighim* in Kaddim: Weavers Ploceidae): destroy maize crops in the farm. They are considered noisy birds. The birds are mostly found in towering trees with thorns. They build close to wasp nests to help guard their nests. They are colonial nesters usually in large numbers, and they are very noisy. Their nests are usually shaped like a 'sock' with small opening facing downwards. The clutch size is usually 2-3 eggs. they feed on nuts, grains, and move in flocks. Eaten

Pukul (*bugul* in Kaddim: Eagle): Pick animals such as small goats, domestic chicks thus bringing losses to farmers who keep such animals. Eaten

Kwom/Nayakar (Double-spurred Francolin): very destructive to farmers. Always dig out seeds planted. Found mainly in farmlands. Eats crops and is very destructive. Its call is *tikurit-tikurit-tikurit*. It is a ground nester, using grass to cover its eggs. It lays eggs between October-December and up to 10 eggs are laid, but the first clutch is usually about 6 eggs. Eaten

Gopang or Go'ek (Stone Patridge): They feed on grains.

Danwet (*danwit, nazel, Zekerondong* in kaddim; Whydah Viduidae): Feed on seeds and grains planted on farms. Found in farmlands, settlements and forest edges, are found in mixed species flocks with Bronze Manikins. Feeds on small grains and nests in trees. Clutch size of 2 eggs, laid between September and October. Eaten

Nilip (Bishops Euplectes*)*: Found in marshy areas and farmlands, between October-December. At other times, they found in grasses near rivers. During harvest, they are seen mostly in farmlands. Nesting behaviour is unknown, but they mostly move in pairs and feed on grains.

7.2.4 Birds of Bad Omen

Yiyi (*guguk* in Kaddim: Owl Tytonidae/Strigidae): Owls are considered evil birds. They are believed to be agents of witches who can transform into owls or dwell inside an owl to inflict harm on victims. Culturally, when the owl lands on the roof of a home and its call is heard, it is believed to be a bad sign, such as someone who has been ill will die, or that bad luck will befall the community. Sometimes, it is also interpreted to mean that there is an evil person in the home, such as a witch, and a meeting of the males in the family is usually called to determine who in the family might be involved in witchcraft. It is a very much-disliked bird, and is usually stoned to drive it away from the village. Not eaten, as eating an owl could mean eating a witch. Found in big caves or forests. Eggs are laid in caves not on trees. It uses twigs in making its nests. Clutch size usually two laid around November. The eggs are medium-sized like a domestic hen's eggs

7.2.5 Anomalous species

Shishik (*shizik* in Kaddim: Bats Chiropterans): Bats are considered by the Mushere to be a special form of birds, because they are not considered as 'true' birds. There was divided opinion

on whether bats are good or evil. Certain individuals associated bats with evil such as witchcraft probably due to their nocturnal lifestyles while others thought them harmless. Eaten by some and avoided by others.

7.2.6 Messenger Birds

Mbul (Laughing Dove *Spilopelia senegalensis* and other Columbidae found in the area except African Green-pigeon): These birds are considered messengers of peace (whether this is a long-standing view, or a result of Christianity remains to be verified since the dove is symbolic of peace in Christian beliefs). They are culturally well-known species and ecologically abundant. They are found in open fields, open savannas, forest edges, rocks and forests. They feed on grains and fruits and lay two eggs. Eggs are laid on trees and are made from sticks, forming a small clumsy heap. The birds are seen all year roundEaten

Ngagak (unidentified species): A bird that announces the death of a relation. It is not considered an evil bird, but a messenger. Anyone who killed *ngagak* had to be taken to a shrine for cleansing and purification. Not Eaten

Pukul (*bugul* in Kaddim; Eagle Accipitridae): The eagle is believed to be a messenger of the gods. It is also considered a very powerful bird that symbolizes strength. In the past, it was said that *pukul* was used during periods of war to help the Mushere defeat their adversaries. It is a revered bird, that they associate with forests, and very tall trees. When asked if *pukul* is eaten, it was said that if one can hunt it down, it would be eaten. There does not seem to be a taboo on eating this warrior bird.

7.2.7 Indicators of the Presence of Other Animals

Nigiya (Hooded Vulture *Necrosyrtes monarchus*): This bird is said to indicate the presence of a dead animal, or human corpse. Whenever an animal dies in the fields, the presence of *nigiya*

reveals where it is and where the body can be found. They usually move in pairs. Habitats are tall bare trees, old palm trees. They indicate the places where carcasses lie. Not eaten because they feed on corpses. Breed on tall trees with dry branches and lay two eggs. Have become rare. Not eaten as it is considered dirty.

Yermon (Greater Honeyguide *Indicator indicator*): This bird is believed to have the behaviour of guiding people, mostly hunters to bees' nests. Its call is Tchwet-tchwet-tchwet. Its habitat includes farmlands, forest. It usually leads us to beehives. Breeding behaviour unknown. Eaten

Ngupiya (*leplep, yer-randong;* Cattle Egret *Bulbucus ibis*): This bird serves to indicate the presence of snakes by making a warning sound when a snake is nearby, which helps to keep cattle out of harm's way in the wild. It also reveals where cattle are because it feeds on the insects that the cattle flush, which is why the Mushere consider it a 'lazy bird' that will not hunt for its food but waits to be helped. Found on trees, especially when cattle are around, and in open savannas. They don't bother much about water. They feed on insects which the cattle flush, especially grasshoppers. They usually move in flock and sleep as a group on trees. They are usually found in even numbers and are seasonal mainly in the dry season and fewer in the rainy season between July-September. Some have black legs while others have white legs. Nesting behaviour unknown. Eaten

Njar/Zar (Yellow-billed Oxpecker *Buphagus africanus*): Open savannah dwelling bird and forest edges. Follows cattle and is quite destructive as it feeds on the blood of the cattle. It picks ticks from their bodies, and injures cattle by opening old wounds. Nesting and breeding behaviours unknown.

7.2.8 Birds Used in Rituals/Traditional Medicine

Ko'o (domestic chicken *Gallus gallus*): Used in traditional rituals such as in curing illnesses, barrenness, and appeasing the gods. This bird is used as food and in rituals in the shrines. For example, if a young person offends an elder, the young person takes *ko'o* to the elder as a sign of repentance and appeasement for the bad he/she has done. Eaten

Gwatu (*gbatu* in Kaddim; unidentified perhaps Storks??): Used in treating various illnesses in the shrine. Ritual involves burning the feathers and sprinkling the blood on some leaves, and placing the leaves on the affected part of the individual's body where the pain is. The sick person is advised to bath with the water containing the mixture. Eaten

Kuljem (*kuljep* in Kaddim; Hammerkop *Scopus umbretta*): This is a bird associated with rivers and streams. It feeds on snakes, frogs, and fish. It is used in rituals where its skull is used in the treatment of persons afflicted by evil spirits, especially women who usually go to the streams and rivers in the evenings to get water and get afflicted by evil spirits, which are associated with the dark. There was divided opinion on whether it is eaten. Some claim it is eaten and its meat is very fatty, while others say it is not eaten. Found around streams and rivers and feeds on fish, frogs, tadpoles, crabs, earthworms. Moves singly and nests on tall trees. The males build big nests using sticks from bamboo and it brings assorted things into the nest such as hair, pins, jewellery etc. The clutch size is 2 eggs.

Nigiya (Hooded Vulture): Certain very powerful Mushere witch doctors are said to use the body parts of vultures in rituals and medicine. Not many respondents seemed to know this fact, but two older respondents mentioned this use of the vulture independently. Not eaten

Tem (Helmet Guineafowl): Used in traditional sacrifices to the gods to stop these birds from multiplying (probably because they are considered crop pests). Eaten

Bol (Senegal Coucal *Centropus senegalensis*): This bird is useful in determining medicinal herbs. When one has a fracture, this bird is caught, and one of its legs broken. It is then released, and they keep a close watch to see how the bird will treat itself, that way, they learn about plants with curative properties.

7.2.9 Birds Used as Pets

Only one bird species fell in this category: *Kwalla* (Yellow-fronted Canary *Crithagra mozambicus*): Usually trapped to be kept in cages as pets. The female has six black dots on the throat, is less noisy and bigger than the male. Feeds on small grains. They are seen all year round. Lays 2 small whitish eggs. Nest is usually made from grasses, and hidden in trees. Male helps in parental care, bringing food to the female and young in the nest, but the female helps as well Sometimes sold

7.2.10 Birds Used in Adornment

Pukul (Eagle): Some claim that the feathers of *pukul* were used during traditional festivals as adornment by traditional dancers, while others claimed that the eagle is very rare, and the use of feathers as adornment has never been a cultural attribute of the Mushere.

Ko'o: (Domestic fowl): The feathers are used by some in traditional adornment.

7.2.11 Birds as Food Taboos

Tidit (Estrildides; Grass finches, Waxbills): These are considered 'friends of man', as they are found visiting human settlements in the villages, even daring to enter homes to eat grains and leftover food. Usually, children and individuals of certain clans are forbidden to eat *tidit* claiming that doing so would make them go bald. Certain clans however do not have a problem with children or anyone eating *tidit*. Found around bushes, farms and houses. They mix in

houses with domestic chickens and feed on small grains. They usually nest in rooftops and include feathers in their nest materials. Two eggs are usually laid which are white in colour. The species are seen all year round.

Sokoton; Red-cheeked Cordon-bleu *Uraeginthus bengalus*: same as tidit above

Nigiya (vulture): This bird is not eaten because it scavenges on dead animals including human corpses.

Ngoro (Pied crow): This bird is not eaten because it also scavenges, and because it is said to have an offensive smelling flesh.

Ngagak (unidentified): This bird is forbidden to be eaten because it is a special messenger that announces the death of someone to Mushere people.

Chilchap (swallows and martins, swifts): Not eaten for unknown reasons, but some believe because they stay very close to man, while someone claimed they are evil.

Yer-fwan (unidentified spp; bird of rain): This bird is not eaten because it is a rain-making bird that 'brings the rain'.

7.2.13 Birds Eaten Only by Men

Njakan (Herons*)*: Eaten only by old men.

*Tem (*Helmeted Guineafowl*)*: Eaten mostly by men; although it is not strictly forbidden for women, it is mostly served to men. There was divided opinion about this belief.

7.2.14 Bird Names Based on Perceptual Qualities

Yer-dang (Speckled Mousebird *Colius striatus*): This bird is named based on its long tail. The literal meaning of its name is ‘Bird of tail’ This might apply to all long-tailed birds as well. Found in forest edges. Move in flock and feed on fruits and seeds. They nest in bushes sometimes close to rivers, laying 2 eggs.

Yer-mon (Greater Honeyguide): Literal meaning: ‘bird of honey’.

Yer-sekep (Woodpeckers): Literal meaning; ‘bird of wood’.

Dikolom or *yer-bis* (Jos Plateau Indigobird/Village Indigobird): literal meaning ‘bird of charcoal’, referring to its glossy black plumage. These birds follow tidit (finches). They also feed on small grains such as ‘Accha’ (Fonio). ‘We have never seen its eggs or its nests’.

Yokmar (Black-crowned Tchagra): Literal meaning ‘bird of farm’.

Jebjah or *Shosho* (Manikins): Literally means ‘smallish’. These birds are found everywhere; in villages, bushes, farmlands, forest edges. They move in flocks and feed on grains. They nest in trees especially the acacia tree and other thorny bushes. They also use wasps to guard their nests. Clutch size could be up to 20 eggs.

Redchini (African Golden Oriole *Oriolus auratus*). Literal meaning: ‘beautiful’ due to the bird’s beautiful golden colour. Found around forest edges and farmlands. Feeds on fruits and is a tree-nester. It builds its nest with grass materials; clutch size is 2 eggs.

Yer-kong (Bee-eaters Meropidae): Literal meaning ‘bird of bank’, referring to how the species build their hole-nests by the sides of banks in gulley and rivers. This might also refer to other birds with similar characteristics such as kingfishers.

7.2.15 Birds Used in Song and Folklore

Nanaan (*nanaankulet* or *nanaanalet*; Cinnamon-breasted Bunting *Emberiza tahapisi*): found in almost every open space such as farmlands and forest edges. Feeds on small seeds and grains and move in pairs or singly. They are ground nesters nesting near small rocks in grasses, or acacia plants. They lay 2-3 egg during the dry season. Bold bird. This was the only bird in song that seems to remain in the knowledge of most adult Mushere respondents,

Song
Nanaankulet a wai ran kaji a pa ran kah an a pe tam kulok kurem na nug.

Meaning: the song talks about the bird called nanaankulet, which has a black and white stripped head, resembling the braids of an African woman. When other birds see this design, they ask the bird;' Nanaan, who made this beautiful design for you?" Nanaan replies: "It is my father who did it for me for a special dance, because soon it will be harvest time" (Naula adult focus group meeting)

Folklore
"Yokmar stops singing after the rainy season is over (September-March), because other birds use sand to block its throat. They do so because *yokmar*, being a very loquacious bird would always frighten the birds away when they are feeding on 'Accha' (Hungry rice: *Fonio sp*) in the farms during harvest time. It usually sings a deceitful song telling them 'the farmer is coming; the farmer is coming' making them to fly away. To stop it from giving these false alarms and thus distracting the other birds from feeding, they block its throat with sand throughout the harvest time. In fact, *yokmar* has many versions of its songs. In the afternoons, it is usually sarcastic, saying to farmers returning home 'you are going back in the afternoon' (meaning the individual is lazy). When one is walking home alone, or trying to steal from

someone else's farm, *yokmar* will sing "who is that?" when you look around, you wouldn't find anyone" (mixed focus group, Naula).

Why tidit Feeds On 'Accha'

"The reason why *tidit* feeds on 'Accha' is because there was a young girl who once got married. One day, as she was pounding 'Accha' in her new home, *tidit* came to her and said, 'your parents are dead, and you are here, your parents are dead, and you are here in your husband's house'. The new bride gave tidit some of the 'Accha'. That is why it feeds on 'Accha' till today"

*Story on kwom (*Double-spurred Francolin)

Three young men went to woo the daughters of a certain woman. The mother gave the men headdresses to cover their heads with the intention of distinguishing them from her daughters when she came to burn them up at night. Unfortunately, for her, the young men got to know about her evil intentions and exchanged the headdresses with those of her daughters at night. When the time was right, the mother came to the room to harm the men and ended up harming her own daughters. One of the men started singing *tukuret-tukuret-tukuret* (the call of the francolin) to alert the other two men. The only surviving daughter was sent by the bad mother to check out who was making the call, and she was killed.

Moral of the story: Never plan evil for anyone, as it could backfire.

7.2.16 Other Birds Mentioned without known cultural Beliefs

Tau/sawu/kepkep (Sunbirds Nectarinidae): Found around woodlands, gardens, bushes. It is a wise nest builder, nests in bushes making elongated nests with very small downward openings

shaped like a funnel and hanged on twigs. Move singly or in pairs. Lays 2 eggs and breeds during the rainy season. Feeds on fruits and nectar and loves sweet things such as ‘lifwan’.

Tluwet (Hornbills Bucerotidae)): They move in pairs. They nest in hole. The clutch size is usually two. When incubating, the female sheds all her body feathers and hides in a tree-hole. The male brings food to the nest. Nesting is usually between September-October before young fledge. The birds feed on grains and fruits. Eaten

Yersekep (Woodpecker Picidae): Found in farms, forest edges, forests on dead, decaying trees. It nests in tree-holes. Feeding is unknown, but they think they feed on grains. Clutch size is 2 eggs and sometimes move in pairs or singly.

Gulak/Kadukul (Common Bulbul *Pycnonotus barbatus*): Found everywhere where trees are found; around houses, farmlands, forest edges, bushes. Feeds on fruits during the fruiting seasons when they are ripe. Also, it feeds on red chilli. Builds nest on trees, makes flat nests constructed with grass. Moves in pairs and lays 2 eggs between March-April.

Rumjan (Violet Turaco *Musophaga violacea*): Forest bird/ forest edge habitat. They move in pairs which is why the meaning of the name is ‘twin bird’ (Jan=twins). Flies in short bursts, and feeds on fruits, seeds, hoppers and insects. It is a tree-nester using sticks and twigs. Clutch size is 2 eggs.

Yer-dip (fork-tailed Drongo *Dicrurus adsimilis*): Found in farmlands and forest edges. It nests on trees, laying 2 eggs. They move singly or in pairs, and feed on fruits and seeds. Seen all year round, but mostly towards the end of the rainy season.

Bol (Senegal Coucal *Centropus senegalensis*): Found in bushes, close to human settlements. Slow flier. Lays 2 eggs between October- December after the rains. They are usually in pairs. Once the bird discovers its nest has been located, it changes the nest location. It usually shows what plants are medicinal for healing fractures because the people usually target the birds when they are nesting and break the leg. They then watch to see what plants the bird will use in treating itself, this way they are able to identify plants with such healing properties.

Kangkakat/kangkalat (Green Turaco *Tauraco persa*/ Grey plantain eater *Crinifer piscator*): The green turaco is forest bird seen close to big streams it is heard only in forests. It does not come to the farm or forest edge. It feeds on fruits and seeds and lays two eggs. Nests are built in tall trees, they usually move in pairs. The grey plantain eater on the other hand is found in savannas, farmlands and forest edges. They move in pairs, lay eggs on tall trees as well and have a clutch size of two eggs. both the male and female are involved in parental care of the young. The male brings food for female when incubating and when the young hatch.

Pukul/Bugul (Eagles Accipitridaee): Forest bird. Does not come close to settlements only rarely. Picks up small animals such as goats. Moves singly. Nests in very tall trees lays 2 eggs.

7.3 Discussion

7.3.1 Is There Substantial TEK of Birds among the Mushere?

Most cultures with documented ethno-ornithology have demonstrated extensive traditional ecological knowledge (TEK) of birds (e.g. Agnihotri & Si 2012; Muiruri & Maundu 2010; Ng'weno 2010; Forth 2004; Diamond & Bishop 1999; Ichikawa 1998; Kizungu 1998; Hunn & Thornton 2010; Diamond 1966). By comparison, this study reveals a relatively low TEK of birds. As Hunn and Thornton (2010) observed, species naming and recognition declines when

local people ignore or speak in general terms about species of little salience, this can be clearly seen from the results, as revealed by the number of general or group terms used for certain birds in the study group, and the many unidentified or unnamed species.

Life expectancy in Nigeria is 52 years (World Bank 2012), and for rural dwellers, this is likely to be even less, considering their poverty level and poor health conditions. So, it was not surprising that I encountered fewer elders belonging to the age classes 55 to >65 years, despite efforts to find such individuals. The ability of individuals to name on average only ten birds or less shows a poor knowledge of birds, and the observation that older Mushere respondents did not know significantly more than the younger respondents suggests that bird knowledge may have long been poor.

An interesting observation from this work is how Mushere knowledge of birds was very limited regarding ecological and behavioural aspects of birds with their environment (i.e. habitat associations, food and feeding behaviour, nesting behaviour, etc.), while they were relatively more knowledgeable about folk names and cultural utility, with most names reflecting aspects of the morphology or behaviour of the bird. This observation agrees with the theory of cultural relativism/ utilization.

The observation that many birds went unidentified might suggest a lack of close observation of birds, which will only occur where a group is considered valuable (Sault 2010). O'Brien (2008) Hunn (2014) observed that as people become less familiar with their natural environment, they lose information such as names of organisms, and their uses also become less relevant. Sinclair et al (2010) also observed that encounter rates are important in determining the reliability and details of the behaviour and ecology of a species, so species which are rarely encountered will not be hardly known. This might be another reason for the observed limitation in knowledge, since most of the species on our list which were shown to the respondents were observed in the Dulu forest, and not around their immediate

environments. If one's senses are not tuned to observe birds, one will not take note of encounters nor be interested in knowing more about the bird.

There were however a few exceptional cases where accurate, detailed descriptions of the breeding ecology of a bird was provided. For instance, respondents could relate how *tluwet*, the Hornbills (Bucerotidae) lay eggs in tree-holes, sealing off the entrance to their nests leaving only a small opening from which the male brings food to the female, which they say lays 2-4 eggs. They also knew that female hornbills shed their body feathers and use them as nesting materials, these observations correspond with scientific ecological knowledge of the breeding behaviour of the species (see similar reports by Ichikawa 1998). Adequate knowledge of the nesting behaviour of the Helmeted Guineafowl (*Numida meleagris)* and the Double-spurred Francolin (*Francolinus bicalcaratus)* are well known because of hunting for the eggs and adults of such birds. Both species are ground nesters, 'hiding' most of the eggs deeper down in the soil, and 'distracting' predators with a few eggs placed above the soil, usually covered with dry grass or leaves.

Mushere ethno-ornithology reveals a lot about their agricultural lifestyle. Five of the thirteen themes that emerged from their ethno-ornithology dealt directly with their agrarian lifestyles. Most birds mentioned are associated with farming activities. All the indicator species reflect seasons associated with farming while some, such as vultures and egrets, reveal the presence of other animals of interest to them. Certain respondents noticed the decline in vulture populations, including the Hooded Vulture *Necrosyrtes monarchus* (Birdlife international 2015, 2009). Few individuals expressed concern on the rarity of vulture sightings. The Mushere consider vultures as 'environmental cleaners' and as indicators of the location of carcasses. However, no respondent knew the cause(s) of the vulture decline. These kinds of situations present opportunities for collaboration between scientists and local people. Scientists can

provide proven facts about the causes of the observed decline in vulture populations and possible ways of mitigation, while local people can help with valuable information about vulture sightings, and become partners in its conservation through attitudinal changes and a willingness to make informed choices that can improve vulture habitats. For example, it has been found that part of the reason for vulture declines in Nigeria, as elsewhere in Africa (e.g. Kenya, Muiruri and Maundu 2010), is because of the trade in vulture parts for traditional medicine (Kioko et al 2015; Awoyemi 2014; Birdlife international 2015), a use which the Mushere acknowledged.

The Mushere can be helped to understand (through various educational and advocacy initiatives) that trading in vulture parts, poisoning of animals fed on by vultures, and habitat loss are contributing factors to the decline in vulture populations, which they rely on for vital information and the ecosystem service vultures render. Conservation practitioners, researchers and scientists can then collaborate to educate, share findings and deliberate with the locals on ways to mitigate the problem. This might help in elevating the status of the species to them and hence foster vulture appreciation, protection and conservation.

The Greater Honeyguide (*Indicator indicator*) is a cherished species because of the role it plays in directing humans to where bees' nests are located. One of the important forest resources that some Mushere people depend on for cash is honey, so the presence of the Honeyguide seemed to be very important to them. As observed in many cultures (e.g., Wood et al 2014; Muiruri and Maundu 2010; Dean et al 1990; Isak and Reyer 1989), the Mushere also accurately described the guiding behaviour of the Greater Honeyguide. It does short flights and perches in such a way that it is visible to the people, a behaviour it maintains until the beehive becomes apparent. Mushere belief has it that once the individual has harvested the honey, he ought to leave behind some combs for the bird, as a sign of appreciation. Failure to do so would usually

lead to the bird directing such an individual to harm when next they meet, such as directing the person to a snake (see similar reports by Chiweshe & Dale 2000). There is a moral lesson in this relationship of the Honeyguide and man: one ought to reciprocate gestures of kindness by showing appreciation. Nature one way or another would usually punish an ungrateful person. I could not determine if the use of the Honeyguide to locate beehives is an on-going practice among contemporary Mushere people. That would be an interesting area for future work.

The Cattle Egret (*Bubulcus ibis*) on the other hand serves as an indicator species that warns herders of the presence of snakes, thereby helping their cattle to avoid being in harm's way. Interestingly, this species had three names in Mushere *(ngupiya, leplep, yer-randong*) which appeared to be age-dependent, but will need further investigation to verify. There seemed to be a transition among Mushere generations in naming birds, with the younger generation possibly creating their own bird names mostly based on the birds' behaviour and appearance, as was observed with most bird names that had the 'yer' prefix attached to them. Such bird names seemed to be recent creations and almost all such birds were named because of their physical appearance e.g., *yer-dang* (bird of tail; Speckled Mousebird *Colius striatus*), *yer-kong* for the bee-eaters (Meropidae), *jebjah* or *Shosho* (meaning "smallish") for the Manikins (Estrildidae). These three species' names bear similarities to their Tembo names in the DRC (Kizungu 1998), suggesting the importance of perceptual salience in cultural naming of birds. If the transmission of folk bird names is not effectively ongoing, these new names may serve to replace the old ones. The Cattle Egret is also thought to can give children a white patch on the finger. Children sing to them when in flight, waving their hands to reveal their fingers. They believe that at the end of the wave and song, they usually find a white patch on a finger, a gift from the bird. It seems to be a widespread belief in the northern part of Nigeria. An important question for future research is whether conservationists can build on such relationships between children and birds

to encourage a love for birds and foster conservation by using such popular birds in conservation education for children in Mushere.

Birds that scavenge and those considered evil are not eaten; hence, Vultures (Accipritidae) and the Pied Crow (*Corvus albus*) are forbidden foods. This observation seems to be shared in diverse cultures, for example, Krech (2009) reported similar belief among Southern American Indian tribes who forbade the eating of chicken, which they refer to as 'Dunghill fowl' because it scavenges and eats faecal matter (also Kizungu 1998). The only species which Mushere people unanimously exhibited *ornithophobia* towards were Owls. Although I did not have sightings of owls in our bird records of Mushere or during my research period to ascertain what owl species occur there, I passed round the picture of a Barn Owl (*Tyto alba)* to participants during our focus group meetings. It was interesting to see that no one was willing to hold the picture beyond a second! Once they realized what bird it was, they quickly passed it on to the next person, warning the person beforehand of what he/she was about to see. When asked why they disliked the bird so much, they responded that its home is in the bush (meaning away from human settlements) and so had no business being around their homes. In addition to a Mushere belief that the call of an owl is a bad omen, they also believe that witches can transform into owls and carry out their evil. An owl calling from the roof of a house may also indicate the presence of a witch in that home, a situation that could create suspicion and even conflict in families and the community.

The fear of owls is not unique to Mushere people; it seems to be near universal (e.g., Marcot 2007 in the DRC; Krech 2009 in Southern America; Pandi and Abbi 2011 in the Great Andamanese; Forth 2004 in Nage; Mbuti Ichikawa 1998). The nocturnal lifestyle of owls, their unique adaptation to life in the dark, and their eerie calls may be reasons for this fear (Pandi and Abbi 2011). Interestingly, this belief and fear of owls was shared by both literate and non-literate respondents (overall, 67(30%) respondents recalled the Owl and all of them feared and

thought of it as evil) revealing how deep-rooted a cultural belief can be. Such a belief could place owls in a very precarious situation in the culture, although they do not seem to deliberately target owls to kill. Future research could focus on discovering the owls of Mushere, their population levels and the human threat levels to them due to these cultural beliefs.

In contrast to owls, an unidentified species called *ngagak*, believed to be an announcer of ill tidings such as the death of a loved one, is revered and not harmed. When a person dies away from home, *ngagak* brings the message to the community. Once my informant Haggai was on his way to the village and came across a woman who was also travelling his way; suddenly *ngagak* flew past 'crying' and the woman stopped, placed her hands on her head (a sign of deep sorrow) and exclaimed 'whose loved one would that be?' She meant that a death had occurred in the community. Haggai related this event because I wondered if such 'bird messages' were still being honoured and used in the communities. From a conservation perspective, such a belief gives the bird some measure of protection.

Because Mushere people differentiate birds mostly by their appearance, most bird species are lumped together. For example, all the species of pigeons and doves in our Mushere bird records (eight species) are all called *mbul*, except for the African green pigeon (Treron calvus) called *mbulkan*, probably due to its very different plumage colouration. The Western Grey Plantain-eater (*Crinifer piscator*) and the Green Turaco (*Tauraco persa*) two of the three species of Turaco that occur there, are known by the same generic name *kangkakat.* Interestingly, the Violet Turaco (*Musophaga violacea*) is named at the folk specific level as *rumjan*, again probably due to its distinct colours, and especially the distinct and striking head patterns. Estrildides (Grass finches and Waxbills) are generically classified as *tidit*. Exceptions are the two species of manikins identified in the area (*Lonchura cucullata* and *Lonchura fringilloides*). These are called *Jebjah* (meaning 'smallish') because of their relatively small size, and probably because of their flocking behaviour along with the Red-cheeked Cordon-bleu,

Uraeginthus bengalus that is known as *sokoton*, although some also refer to it as *tidit*. Both species of hornbills found in the area (Grey Hornbill *Tockus nasutus* and Pied Hornbill *Tockus fasciatus*) are referred to as *tluwet*, while all sunbirds (Nectarinidae) identified (seven species) are called *tau* or *sawu.* Size does not seem to affect which birds are eaten and which are not as they eat both small and large birds.

Ecological salience, the relationship between local abundance of a species and its cultural knowledge were closely related, as our results show that the most culturally salient species *mbul (*Laughing Dove and other species) corresponded with our most abundant bird group, the Columbidae. The Mushere also had more knowledge of birds that have a direct effect on their crops, and they could name and describe such birds. They showed little such knowledge when a species had no known use agriculturally or culturally, or when it was not common around the villages. I found that such unnamed birds could be familiar to respondents, but they would have no known Mushere names for them. I interpreted this observation to mean that only birds which have some utilization or cultural association, and which are commonly occurring around the villages are culturally salient. This observation is consistent with that made by Agnihotri and Si (2012), in their work with Solega communities where birds that were more likely to be recognized and named were those that had some cultural significance, as also observed by Hunn (1999).

7.3.2 Is There Evidence of Ornithophilia among the Mushere?

Overall, I encountered an indifference in respondents towards birds, which I have termed *ornithoapatheia*, in contrast to the *Ornithophilia* and *Ornithophobia* of Bonta (2003, 2010). Mushere people do not deliberately think about birds in the way that ornithologists and other bird enthusiasts do, or as reported for other indigenous groups elsewhere (e.g., Ichikawa 1998, Kizungu 1998) so to understand the place and value of birds in their culture, it is important to

relate it to their way of life, and their perceptions of wildlife. As has been observed in most rural African societies that are largely agrarian, there is usually little or no sympathy towards wildlife, most species of which are viewed mainly as meat (Lamarque et al 2009). This is not to say they are completely unimportant, it just means that they do not feature prominently in the cultural mind as things to show affection towards. Asking the question 'are birds of value or important to you' in Mushere makes no sense unless it is interpreted as 'do you have any use for birds?' Considering the number of birds that had names, cultural uses and associations, it suggests that the Mushere in the past may have given a little more attention to birds than the present generation of Mushere considering the bird names and stories which the present Mushere tried to recall.

The poor knowledge of the names, ecological associations and cultural uses of most birds listed could reflect the changes that have happened and are still happening in the social, cultural and economic lives of the Mushere. Such changes as language loss, habitat use, and general economic activities may be contributing factors to the low knowledge observed. Generally, the people were surprised at my interest in birds. 'Who cares about birds? Why are you interested in something as *unimportant* as birds? We see them as '*nama'* i.e., meat' (see similar report by FAO, Lamarque et al 2009). This perception goes contrary to what some have described (e.g., Tidemann et al 2010; Johnson 1992) that indigenous people view all elements as infused with spirit and that they view human life as not superior to other elements. I think that each indigenous group must be treated distinctly, as perceptions, and cultural values are specific to indigenous groups and are therefore not universal.

Most respondents regarded me as 'odd', perhaps because I have food security and few problems, I could afford to be interested in something as insignificant as birds. This attitude towards birds served to prove that birds might never have played a crucial role in the Mushere culture. Since birds do not contribute much to their cash economy and present interests (except

of course as pests causing loss in terms of food), they do not rank high in the cultural mind. This observation is crucial in the planning of bird-related conservation activities among the Mushere.

Why is there a low TEK and low appreciation for birds among the Mushere? There are two main arguments I advance in this regard: the first is linked to their cosmological world view (Alves et al 2012b; Houde 2007). The Mushere belief about the origins of the world as described through oral history and supported by literature (Mushere et al 2007) is monotheist. It involves a god called *pa Naan* (God the father) who created everything (Mushere et al 2007). Their cosmology is devoid of biological deities in the forms of plants and animals as seen in the cosmology of people elsewhere with rich TEK such as the Hindus, Indians, and native Americans, who have a culture of deep respect for wildlife and plants emanating from their cosmological worldviews. It seems that cultures that have animal gods, or totems as part of their cosmology have a culture of respect for nature (e.g., concept of *mother earth* Turner et al 2000) and seem to have stronger relationships and positive cultural conservation attitudes. Examples of these spread across different tribal groups and societies worldwide (e.g. Hunn & Thornton 2010-Tlingit; Clark & Slocombe 2009- Aborigines; Turner et al 2000 aborigines, British Columbia; Terashima 2001-Ituri of the DRC, Serpell 2005; Anderson 1996-*feng-shui*, China; Anderson 1996- Native Americans; Anderson 1996-Zapotc of Mexico; Brightman 1993-Cree tribes America). For example, Hickey (2006) described the people of Vanuatu of South Pacific as people who held much TEK which they used in traditional resource management in the past because of their cosmological worldviews about all facets of life. With the arrival of Europeans to the islands, and more recently, development and globalization, there has been a process of TEK erosion, although they still hold an inherent reverence for nature because of the belief that 'all things have a spirit and are interconnected through this spiritual medium' (Hickey 2006). The place of animals and plants among a people's culture may

therefore be affected greatly by how they are perceived from a religious and cultural perspective. Perhaps the Mushere might have had more value for birds if birds played a prominent role in their cultural and religious cosmologies, but again, they may have been wary of sharing or exposing their knowledge of such traditions, beliefs and practices with me, as they might be perceived as still holding unto the 'pagan' ways and beliefs. Alternatively, they may have avoided discussing such topics with me because I am a woman, and such information are culturally not women's premise. It is important to be bear this in mind in mind.

Secondly, religion may also be responsible for the observed pattern. Only recently has the Church started to teach about the Christian responsibility of creation care. Most Christians have been taught to understand that man is ruler over all, and most people take this in a utilitarian manner. Therefore, this religious influence and worldview might also be partly responsible for the observed lack of closeness with birds and the natural environment. To substantiate this argument, as part of my giving back to the host community, I worked with EDEN to organize a creation-care workshop for church leaders in Mushere in 2015. There were close to 30 church leaders in attendance. As part of our feedback mechanism, we asked participants to share their experiences with us about the workshop. Most of these clergy observed that our duty of creation-care as we presented to them had not been their understanding of the biblical instruction in Genesis 1:26-28 where Adam was instructed to multiply, take care of the earth and subdue it. They had always thought it meant every creature was under man to be used as he liked, there was no understanding of the responsibility of care involved. If the leaders who are instructors perceived the environment in this manner, it is only logical that the people they teach would also think about the environment in a comparable manner. In the old traditional religious way, it was believed that the environment was shared with malevolent spirits, therefore they were led by fear to respect it and the animals/plants. There were sacred parts in the forest where rituals were carried out for the gods, placing restrictions on what and where

people could do or go to in the forest. Without regard for such traditions these days, mostly because of embracing the Christian faith, such restrictions have been lost (Pa Lekshak 80 years old, personal communication, see also Alves et al 2012b; Hickey 2006).

7.3.3 Conclusion and Conservation Implications of Findings

The theoretical basis for this study was to investigate if the naming of birds by the Mushere was either utilitarian or intellectual. The findings of this study suggest that utilitarian factors were predominant in determining birds which are named and are culturally significant, although ecological and morphological attributes also seemed to play some role in naming ability of respondents.

Successful conservation would involve an attempt at elevating the value of birds in the cultural mind. This could be through conservation education using various participatory methods such as community discussions and seminars on the roles of birds in the forest ecosystem. Also, using bird documentaries and provision of birding equipment such as local bird field guides and binoculars. Especially targeting children can also lead to attitudinal improvement towards their views and perceptions of birds. Finally, it is important to relate these activities to improved livelihoods, as poverty is a crucial factor affecting sustainability and conservation in African communities. Indeed, the process has started in Mushere, as the people were surprised that I was studying something they consider unimportant.

Using my story and life experience studying birds and doing conservation work, many young Mushere individuals might become interested in birds and conservation and grow from perceiving birds as only good for eating, to perhaps even developing a love for them. Bonta (2010) tells the story of a local Honduran, Urbina Francisco, whom he mentored as a local birder and conservationist. Urbina developed into the country's leading conservationist, using

his local knowledge of birds alongside the scientific information he had learned to encourage attitudinal change towards birds and nature in his community because it provided him with a job, gave him a sense of responsibility and changed his understanding of birds and nature. Thus, as Bonta observed, finding and working with such individuals who have a potential for such interest in the wild, as well as having leadership qualities, can be a first step in encouraging local communities to become involved with bird conservation.

CHAPTER EIGHT

A Preliminary assessment of Mushere People's Perceptions of the Value of TEK and the Dulu Forest: Implications for conservation of the Dulu forest

Abstract

This chapter was aimed at understanding the perceptions, valuing and utilization of the Dulu forest, and the perceptions around its conservation. Methods involved the use of semi-structured open-ended questionnaires for data collection.
Results of the forest data revealed a 100% valuing of the forest as a valuable resource. The predominant perception of the forest was a place for timber and its extraction (51%), which was mainly for commercial purposes (85%). Respondents perceived that the Dulu forest has been greatly degraded (93%) and the main drivers were logging (64%), hunting/logging (23%) and increase in human population and hence demand for more farmlands (4%). The forest was perceived to have between 1-5 years (64%) of existence in the absence of any intervention. Respondents reported no known laws and regulations governing forest utilization (79%) and 50% of respondents thought community leaders should be responsible for the forest management. Finally, 93% respondents showed willingness to participate in the conservation of the forest. These findings reveal people's perceptions of the forest, and main drivers of the degradation of the forest. I suggest the need for an immediate conservation interventive measure in the protection of the Dulu forest, building on the positive attitude and community willingness towards the conservation of the Dulu forest.

8.1 Introduction: Deforestation

In recent years, deforestation issues have received global attention. It has been linked to land degradation, floods, famine and rural poverty in developing nations (Barraclough and Ghimire 1995). The world's remaining tropical forests, which make up about one-third of the world's land area, are fast disappearing and making significant contributions to climate change. There are many reasons why these concerns exist. For example, as many as 500 million foresters and those living close to tropical forests depend on forest resources for their livelihoods including food, fuel, fodder, etc.(Barraclough and Ghimire 1995). Deforestation also affects the ecological knowledge of forest dwellers leading to knowledge loss (Brazee and Southgate

1999), and forest degradation is closely followed by the extinction (local or otherwise) of diverse taxa.

Africa has the largest annual deforestation rate among the world's continents, with West Africa experiencing the most rapid deforestation (Wibberley 2014). The rate of forest loss in Nigeria is said to be approximately 3.5%, the highest rate globally (Modibbo et al 2016). Causes of deforestation in Nigeria include, population growth, fuelwood extraction, hunting and several anthropogenic activities including clearing of forest land for agricultural purposes (Suleiman et al 2017; Modibbo et al 2016).

8.1.1 Causes of Deforestation

Deforestation, a process whereby natural forests are cleared through logging or burning either to use as timber or to replace the area for alternative use (FAO, 1988), is a major challenge globally. Rates and causes of deforestation differ from region to region. In industrialized societies, it is mainly for development of big industries and businesses, while in less developed or developing societies, population growth (Nath & Mwachahary 2012; Jha & Bawa 2006; deFries et al 2010; Fairhead & Leach 1998; Rudel & Roper, 1997) and poverty are among the leading factors, and the activities linked to these factors include harvesting trees for fuel, timber, clearing trees to expand agricultural land, and housing (Geist & Lambin, 2002), an observation that led Jha & Bawa (2006) to conclude that human population development constraints and policy choices, were two leading factors driving deforestation globally. Global annual deforestation has been estimated to be around 13.7 million hectares a year, most of this being caused by human activities but also by natural forces such as storms, fires and diseases. Much of the world's terrestrial biological diversity are concentrated in tropical forests (about 70%), which are fast disappearing. The United Nations Environment Program (UNEP) launched a project in 2008 using the satellite imaging

Landsat to create an atlas of forests in Africa that will reveal the changes which have occurred over the past four decades. The atlas revealed massive deforestation taking place across the whole continent brought about by road construction, clearing of forests for plantations, increased urbanization and a high increase in population sizes. Deforestation is a huge challenge in Africa. For example, in Malawi, large areas of forest have been converted to farmland and mango plantations due mainly to population growth and demand for fuel wood (Wibberley 2014). Drivers of deforestation for sub-Saharan Africa (SSA) have been found to be different from those of other tropical areas such as Latin America and Southeast Asia. Deforestation rates were observed to be slower in SSA, but the underlying factors remained largely unknown. Recent advancements in the study of deforestation using satellite images have led to a better understanding of the dynamics of deforestation in SSA. Rudel et al (2013) observed that a key factor driving deforestation in SSA was urbanization, which gives rise to mass movements among rural dwellers to urban areas. As a result, forests or vegetation around urban areas experience more deforestation especially around transportation corridors, as human population increases, and the demand for energy and food increases, demands which then drive the cycle of deforestation in the rural areas who respond by clearing more land to produce more food etc, the demand for energy using fuelwood also increases (Rudel et al 2013). They identify three causative agents of deforestation in SSA to be; higher numbers of poor people, larger extractive sectors of the economies, and a more arid climate.

This is where community-based participatory approaches become useful for conservation. The advantages and disadvantages have already been discussed in earlier chapters, and will not be repeated, but to tackle the complex issues surrounding deforestation in sub-Saharan Africa, a mixed approach to conservation, considering the difference in context of deforestation in SSA, relative to other areas of tropical forest is important. Different authors

(e.g., Roe et al 2015; Wicander & Coad 2015; FFI 2013; Hill et al 2011) have suggested alternative income sources as a way of mitigating deforestation through a CBC approach, but results to prove the effectiveness of such inputs are lacking (Wicander & Coad, 2015; Wright et al 2015), and have been attributed to low funding, lack of project impact monitoring (Wicander & Coad, 2015), and flawed assumptions about people's needs, aspirations and the factors that influence choice (Wright et al 2015). This raises the issue of how important the understanding of local people's perceptions of their local nature/biodiversity is to the success of conservation.

8.2 Perceptions and Attitudes Towards Nature

Perception has been defined as '*...the understanding of reality by people... perception does not only involve that which manifests through the sense organs but is influenced by psychological and cultural factors'* (Silva *et al.* 2014). Washburn (1999) also defines perception as '*the way organisms visually receive, organize, and structure information from the environment'*. While *attitude has been defined as, '...a human psychological tendency, expressed by evaluating an object with favour or disfavour…consists of beliefs, which are associations people establish between the attitude object and various attributes'* (Gillingham & Lee 2002). Many studies have observed the crucial role that understanding people's perceptions plays in conservation (e.g., Beh et al 2013; Allendorf & Songer, 2012; Sundaresan et al 2012; Htun et al 2010; Kuriyan, 2010; Gillingham & Lee 2002; Fiallo & Jacobson 1995; Brandon & wells, 1992). For example, Allendorf and Songer (2012), observed that protected area (PA) management decisions are usually taken without recourse to the local communities surrounding the PAs, and suggested that one way to improve PA-park people relationship was through understanding park-people's perceptions of PA. Also, Allendorf et al (2006), associated a positive attitude towards three PAs with a perception of

conservation benefits especially, benefits resulting from management of the areas. They also found that positive attitudes towards PAs were more correlated with perceptions than with socio-economic variables.

Likewise, Bauer (2003), found that attitudes of Cameroonians living around the Waza National Park were significantly correlated to their perceptions of local benefits from PA management. In Brazil, Ferreira & Freire (2009), found that lack of familiarity with the goals of PAs affected people's perceptions of the PAs. Similarly, Bruyere et al (2009), found that perceptions of PA managers and local communities on the value of tourism varied because of inadequate communication. These studies mostly have one central theme, the importance of understanding perceptions of players involved in conservation about not only the environment and biodiversity, but the conservation management as well. Understanding local perceptions towards nature and conservation is therefore crucial for conservation success because studies of people's environmental perceptions are useful in '*finding out people's opinions, feelings, attitudes, preferences and values regarding the natural resources and/or environment around them*' (Silvaet al 2014). Such studies are also useful for addressing issues such as finding out changes that have occurred in a place, drivers of the change and how to mitigate or enhance such changes where they are positive.

8.2.1 Gender, Age on Environmental Perception.

In their book, 'environmental attitudes', Gifford & Sussman (2012) listed variables that determine people's concern for the environment to include age, gender, place of residence (i.e. urban-rural) and direct experiences with nature. Literature about gender and perceptions of the environment suggests that women show more positive attitudes toward the environment than men (Torgler et al 2008), and usually volunteer more in environmental-related activities (Bekkers 2005), but literature on the subject is scarce and inconsistent (Van Liere & Dunlap

1980; Hines et al 1986-87). Although recent studies have found women to hold more positive perceptions of the environment than men (Zeleny et al 2000; Bord & O'Connor 1997; Hunter et al 2004), Kealy et al, (1990) and Cameron & Englin (1997) however found that men's perceptions and attitudes were more positive than women, while brown and Taylor (2000) found no gender differences in environmental perceptions.

Two theoretical bases for gender differences in environmental perception exists. The first school of thought claims that these differences exist because of the biological, psychological and experiential factors faced by men and women, that lead them to respond to issues and problems differently (Torgler et al 2008). The second argument (the opportunity argument), suggests that these differences reflects the different opportunities and external limitations men and women face, they do not necessarily have different motivations.

Age has been suggested to be negatively correlated to environmental perception, with younger people showing more positive attitudes towards environment than older individuals (Whitehead 1991; Howell & Laska 1992; Togler et al 2008). However, a meta-analysis of environment-age data by Wiernik et al (2013) revealed that older individuals often showed more positive perceptions towards the environment, such as engaging more with nature, avoiding harmful behaviour towards the environment and conserving natural resources and raw materials. Aminrad et al (2011) also found that older students in a Malaysian University showed more awareness and positive attitudes towards nature, likewise, Wray-Lake et al (2010) fond that young people perceived the environmental responsibility as the role of governments and consumers, rather than personally accepting responsibility for the care of the environment. Although empirical data are lacking, and inconsistent, the general pattern seem to suggest that older individuals might hold more positive perceptions towards nature than younger cohorts.

8.3 Objectives

My main research goals were to carry out a preliminary assessment of the perceptions of the people within the immediate Mushere communities surrounding the Dulu forest including the management/leadership and conservation of the Dulu forest. The objectives were:

1. Find out what changes have occurred in the Dulu forest;
2. Find out the causes/drivers of those changes.
3. Suggest ways of mitigation.

8.3.1 Hypothesis

Null hypothesis: There is no difference in the perceptions of the forest/use/valuing based on the gender, and age of respondents.

Alternative hypothesis: Respondent's perceptions of the forest will differ based on gender, and age of respondent.

8.4 Methods

I used semi-structured open-ended questionnaires (appendix 8) to gather information on respondents' knowledge, use and perception of the forest. For the forest survey, respondents were drawn from Kaban (13.2 %; four males, 3 females), Naula (83%; 28 males, 16 females) and two males (3.8%) respondents only from Njemut (reasons given in chapter three). I used purposive sampling to find individuals who visited the Dulu and used its resources, and who were willing to participate in the survey, mainly because individuals who had never visited the forest, nor relied on it for their income and sustenance cannot offer any meaningful contributions to the survey. Using a purposive sampling technique proved advantageous because it enabled me to find respondents that had the knowledge I was interested in understanding. Although the method has the disadvantage of being subjective and limiting in

its scope of generalization, there seemed to be no compelling reasons to argue that these responses were not representative of the communities, as my informal interactions and conversations with the Mushere revealed that their general perceptions of the forest were in line with my findings. In addition, specialized knowledge research depends on expert knowledge, and 20-30 respondents could produce the required information (Borgatti 1999). Respondent selection was dependent on the willingness of individuals to participate in the research. The surveys were conducted at weekends when most of the adults were in the villages. Although the Kaban community is not one of the custodians of the Dulu forest, their closeness to it and their utilization of the forest resources were criteria for their inclusion. The questionnaire had three sections; a section on the demographic information of respondents, the second on general forest knowledge and use, while the third section contained questions of conservation interest.

8.4 Analysis/Results

8.4.1.1 Data Analysis

Data were analysed using descriptive statistics. The responses were coded, and thematic analyses were conducted to classify responses into groups. Silva *et al.* (2014) and Bernard (2000) contain detailed descriptions of the thematic method. In summary, it involves a careful analysis of the texts for similarities in responses, grouping similar responses under a central theme, coding the themes for analysis and using an appropriate statistical tool to find out the existing relationships in the responses. In response to the question about perceptions of the Dulu forest, fourteen themes emerged from the initially coded responses. Each response was analysed using the approach described in chapter four. There were certain responses which were unique and were maintained. The fourteen themes are presented in the results section. The category the theme animals/plants contained all responses that signified that the individual

conceptualized the Dulu in terms of mainly any or specific animal or plants, other than birds i.e., responses such as; 'I think of hunting, trees, vegetables etc reported response were themed as animals/plants. All respondents who mentioned perceiving the forest only in terms of trees or timber were themed 'trees', while responses that depicted honey collection and hunting, or mentioning any animal were themed 'honey/animals'. Any mentions of wild animals together with the serene environment the Dulu provides was themed 'wild animals/peaceful place, while those who thought of the Dulu as a place for extracting timber and for farming were also themed as 'timber/farming'. Those who reported perceiving the Dulu as 'a bush, forest, etc, i.e. a working ecosystem were categorized as 'forest'. Any response that dwelt on the destruction to the forest was themed 'destruction going on', while responses that dwelt on harvesting wild edibles was themed' wild vegetables and fruits'. The others included references to farming, birds, and a combination of honey collection and harvesting timber (honey/trees). Non-parametric independent sample tests (Kruskal-wallis and Mann-Whitney tests) were carried to determine the differences between the frequencies of responses in the various categories by age, gender and occupation, to determine whether the null hypothesis was to be accepted or rejected.

8.4.1.2 Results: Distribution of Respondents

In all, fifty-three respondents were surveyed, 19 (35.8%) females and 34 (64.2%) males. The age distribution was 18-29 years 16 (30%), 30-49 years 18 (34%) and 50 years -above 19 (36%). Thirty-three (62%) were farmers, 12 (23%) were timber operators and eight (15%) belonged in other occupation types.

8.4.1.3 Perceptions, Changes to the forest and Valuing of the Dulu Forest

Perceptions of the Forest by Gender: the gender perceptions of the forest were; Timber (14 men, 6 women), trees (2 men, 3 women), Honey/animals (3 men, 2 women), forest (4 men, 0 women), land for farming (2 men, 1 woman), fig. 8.1. Although more men than women (70% of men and 30% women), perceived the forest in terms of timber extraction, the overall perceptions of the forest were not statistically different by gender (Mann-Whitney Test = 253.50, S.E= 52.38, $p > 0.05$).

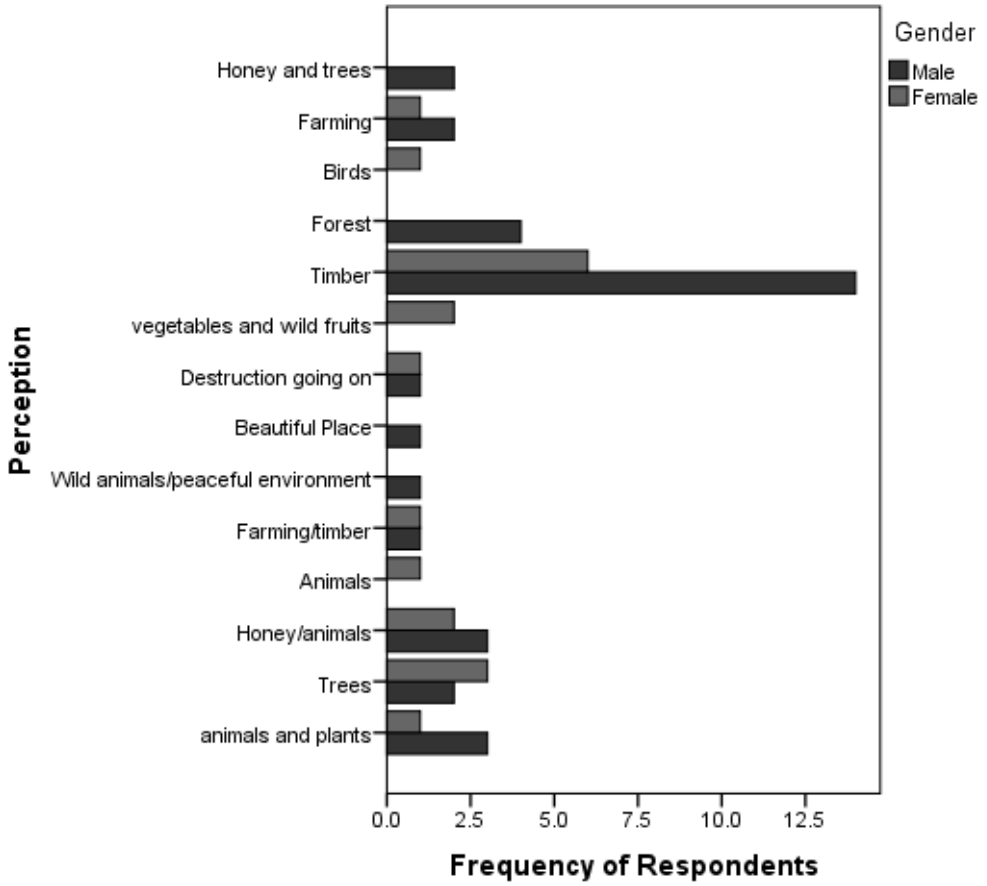

Figure 8.1: Gendered Perceptions of the Dulu Forest.

Perceptions of the Forest by Age: Respondents had differing perceptions of the forest by age, when confronted with the question "when I think of the Dulu I think of ...', The two younger age categories (18-29 years, 55 % ; 30-49 years, 35 %), perceived the forest predominantly in relation to timber extraction, while only 10 % of the oldest age category (50 years- above) perceived it in terms of timber extraction. The predominant perception for the oldest age category was related to honey/wild animals (80 %), fig. 9.5.2. This difference in perception between the younger and oldest category were statistically different (Kruskal-Wallis test = 6.96, df =2, $p < 0.05$).

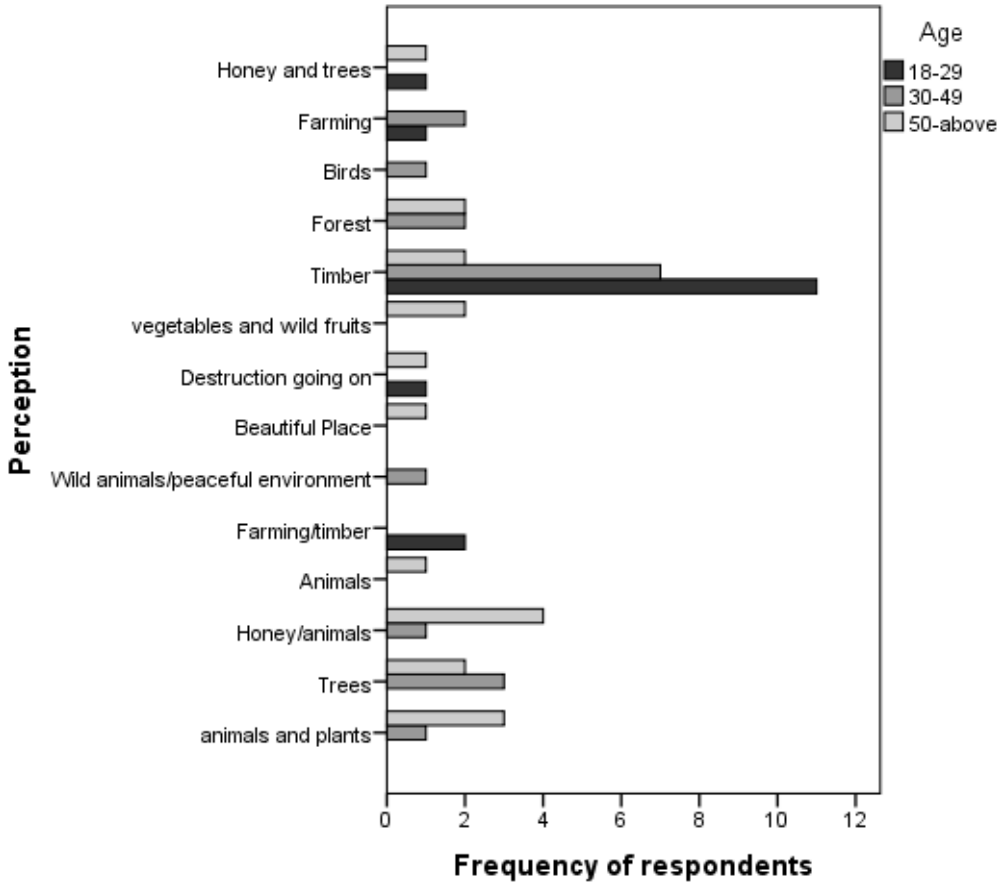

Figure 8.2: Age-related Perceptions of the Dulu Forest.

With regards to perceptions of the forest based on respondents' villages, the perceptions were different statistically (Kruskal-wallis test = 14.28, df =2, $p < 0.05$), this difference however was because all respondents from Naula village (n=20, 100 %), perceived the forest as a place for timber extraction (Fig. 8.3) while none of the other respondents from other two villages perceived it in that way.

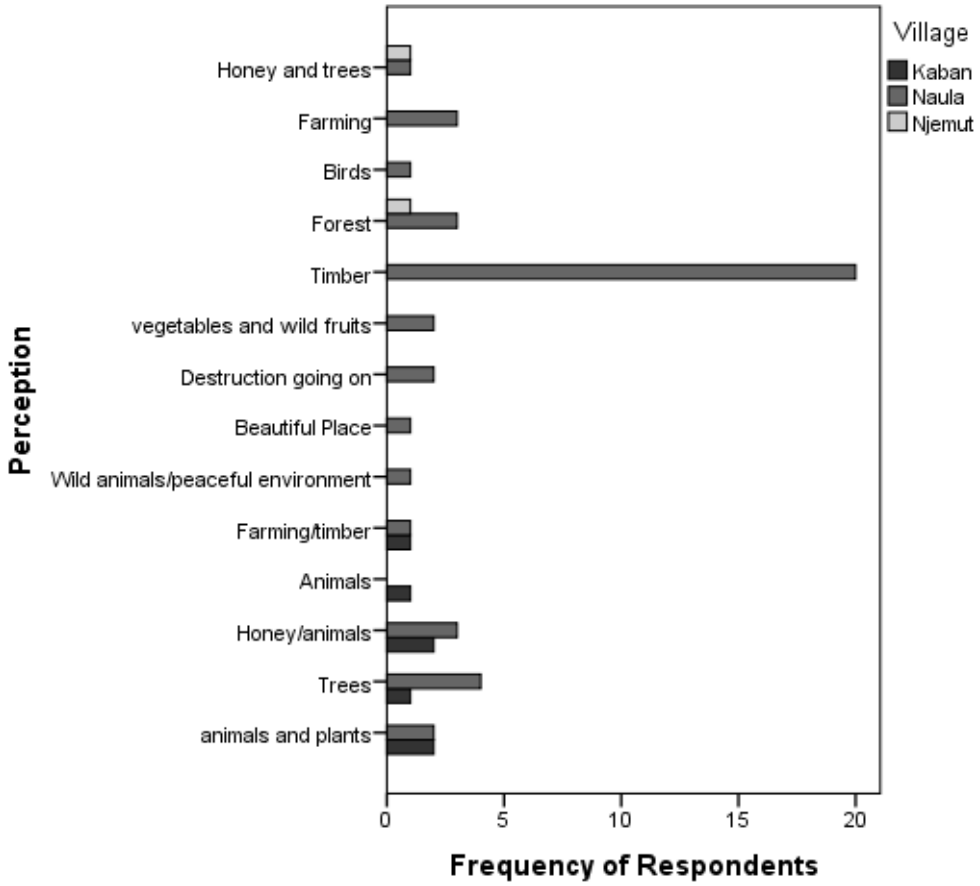

Fig. 8.3: Village-related Perceptions of the Dulu Forest.

8.4.1.4 Forest Knowledge and Utilization

As a measure of forest knowledge, I asked respondents how often they visited the forest. The result revealed that 33 (62%) visited at least once a week, 10 (19%) visited monthly and another 10 (19%) visited at least once a year.

Gender and Frequency of Visits: Men from all villages reported more weekly visits (79 %) than women (21 %). On the other hand, more women reported monthly visits (60 %) than men (40

%), and rarely visiting the forest (women 60%, men 40 %). These differences between the genders were statistically significant (Mann-Whitney U= 451.0, S.E = 46.55, $p < 0.05$).

Age and Frequency of Visits: The highest weekly visits were by the middle-aged population (30-49- years: 49 %), followed by the youngest age category 18-29-year olds (33 %) and finally the oldest age category, 6 (18 %). For monthly visits, those within the oldest age category was the highest 6 (60%) followed by the youngest group, 4 (40%), and none of the middle-aged group reported monthly forest visits. The oldest age group reported rarely visiting the forest 19 (36 %), followed by the middle-aged group 18 (34 %) and lastly the youngest group 16 (30 %). These differences in age visits were statistically different (Kruskal-wallis test = 12.44, df = 2, $p < 0.05$)

Village and Frequency of Visit: the highest number of respondents who reported weekly visits to the forest were from Naula community 29 (88 %), followed by members of Kaban community 2 (6 %) and Njemut community, 2 (6 %) respectively. Only 10 (100%) respondents from Naula communities reported making monthly visits to the forest, while 5 (50 %) respondents from Naula and 5 (50%) from Kaban reported rarely visiting the forest respectively. The differences in village visits were statistically different (Kruskal-Wallis test = 7.86, df = 2, $p < 0.05$).

Gender and Forest Utilization: The predominant use of the forest was for timber extraction 27 (51%; 20 men, 7 women), followed by farming 8 (15%; 4 men, 4 women), other uses are presented in fig.8.4. The reported gender uses of the forest were not statistically different (Mann-Whitney U = 393.0, S.E= 50.11, $p > 0.05$).

Age and Forest Utilization: The predominant reported use of the forest by all age groups was for timber extraction, (18-29 years, 37 %; 30-49 years 44 %; 50 years-above 16 %).

This was followed by land for farming, (18-29 years 25 %; 30-49 years 25 %; 50 years-above 50%). The next higher category was a combination of timber/farming, (18-29 years 60 %; 30-49 years 20 %; 50 years-above 20 %). These reported uses of the forest were statistically different across the age groups (Kruskal-Wallis Test = 9.26, df =2, $p < 0.05$).

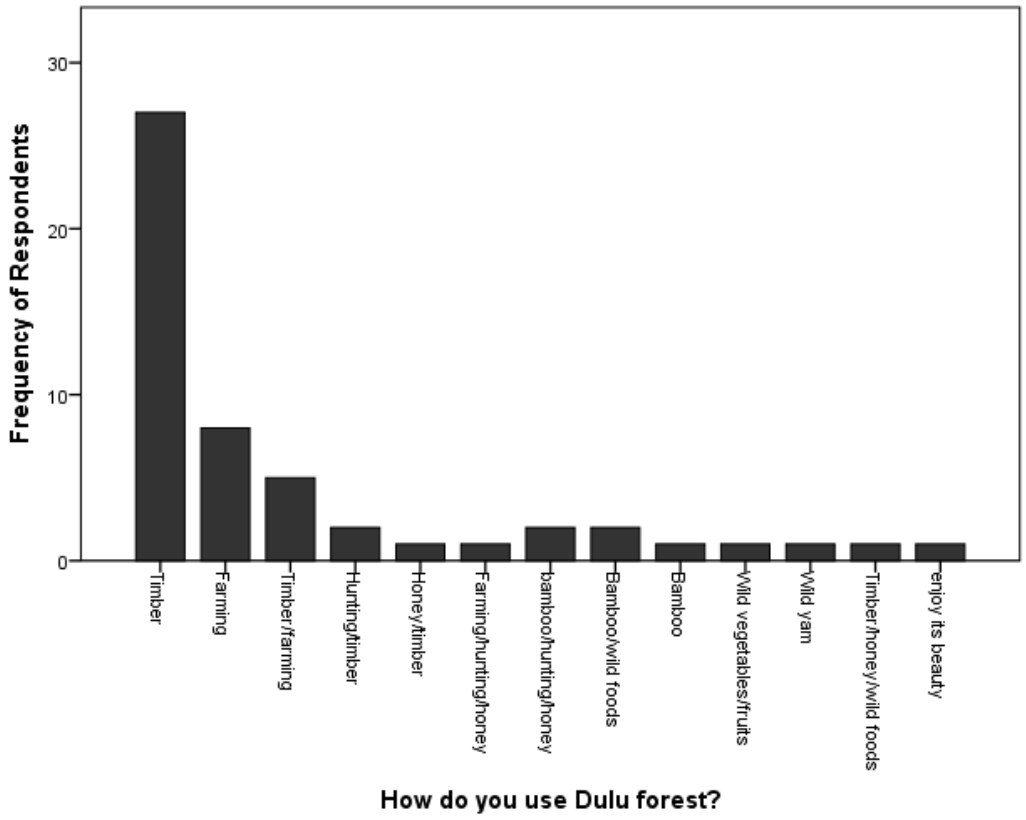

Fig. 8.4: Respondents' Self-Reported Utilization of the Dulu Forest

Perceived Most valuable Forest Resources by Gender: The most important perceived forest resource was timber 23(43 %; 18 men, 5 women) followed by land for farming 13 (25 %; 6 men, 7 women), next was wild foods (17 % ; 5 men, 4 women) and wild foods/ timber (9 %; 4 men, 1 woman). These gendered differences in responses were not statistically different (Mann-Whitney U = 239.50, S.E = 51.01, $p > 0.05$).

Perceived Most Valuable Forest Resources by Age: The different age categories also reported, timber (18-29 years 44 %; 30-49 years 48%; 50 years-above 9 %), land (18-29 years 8 %; 30-49 years 23 %; 50years-above 69 %), wild foods (18-29 years 11 %; 30-49 years 33 %; 50 years-above 56 %) and wild foods/timber (18-29 years 40 %; 30-49 years 20 %; 50 years-above 40 %) as the most valuable forest resources. These ages reported differences were statistically different (Kruskal-Wallis Test = 16.24, df = 2, $p < 0.05$).

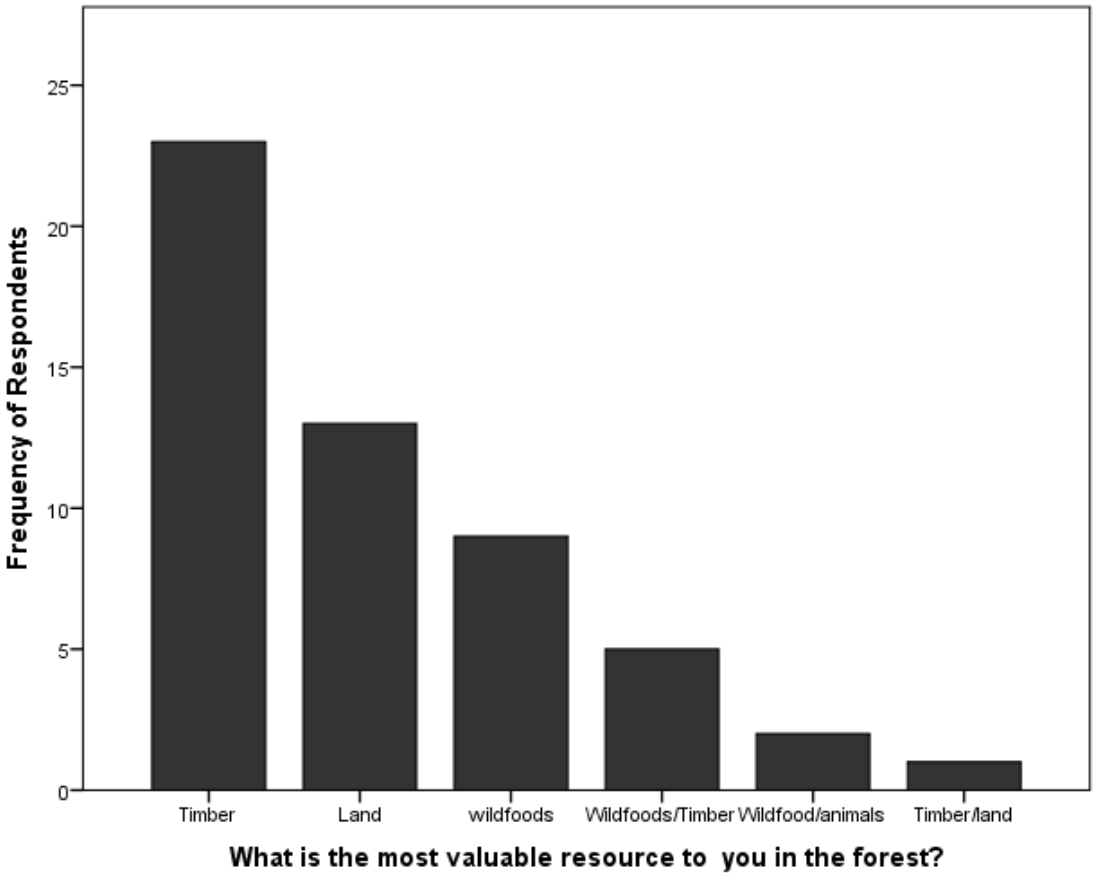

Figure 8.5: Respondents' Perceptions of the Most Valuable Resources of the Dulu Forest

Forty-five (85 %) reported extracting timber for purely commercial purposes, while five (9 %) claimed timber was harvested mainly for personal or community building projects. No one mentioned use of trees for firewood, because they extract firewood from the woodlands close to their homes, and never from the Dulu forest.

8.4.2 Leadership, Forest Change and Forest Conservation

Perceptions on the leadership responsibility of the forest revealed that 14 (26%) thought that community leaders should be responsible for managing the forest, while 13 (25%) thought the village chief should be responsible for the management of the forest; 10 (19%) perceived that the government should be responsible for the forest, while 9 (17%) thought it should be the responsibility of whole community. When I analysed these responses by village, respondents from Naula community suggested community leaders 13 (29.5%), the chief, 13 (29.5%), the whole community 8 (18.2%), men, elders, government/community members all had (2.3%) and 2 individuals who claimed they had no suggestions (4.5%). Respondents from Kaban on the other hand suggested the government 4 (57.1%), community leaders 1(4.3%) and forest guards 2(28.6%) should be responsible for the management of the forest. Lastly, respondents from Njemut thought that the government (50%), and the community (50%) were to be responsible for the forest management.

On whether respondents were aware of any existing laws and regulations governing forest utilization, 42 (79 %) claimed ignorance of knowledge of any rules or laws governing the use of the forest, 7 (13 %) reported there was only law against felling economic trees especially the Shea butter plant *Vitellaria paradoxa*, and a further 4 (8 %) claimed there were laws but no implementation.

Gender perceptions on the change to the forest: more male respondents (67 %) thought that the forest had changed than women (23 %), 50 % of both men and women thought it has not changed, while 64 % of men and 36 % of women claimed they did not know whether it has changed or not. Also, on how the forest has changed, 67 % of men and 33 % women claimed the forest used to be dense, and has been destroyed by logging, one male individual claimed it

has remained intact, a female claimed it was improving, and two women claimed they had no idea on why the forest had changed. The responses were not statistically different (Mann-Whitney U= 365.50, S.E = 24.50, $p > 0.05$).

Age perceptions on changes to the forest: When respondents were asked if they thought the forest had undergone, or was undergoing any change, 39 % of the oldest category claimed it had changed, followed by 33 % of the middle-aged category and finally, 27 % of the youngest category. Next, 50 % each of the youngest and the middle-aged groups claimed that the forest had remained intact, undergoing little or no change, none of the oldest age group responded in this category. Lastly, another 50 % each of the youngest group and the middle -aged group claimed they did not know if the forest had changed or not. Also, when asked how the forest had changed, 39 % of the oldest age group, 33% of the middle-aged group, and 29% of the youngest age group claimed that it has been destroyed and has changed from being a dense forest to an open one, one individual in the middle-age claimed it was still intact, one respondent from the youngest age group claimed the forest was improving, while 50 % each of the youngest and middle-aged groups claimed that they did not know what has happened to the forest. These responses were not statistically different (Kruskal-wallis test = 2.39, df = 2, $p > 0.05$).

Gender Responses on perceived reasons for Forest Change: On why the forest has changed, most men (83 %) and 17 % women, perceived the change to be because of hunting and logging pressure, 59 % men and 41 % women claimed it was because of deforestation, 50 % each of men and women thought increase in population size was responsible for the change, and lastly, 60 % men and 40 % did not know why the forest had changed or not. The responses were not statistically different (Mann-Whitney test = 285.50, SE= 45.87, $p > 0.05$).

Age Responses on Perceived Reasons for Forest Change: when respondents were asked why they thought the forest has changed, 32 % of the youngest age group, 24% of the middle-aged group, and 44 % of the oldest age group claimed deforestation was responsible, hunting and logging pressure (25 %, 58 % and 17 %) respectively, population growth (50 % each of the youngest and oldest age groups) and lastly, those who had no ideas as to how (20 % , 60% and 20 %) of the youngest, middle-age and oldest age groups respectively. The responses were not statistically different (Kruskal-Wallis test= 4.31, df = 2, $p > 0.05$).

When respondents were asked how long they thought the forest would last given the present activities, thirty-four (64%) respondents perceived that the forest had between 0-5 years more before it gets exhausted; one respondent believed that it had about 100 years more to go, while another respondent thought that the forest would last forever. Three (6%) others responded with 'I don't know' to the question (fig. 8.6).

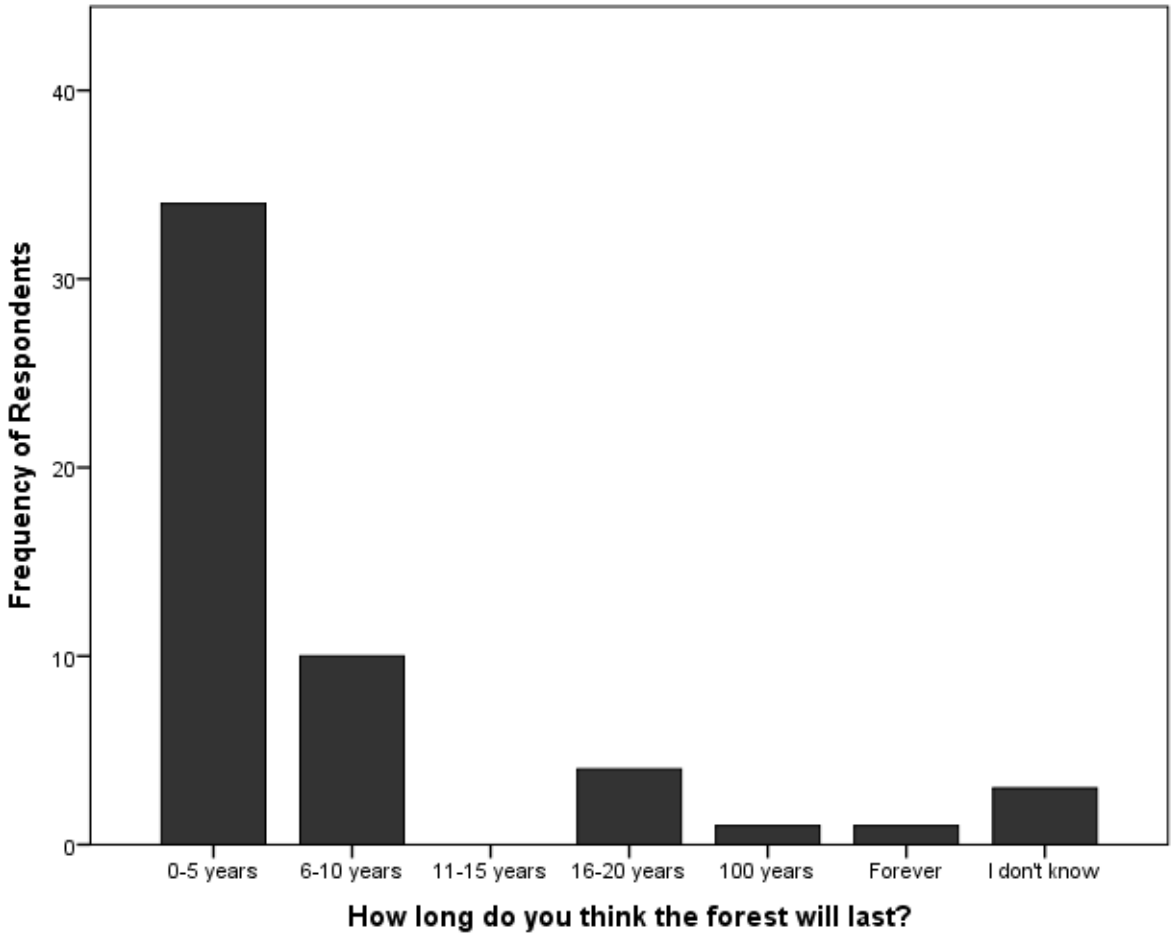

Figure 8.6: Respondents' Perception of the Longevity of the Forest

In addition, I asked respondents if they would be willing to participate and help in the conservation of the Dulu forest and 49 (93%), including all the female respondents responded in the affirmative. Age-wise, this accounted for 33 % (18-29 years), 31 % (30-49 years) and 38 % (50 years-above). Only four male respondents (8 %; 75 % 30-49 years, 25 % 50 years-above) responded in the negative. Why would respondents support or not support the conservation of the Dulu forest? An equal proportion of men and women (50 % each, all 50 years-above), would support the conservation of the forest to stop the present destruction going on there, another 50 % each of men and women (25 % youngest age, 17 % middle age, 58 % oldest age) wanted it to improve because they love the forest. More men than women (60 %

men, 40 % women; 40 % youngest age, 40% middle age, 20 % oldest age) would support conservation because they want the forest to be sustainable, 82 % men and 18 % (35 % youngest age, 41 % middle age, 24 % oldest age) were interested for the sake of future generations, while 33 % men and 66 % women (50 % youngest age, 33 % middle age, 17% oldest age) would support conservation because they wanted the whole community to benefit from the results from the conservation of the forest. Only three men were negatively inclined towards the conservation of the forest, because they perceive that it would take their lands (one 30-49 years old, another 50 years-above), and because they were not sure the conservation work would bring about any changes in attitude and use of the forest (one 30-49 years old).

Lastly, I asked respondents to provide suggestions toward the conservation of the forest. Sixteen (30%; 9 men, 7 women) suggested allowing the land to regenerate, 14 (26%; 9 men, 5 women) suggested the creation of a community forest reserve, while nine (17%; 6 men, 3 women) believed laws should be made to regulate the use of the forest and its biodiversity, (fig. 8.7).

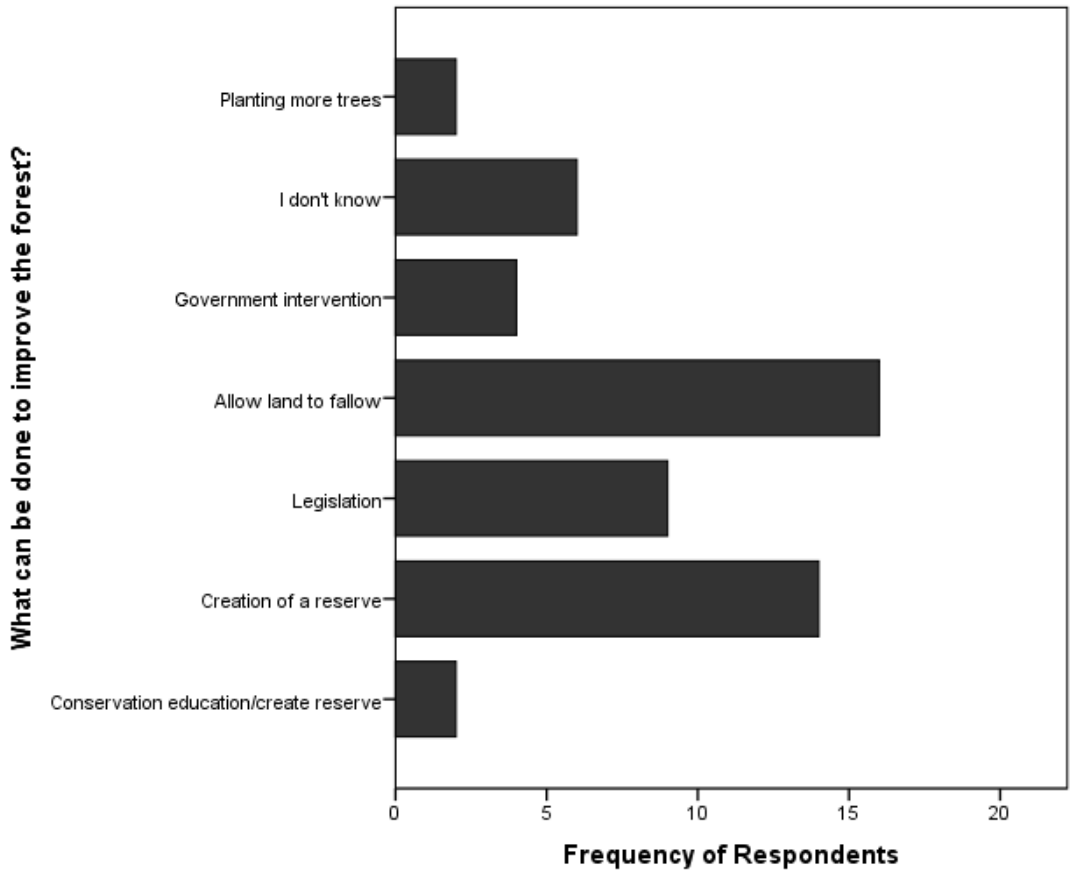

Fig. 8.7: Respondents' Suggestions on Ways to Improve the Dulu Forest

8.5 Discussion

8.5.1 Gender and Age on Perceptions of the forest (Knowledge and Valuing)

'*To understand how people related to their natural environment it would first be essential to understand how people conceptualized that environment...'* Eugene Hunn 2014

One of the crucial issues to understand before embarking on a community-forest conservation project is how important the forest is to the people and how they perceive it. The key

perceptions of the forest centred around timber extraction and land for farming, and these perceptions were mostly age-differentiated. The only statistically significant gender-differentiated response was in the knowledge of the forest, which was measured by how regularly respondents visited the forest. Although this might not be the best measure for knowledge, it gives an idea of those who might hold more knowledge of different aspects of the forest because of frequency of visits, as individuals who hardly visit would not be acquainted with the forest. Also, because men reported more visits to the forest mainly for timber extraction, in-depth knowledge of the forest flora, might be women's knowledge (e.g., Voeks, 2007; Guimbo, 2011), while aspects of the ecology of the forest necessary for effective timber extraction might be men's domain, as the findings revealed that women reported perceiving the forest more in terms of its floral composition (trees, wild vegetable and fruits) and the land for farming, than men did, but this is subject to further research.

Age, however was consistently a significant factor in differentiating the perceptions of respondents on the valuing, knowledge and use of the forest, except in the perceptions of changes to the forest, where perceptions did not seem to change significantly with age. The age-related perceptions revealed various ways that each age group viewed and utilized the Dulu forest. The oldest group valued the land more, while the middle and youngest age groups valued timber more. Contrary to the school of thought that theorizes that older folks are usually less interested in contributing towards conservation, this results showed that older Mushere respondents were more interested in the preservation of the forest than the younger respondents This is an important finding, that supports the observations of previous researchers (e.g. Wiernik et al 2013), that older individuals tend to perceive the environment more inclusively and positively than younger individuals, mentioning uses of the forest that included its aesthetic values, its provisional uses, and even mentioning the dislike for the destruction going on in the forest as a result of the extraction of timber, although certain

individuals from the two older categories were also concerned that conservation might deprive them of their lands. Although certain authors have suggested that age is negatively correlated to the willingness to contribute to additional environmental protection (because older people do not usually have much stakes anymore in the results of such activities (whitehead 1991; Torgler, 2008), these findings do not agree with that. In this study, older respondents were less in support of the destruction than the younger respondents, and were the only group whose main reason for wanting to support conservation was to stop the destruction going on, because they love the forest and wanted to see it improve. Based on these results, the null hypotheses on gender is retained, while that on age is rejected. The younger age groups on the other hand, were more interested in the economic aspects of the forest, probably because they are the age group who are at the productive stages and have families to care for.

8.5.2 Drivers of Forest Change

From the findings of this study, three main drivers of forest change were identified; deforestation due to logging, hunting pressure, and population growth, like the findings of Chan & Sasaki (2014) in Cambodia among the rural poor, where deforestation was driven by illegal logging, among others. One of the crucial requirements of the REDD+ is for countries to identify drivers of forest degradation and deforestation, so that they can develop effective action plans and strategies (Hosonuma et al 2012). A review of reports by countries on drivers of forest change and degradation by Hosonuma et al (2012) reported that fuelwood/charcoal production and subsistence/commercial agriculture were main drivers in Africa, while commercial agriculture was the main driver in both Africa, Latin America and Asia (see also Houghton, 2012). Understanding local drivers of forest degradation and deforestation is central to overcoming the global challenges associated with forest loss and degradation such as habitat

loss, species extinctions and climate change. It is also important for developing national/local policies and strategies for mitigation (Boucher 2011; Rudorff et al 2011). Hosonuma et al (2012) also observed that despite the importance of such understanding, empirical data are lacking on drivers of forest change and deforestation, and so drivers of forest change remain unknown, but forest degradation is said to be driven by timber extraction, and logging accounting for about 52% in Latin America and Asia. Data from most African countries are lacking, and the findings of this research, though preliminary, and based on limited data are a contribution at a local level.

The results of this research revealed that most respondents visited the forest at least once a week mainly for timber extraction. Although non-timber forest products (NTFP: honey and wild animals, wild yam, wild fruits and herbs) were also mentioned as extractive resources, few respondents perceived the forest in the light of these resources even though they are important as food in times of scarcity, and some fruits could be sold in exchange for cash (Mahanty *et al.* 2006). This reveals the extent of pressure exerted on the forest and its resources.

Underlying the main drivers of degradation, at least in Africa is poverty. As Angelsen & Wunder (2003) observed, forest loss contributes to maintaining or increasing poverty, which is why several authors have suggested sustainable livelihood alternatives to forest resource utilization. The World Bank defines poverty as not only a lack of material possessions, but also a feeling of vulnerability and insecurity in the face of challenges (Mahanty *et al.* 2006; World Bank 2002). Therefore, to tackle the poverty challenge, a holistic approach that will take into consideration the five types of assets that makes up livelihoods (human, social, political, financial and physical assets) is necessary. Carney (1999) and Mahanty *et al.* (2006) observed that '*the degree to which communities, families and individuals can access these five assets and put them to productive use determines their ability to build sustainable livelihoods'*. There is the need to use a multi-dimensional approach such as collaborations between various experts

related to these five assets to help develop strategies that would suit the uniqueness of the Mushere situation.

Poverty is a complex situation; it cannot be addressed effectively through conservation education alone, but also through impacting knowledge about environmental and natural resource stewardship (Swinton & Quiroz, 2003). We would need an approach that includes governance, appropriate enterprise development and integrated approaches (Mahanty *et al.* 2006). The predominant perceptions of the forest were mainly utilitarian, and there was no indication that sustainability was part of the strategy for the utilization of the forest, as revealed by the perceptions of the locals on the longevity of the forest. Several authors (e.g., Badola,1998) have suggested that dependency of local people on forest resources results from a lack of alternative livelihoods, and that social, economic and cultural factors are the key determinants for accepting a proposed alternative. This means that to conserve the forest effectively, finding an effective means of tackling the challenge of illegal logging must be prioritized, and this could be possible through a joint-partnership with the various stakeholders (including the local forestry departments, and various stakeholders at the community level).

The perceptions of the locals to the forest also sheds light on possible reasons for the observed low knowledge and appreciate of birds reported in earlier chapters. Where the relationship of the locals with their forest ecosystem is mainly extractive, little or no attention will be paid to intrinsic value of the forest such that individuals might take time to enjoy and observe the biodiversity in the environment. Likewise, the destruction/degradation of the forest habitats might explain the absence of forest bird species from the cultural mind.

To further understand the activities going on in the Dulu forest, EDEN carried out a preliminary assessment of the value chain of the timber trade in 2014 (EDEN & Kyesyil 2014 unpublished data) and our findings revealed that the main beneficiaries were the middlemen and the local

timber-shed owners. These people are mostly non-Mushere ‘outsiders’ who would easily look elsewhere for timber once the Dulu forest has been exhausted, leaving the locals to face an uncertain future from whatever ecological challenge would ensure from the destruction of the forest. They take advantage of the poverty of the locals, paying them as little as between a dollar to two dollars for a days’ job. Women are usually used as local ‘transporters’ to carry logs out (usually on the head) from where they are harvested to the nearby villages where tractors and other vehicles suitable for the bad roads would carry them to the city. The women spend on average between an hour and two hours walking with logs of wood on the head to the villages. The men are mostly involved as timber operators or contractors. An operator is the one who handles the machines and fell the trees, while the contractor owns the machines and maybe a tractor for transporting timber out to where they are needed. The timber operators make about eight US Dollars a day for 80 logs of timber (at an exchange rate of 480 NGN to USD). The community is paid an equivalent of two USD for 80 timbers which it uses for its development (EDEN & Kyesyil 2014 unpublished data).

Interestingly, one of the respondents who was helpful in organizing people for this research was a timber contractor. He is also a community leader who surprisingly did not seem threatened by my interest in finding out information about the forest and the timber business. He was willing to share information with me about the state of the Dulu forest and even reported wanting to see the forest restored. He also expressed his willingness to participate in any conservation project to that effect. This response was the same with most of the individuals involved in the trade who were involved in the research. They all reported wanting to see the forest improve, and wished that their activities could be controlled. If these were sincere responses (as people might be expecting some monetary benefit), it gives hope for the conservation of the forest, which should go simultaneously with a poverty alleviation or alternative livelihoods plan that will provide for most the locals in the timber trade

Equipping the Mushere with information about the ecological importance of the forest, provides them with more options as they consider reasons why they should work together in ensuring the sustainability of the Dulu forest. Knowing the significance and relevance of the Dulu to the Mushere communities living close to it was therefore one of the important findings in the research. Also, since there was no prior information or data on the past state of the forest, as is common in most African societies (e.g. see Abel & Blaike 1986), I relied on narratives from the locals on forest history and utilization.

Reconstructing the Dulu from the narratives of the locals shows that the Dulu used to be a very thick, dark forest, with many wild animals including large carnivores and herbivores. Dulu forest was a type of southern tropical forest and was home to many typical forest bird species and other animal taxa such as large mammals, that have been lost through habitat loss or change, and hunting pressure. The Kagoro Nindam forest in northwest Nigeria would have been the closest in structure and bird/animal composition to the Mushere forest (see Abalaka and Manu 2007; Dyer *et al.* 1986 for birds of Kagoro Nindam forest) due to its proximity and similar climatic conditions, and a look at the available literature on Kagoro could give a picture of what the Mushere forest was like.

Most of the respondents thought that the wild animals may have moved out because of the noise from the modern machinery used in felling trees, or as a response to hunting pressure. Interestingly, one respondent claimed that the forest has remained intact, even though this respondent was old enough to know what the forest was like in the past. Another respondent also claimed that the forest was improving in its composition of both plants and animals. These two respondents were timber operators who showed initial resistance towards the research, and who I suspected were not being truthful because they probably felt their trade was going to be threatened by the research. If correct, this reveals the hostility that people can show when they feel their means of livelihood is being threatened. It also underlines the need for researchers to

be careful when conducting such research as one could literally be exposed to danger to one's life based on the wrong perceptions of the research. Again, one ought to be aware of situations where respondents can give false responses either to deter the research focus, 'contaminate' the data or simply to make a point (see Milner-Gulland et al 2014; Nuno et al 2013; Milner-Gulland 2012; st John et al 2012, 2010) Apart from these individuals, most of the respondents expressed concern about the destruction of the forest. The older respondents were more concerned about the degrading state of the forest, while younger respondents I discussed with were more concerned about how trees good for timber were becoming increasingly harder to find, necessitating them to venture deeper into the forest.

8.5.3 Politics and Leadership

Leadership (governance) is usually a major factor in the success or failure of any project, and the state of the Mushere forest calls for concern, especially as it relates to responsibility for the forest. Respondents reported that they were not aware of existing local community laws or regulations governing the use of the Dulu forest, thereby exposing the forest and its resources to a case of the 'tragedy of the commons' (Hardin 2009). But in fact, in chapter two (tenure systems), I reported on the governments' ownership of all lands in northern Nigeria, including community lands. This law, established in 1978, is still being contended, and this might be why the locals did not want to acknowledge any government presence as it relates to the Dulu forest. Despite this political issue, this is one crucial area which must be taken into consideration if the forest conservation is to be successful. Respecting the experiences and the local knowledge of the forest by the locals, and working with them, regardless of their lack of scientific expertise, is a crucial step in achieving the conservation goals of the conservation of the Dulu forest (see Gosler et al 2013 for a similar suggestion). Respondents from Naula especially, felt that the community leaders, the chief and indeed the whole community should shoulder the

responsibility of managing the forest. It is important to note that Naula community were more open to this research and the conservation initiative, and their perceptions on who should be responsible for the forest's management was explicit: they would prefer their chief, community leaders and the whole community to be responsible for the forest management. Their views on this critical issue must be taken seriously on board. Most respondents from the other two villages (Kaban, Njemut) thought that the government ought to oversee the management of the forest, although the sample size of these communities must be considered. It is also important to state that Kaban villagers do not think of themselves as having a real stake in the Dulu forest, and their responses might reflect this perception. EDEN should in fact work with the local community leaders in setting rules and regulations concerning the forest use, using several approaches: One method could involve the use of templates from successful community-based conservation projects elsewhere (e.g. CAMPFIRE, Zimbabwe, campfirezimbabwe.org; NRT Kenya and IRDNC Namibia in www.iied.org) that had a similar situation by following the steps used in building such a leadership structure, and contextualizing it to the local situation in Mushere. The advantage would be that we would not be re-inventing the wheel, but learning from others' experience. However, it could be that for cultural, socio-political, environmental or economic reasons, what worked in one community might not to be effective in another location. A second approach therefore could involve EDEN serving as consultants while the community themselves set up the structure they desire for the management of the forest. They will also be the ones to agree upon the laws and regulations, along with penalties for offenders from a local legal system, with professional input from EDEN. This approach would have the advantage of giving ownership and responsibility to the communities from the initial stages. It would mean they would be keeping to or breaking their own agreed rules and regulations, rather than the rules of 'outsiders', which may be perceived as 'imposed' sets of rules and regulations. A third approach could involve working together as equal partners in the management of the

forest. This would involve drafting a memorandum of understanding (MoU) with each party being clear on its terms, expectations and responsibilities. The leadership would be shared, and laws and regulations would be jointly agreed upon. The results of a breach of the agreement by any of the parties, and the duration of the partnership or review periods must also be clearly stated. This in my opinion might be the best approach, as it will allow both parties to think carefully through the process and agreement, make their contributions, take responsibility and have a form of ownership to the entire process, but it would be for the community to decide which model, if any, they would prefer.

8.5.4. Conclusion, Conservation and Policy Implications of these Findings

'…solutions must be found in motivating individuals, especially those who actually use the resources, to conserve'. Anderson, E.N. 1996

Three main objectives of this chapter were to understand the perceptions of the Mushere about the Dulu forest, find out drivers of deforestation and degradation of the forest and find out ways of mitigating it. I argued that without understanding the perceptions of local people about their environment, and conservation, succeeding in developing effective strategies and policies for conservation, which also need to be participatory and inclusive of local people's views and knowledge. The perceptions of the Mushere locals involved with the Dulu forest revealed that the predominant view of the forest is mainly as a site for resource extraction. This view was mainly held by the younger age respondents who are at the reproductive ages. The perceptions of the resources in the forest revealed that apart from timber, the people also value the land. Gender did not seem to influence perceptions, but age was a significant factor, in differentiating individual perceptions. These two findings have conservation implications, conservationists should seek to understand the perception of various demographic/stakeholders in communities

before embarking on projects, in this case, both men and women need to be targeted in the conservation strategy and policy development, but the youngest and the middle-aged groups are key, as they are the most users of the forest and its resources, are key stakeholders who would need to be involved in any decision-making and planning.

The main drivers of the local deforestation of the Dulu was found to be logging activities, driven by the need to improve their socio-economic standing, this might be as a result of poverty or greed, which are two factors usually implicated in the unsustainable use of natural resources by people (e.g., von der Osten et al 2017; Wilke 1991), but need further investigation into. This is different from the drivers of deforestation at a regional level, but reflects national drivers of deforestation in Nigeria, which include logging, bush burning, and charcoal reduction. Although this result is local, this study contributes to the local and national understanding of the drivers of deforestation. Such local studies provide data which then gives a picture of the national and regional issues of deforestation. Mitigation will require a complex approach. Mahanty *et al.* (2006) recognized social and political (e.g. family and government connections) assets as vital for the success of any community-based conservation program. In the present case, this might involve understanding the family unit in Mushere and how family responsibilities are structured.

It is important to understand the socio-cultural, political and economic challenges families face daily, and where intervention is most needed to break the cycle of poverty. For example, do we need to empower women, since it is well-known that women spend most of their incomes on family, or would empowering the men work best in Mushere or best of all, how do we aim at empowering both parties in the right way? Are resources accessible to both men and women equally? What are the underlying causes of poverty in Mushere? What types of education and development needs to be in place to bring about poverty alleviation? These questions will need

to be well understood for effective action; otherwise, we might end up in the list of the many similar failed projects worldwide.

In conclusion, therefore, although the results of this preliminary study come from a small sample size, biased towards forest resource utilizers, I suggest that to successfully restore or protect the Dulu forest, deliberate efforts must be taken to encourage the people's perceptions of the forest ecosystem to be more positive and encourage a more sustainable outlook, such as encouraging tree planting and other similar activities which will help reduce the effects of deforestation, and ensure the sustainable use of forest natural resources, while working on improving attitudes and perceptions towards resource use through continuous dialogue and education on not only the local consequences of our actions or inactions, but the global effects as well.

CHAPTER NINE

Summary, Conclusion and Recommendations.

The overall goal of this research was to investigate the potential importance of using ethno-ornithological knowledge in conservation using a community-based conservation approach. The thesis was centred around the argument that although birds are usually an important flagship domain in conservation, understanding their place and value in a culture is an important first step in any bird-related conservation program. Such perceptions and valuation can be reflected in the local knowledge and cultural beliefs of a people, as presented in the introductory chapter and the various related chapters.

The results of this work have shown that having local knowledge and interest in birds is not universal, as revealed by the comparatively low ethno-ornithological knowledge/indifference reported in this study relative to previous ethno-ornithological studies reported elsewhere (e.g. Muiruri & Maundu 2010, Kenya; Ichikawa 1998 Mbuti). I have described the relationship observed among the Mushere relating to birds as *ornitho-apatheia*, an indifference to birds, which might represent a lack of strong connectedness to nature, or simply a lack of acknowledgement of the presence of birds and animals perceived to be less than humans. The findings further revealed that the low knowledge of birds was not driven by an individual's education, or age, although occupation and gender were significant predictor among village respondents. Although men seemed to know more diverse bird names than women and children, none of the groups were highly knowledgeable about birds, which suggested that bird knowledge in Mushere might not be anyone's knowledge.

The conservation implication of this finding reveal how conservation work can be negatively affected by the local perceptions and valuing of birds among local people. The dominant perceptions that local people are usually more knowledgeable about nature and value it more (e.g., Carrier & Gewertz 2015; Mazzocchi2006), was not found to be so in this study, although it can be argued that the sample size, and the selection methods may not have been representative enough to justify generalizing. However, these initial findings raise questions on what might be happening to the perceptions and valuing of nature more widely among local people. Further, the findings have shown the importance of understanding local perceptions and knowledge of any biological domain before engaging local people in the conservation of nature.

The findings of this study also pose a challenge to conservation practitioners to work more on understanding local contexts of nature when engaging local people in conservation as some author have suggested (e.g., Bennet & Deane 2014; Ladio & Lozada 2006; *Kuriyan*, 2010; Gillingham & Lee 2002). In addition, the findings revealed the importance that local interest plays in the conservation of nature (see Clark & Slocombe 2009). This was revealed by the low TEK of both urban and rural respondents, due to a low interest in birds. Urbanization, which is usually seen as a factor causing knowledge decline was not a significant factor in the low TEK of the study population. This finding is interesting, as it reveals the significant role that cultural beliefs and perceptions, including interest play in an individual's/collective perceptions and valuing of nature or a biological domain. In the case of the study group, the reported indifference to birds presents a conservation challenge, but also an opportunity for creating awareness on the significant role that bird play in the ecosystem, especially for species which the locals are not knowledgeable about. On a global level, conservationists and conservation practitioners need to understand the underlying reasons for the perceptions and beliefs that local people hold about nature, because that might be a more challenging factor to

cope with than the challenges that globalization and urbanization present to nature conservation, as this form the basis by which individuals conceptualize and subsequently engage with nature.

Ways in which individuals learned, and how local knowledge is obtained and transferred was also presented, and the findings were like the theoretical framework. Individuals reported learning predominantly through vertical transmission (parents-offspring), and oblique transmission (grandparents). However, children reported learning mainly from peers (friends/siblings) an observation also reported by Rogoff (1981), although the predominant theoretical assumption is that children learn mostly from parents and grandparents during work or as they participate in social activities (e.g., Zarger2002a). This finding is important, and the conservation implication of this finding is that conservation practitioners can use such understanding when deciding on which demographic part of the communities they need to focus on, and what methods to use in teaching.

Another important result was the finding that language can reveal a lot about the value and place of a domain among a people. The result of the analysis of Mushere literature served as evidence to strengthen the conclusion that birds are not a culturally significant domain among the Mushere.

Finally, the results of the perceptions, valuing and drivers of deforestation of the Dulu forest, contributed to understanding the local drivers of deforestation. Although conservationist think globally, our work is mostly situated locally, and we act locally to cause changes, as such, understanding the local drivers of the challenges facing nature such as deforestation is important. In the Mushere context, economic reasons were revealed as major drivers of deforestation, therefore to mitigate this challenge, finding appropriate economic incentives that will reduce pressure on the forest resources is suggested. Although local people may not

necessarily conserve nature when they are given alternative means of livelihoods (e.g., Bennet & Dearden 2014), there are few examples of success using this approach (e.g., Campfire Zimbabwe).

In conclusion, I argue that an appreciation of local people's knowledge of the environment is important in any conservation effort, but also suggest that conservationist and conservation practitioners make deliberate efforts to find out and understand local perceptions and valuing of nature in their work with local communities. Using the community-based-conservation approach to conservation might work better where there is an initial valuing and interest in nature, that is shared by culturally.

9.1 Recommendations

Based on my findings, I recommend the following:

First, the use of an ecosystem approach other than a purely bird-centred approach in engaging the Mushere, by emphasizing the importance, value and uniqueness of the Dulu ecosystem and highlighting the ecosystem services the forest provides to the Mushere, while at the same time encouraging an appreciation for birds (and other wildlife) by actively involving the communities in diverse bird-related nature education conservation activities.

Secondly, there is a need for a wider study on the perception and conceptualization of nature in the Nigerian society, as this will situate the findings of this research on a national level. The question arising from this study include whether this indifference is shared by other communities nationally, or if it is an isolated case.

Thirdly, I recommend that similar ethno-ornithological studies be carried out among communities residing in biodiversity hotspots. This will serve as indicators of people's local knowledge, and an assessment of their perceptions towards nature and birds.

Fourthly, I recommend a strategic building up of information about the relationships of children with birds through research into various aspects of children-bird relationships. There is a major gap in this aspect both in literature and practice, which needs to be filled.

Finally, on a more local context, based on respondents valuing of tradition knowledge, I recommend the appreciation of such knowledge where it exists among local people in the implementation of conservation initiatives. Further, the willingness of the Mushere to engage in the conservation of the Dulu forest gives hope, but must be approached cautiously; monetary incentives must not be used at the initial stages, as this could create a wrong perception of the project as a charity project. A strong alternative means of livelihood plan should be developed in partnership with the communities and developed simultaneously with the conservation plan and policy.

There is also an urgent need to establish a leadership structure and create local laws and regulations to govern the use of the Dulu forest. The recommendation by respondents of creating a reserve out of the Dulu should be considered; conserving the whole of the Dulu forest might not be a realistic goal. Working with children who are future leaders, youths who are the present leaders, and women who are usually disadvantaged but central to the success of such an effort considering their roles in the family and communities, and of course the men is recommended to establish a sturdy base for the future of the project and its sustainability. To achieve this, I recommend implementing some of the suggestions for TEK retention and transmission made by respondents such as holding conservation workshops, organizing outdoor nature events with children and youths, and producing adapted educationally relevant materials as teaching and training aids, preferably in Mushere, and getting older Mushere individuals involved in the teaching and learning processes to contextualize learning.

9.2 Contributions to Knowledge

1. This is the first in-depth ethno-ornithological study among the Mushere people of Plateau State, Nigeria.
2. This thesis has considered a key issue in ethno-ornithology which is the application of such knowledge in conservation and has added evidence that not all local communities hold valuable TEK.
3. It has contributed information to the on-going debate on how applicable such knowledge is as a potential tool in conservation of biodiversity, by revealing how a people's cultural perception, valuing and interest of nature and birds (and in fact any biological domain) can affect the effective use of such local knowledge in conservation.
4. It has also provided empirical evidence that the love for birds is not universal. This work has highlighted the need for conservation practitioners to find out biological domains of cultural importance where TEK is likely to abound as a first step in ethnobiological-conservation initiatives concerned with biodiversity management and conservation.
5. It has also contributed to an understanding of local bird knowledge on a local regionally-oriented level among members of a specific ethnic and linguistic group, contributing to the literature on biocultural diversity and the relationship of people with nature and birds.
6. Most importantly, this study has contributed a new term (*ornitho-apatheia*) to the diverse ways people in cultures relate with birds.
7. The research has also provided a model in the use of ethno-ornithology in the context of community-based resource conservation. Using this model of engagement, research

and finally deciding on whether there is sufficient ethno-ornithological knowledge prior to using such an approach in conservation will ensure that projects which aim to use such knowledge are fully informed and aware of the position birds occupy in a culture and the knowledge of birds that exists in that culture, the perceived or real threats to them, or the local ways of protecting them and their habitats, before making major decisions concerning the use of ethno-ornithological knowledge in conservation.

8. Another significant contribution of this work is the presentation of Mushere children's ethno-ornithology, a neglected area in the studies of ethno-ornithology, and the finding that there seems to be a loss in transmission of bird TEK in Mushere. Other ethno-biological studies could benefit from this by looking specifically into children's ethno-ornithological knowledge, as it reveals patterns of generational knowledge acquisition/loss.
9. Finally, this research has contributed to bringing the Mushere and the Dulu forest to the knowledge of the global scientific community. It is hoped that through this study, other scientific research will be conducted in the Dulu forest, and similar habitats across the country.

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APPENDICES

Appendix 1: Mushere Folk Bird Names Generated from Freelists And Focus Group Meetings

Common Name	Scientific name	Folk name	% respondents who recalled bird name
Doves/Pigeons	Columbidae	*mbul*	79.0
Grass Finches	Estrildidae	*tidit*	70.0
Common Kestrel/Grey Kestrel	*Falco tinnunculus/Falco ardosiaceus*	*Fyen*	49.0
Double-spurred Francolin	*Pternistis bicalcaratus*	*Nayakar/kwom*	49.0
Northern Red Bishop/ Black-headed Bishop	*Euplectes franciscanus/ Euplectes hordeaceus*	*Nilip*	48.0
Pied Crow	*Corvus albus*	*Ngoro*	46.0
Owls	Strigidae	*Yiyi/Guguk*	40.0
Cinnamon-breasted Bunting	*Emberiza tahapisi*	*nanaan*	38.0
Manikins	Estrildidae	*Jebjah/shosho*	37.0
Cattle Egret	*Bubulcus ibis*	*Ngupiya*	37.0
Hamerkop	*Scopus umbretta*	*Kuljem/kuljep*	37.0
Shikra	*Accipiter badius*	*Keleng*	37.0
Herons	Ardidae	*Njakan/lat*	29.0

Bee-eaters	Meropidae	*Yerkong*	29.0
African Green-pigeon	*Treron calvus*	*Mbulkan*	29.0
Eagles	Accipitridae	*Pukul/Bugul*	24.0
Swallows/Martins	Hirudinidae	*Chilchap/Wulek*	23.0
Weavers	Ploceidae	*Ndibin/ndighim*	13.0
Senegal Coucal	*Centropus senegalensis*	*Bol*	13.0
Vultures	Accipritidae	*Nigiya*	12.0
Sunbirds	Nectarinidae	*Tau/sawu/kepkep*	11.0
Helmeted Guineafowl	*Numida meleagris*	*Tem/dem*	11.0
Grey Plantain-eater/ Green Turaco	*Crinifer piscator/ Tauraco persa*	*Kangkakat/Kangkalat*	11.0
*Bats	Chiroptera	*Shishik*	11.0
Speckled Mousebird	*Colius striatus*	*Yerdang*	8.0
Black-crowned Tchagra	*Tchagra senegala*	*Yokmar*	8.0
Common Bulbul	*Pycnonotus barbatus*	*Kadukul*	6.0
Yellow-fronted Canary	*Crithagra mozambicus*	*Kwala*	6.0
Nightjar	Caprimulgidae	*Langlakap*	6.0
Domestic Fowl	*Gallus gallus*	*Ko'o*	6.0
Starlings	Sturnidae	*Gulak*	5.0
Greater Honeyguide	*Indicator indicator*	*Yermon*	5.0
Violet Turaco	*Musophaga violacea*	*Rumjan*	5.0
Yellow-billed Oxpecker	*Buphagus africanus*	*Njar/Zar*	3.0
Whydahs	Viduidae	*Danwet/Nazel*	2.0
Hornbills	Bucerotidae	*Tluwet/titlit*	2.0
Woodpecker	Picidae	*Yersekep*	2.0
Indigobirds	Viduidae	*Dikolom/yerbis/yerdip*	2.0
Barbets	Lybiidae	*Shiribitu*	1.0
African Golden Oriole	Oriolidae	*Redchini*	1.0
Water birds (Ducks)	Anatidae	*Nishogor/Yeram*	1.0
Pin-tailed Whydah	*Vidua macroura*	*Zekerondong*	1.0
Senegal Eremomela	Eremomela pusilla	*Jingjit*	1.0
?	?	*Gwatu*	1.0
?	?	*Nhakak*	1.0

?	?	*Khijung/kakujung*	1.0
?	?	*Tenteket*	1.0
?	?	*Fotfew*	1.0
?	?	*Nlamlaga*	1.0
?	?	*Dol*	1.0
?	?	*Ngagak*	1.0
?	?	*Golbang*	1.0
?	?	*Kujung*	1.0
?	?	*Nguram*	1.0
?	?	*Purpukul*	1.0
?	?	*Tiket-tiket*	1.0
?	?	*Jian*	1.0
?	?	*Kakutit*	1.0
?	?	*Kahkah*	1.0
?	?	*Kakachugu*	1.0
?	?	*Kakijuku*	1.0
?	?	*Kakudung*	1.0
?	?	*Kanlikit*	1.0
?	?	*Kavel*	1.0
?	?	*Kinlikit*	1.0
?	?	*Kujakat*	1.0
?	?	*Kultyep*	1.0
?	?	*Kumkut*	1.0
?	?	*Ku'uk*	1.0
?	?	*Kwergwerengwereng*	1.0
?	?	*Naset*	1.0
?	?	*Naupia*	1.0
?	?	*Ndin*	1.0
?	?	*Ndol*	1.0
?	?	*Bolhi*	1.0
?	?	*Buur*	1.0
?	?	*Chekerek*	1.0
?	?	*Chika*	1.0
?	?	*Diit*	1.0
?	?	*Diyash*	1.0

?	?	*Donya*	1.0
?	?	*Din*	1.0
?	?	*Dudut*	1.0
?	?	*Galin*	1.0
?	?	*Gorchok*	1.0
?	?	*Gotegal*	1.0
?	?	*Gulmut*	1.0
?	?	*Nin*	1.0
?	?	*Nibak*	1.0
?	?	*Nishkuram*	1.0
?	?	*Nitwak*	1.0
?	?	*Shukur*	1.0
?	?	*Tched-tched*	1.0
?	?	*Tenticep*	1.0
?	?	*Titnite*	1.0
?	?	*Yerfwan*	1.0
?	?	*Yerkagar*	1.0
?	?	*Yerkajung*	1.0
?	?	*Yerkhijukut*	1.0
?	?	*Yermillip*	1.0
?	?	*Yernat*	1.0
?	?	*Yerngogot*	1.0
?	?	*Yerzink*	1.0

? = unidentified species; salient score=1.0 represents a species or group mentioned by only one respondent. * Bats are classified along with birds (this is a recurrent classification in some local communities)

Appendix 2: Birds of Mushere and the Dulu from 2009-2015 Showing Their Conservation Status.

Family	Common name	Scientific name	IUCN conservation status
Accipritidae	African Harrier-hawk	*Polyboroides typus*	Least concern
	Ovambo Sparrowhawk	*Accipiter ovampensis*	Least concern
	#Shikra	*Accipiter badius*	Least concern

Apodidae	#African Palm-swift	*Cypsiurus parvus*	Least concern
	Alpine Swift*	*Tachymarptis melba*	Least concern
Alaudidae	Sun Lark	*Galerida modesta*	Least concern
Bucerotidae	#African Grey Hornbill	*Lophocerus nasutus*	Least concern
	African Pied Hornbill	*Lophocerus semifasciatus*	Least concern
Collidae	#Speckled Mousebird	*Colius striatus*	Least concern
Columbidae	#Adamawa Turtle-dove	*Streptopelia hypopyrrha*	Least concern
	Red-eyed Dove	*Streptopelia semitorquata*	Least concern
	Vinaceous Dove	*Streptopelia vinacea*	Least concern
	Laughing Dove	*Spilopelia senegalensis*	Least concern
	#African Green-pidgeon	*Treron calvus*	Least concern
	Bruce's Green-pigeon*	*Treron waalia*	Least concern
	Black-billed Wood-dove	*Turtur abyssinicus*	Least concern
	Blue-spotted Wood-dove	*Turtur afer*	Least concern
	Tambourine Dove	*Turtur tympanistria*	Least concern
Cuculidae	Klass's Cuckoo	*Chrysococcyx klaas*	Least concern
	Red-chested Cuckoo	*Cuculus solitarius*	Least concern
Coraciidae	Broad-billed Roller	*Eurystomus glaucurus*	Least concern
Falconidae	#Grey Kestrel	*Falco ardosiaceus*	Least concern
	Fox Kestrel	*Falco alopex*	Least Concern
Halcyonidae	African Pygmy-kingfisher	*Ispidina picta*	Least concern
	Blue-breasted Kingfisher	*Halcyon malimbica*	Least concern
Indicatoridae	#Greater Honeyguide	*Indicator*	Least concern
Lybiidae	Double-toothed Barbet	*Pogonornis bidentatus*	Least concern
	Yellow-fronted Tinkerbird	*Pogoniulus chrysoconus*	Least concern
	Yellow-rumped Tinkerbird	*Pogoniulus bilineatus*	Least concern
Meropidae	#Red-throated Bee-eater	*Merops bulocki*	Least concern

	White-throated Bee-eater	*Merops albicollis*	Least concern
	Swallow-tailed Bee-eater	*Merops hirundineus*	Least concern
Musophagidae	#Violet Turaco	*Musophaga violacea*	Least concern
	#Western Plantain-eater	*Crinifer piscator*	Least concern
	Green Turaco	*Tauraco persa*	Least concern
Picidae	#Grey-faced Woodpecker	*Picus canus*	Least Concern
	Cardinal Woodpecker	*Dendropicos fuscescens*	Least concern
Phasianidae	#Double-spurred Francolin	*Pternistis bicalcaratus*	Least concern
Odontophoridae	#Stone Partridge	*Ptilopachus petrosus*	Least concern
Passeridae	#Northern Grey-headed Sparrow*	*Passer griseus*	Least concern
	Bush Petronia or Sahel Bush-sparrow	*Gymnoris dentata*	Least concern
Malaconotidae	Orange-breasted Bush-shrike	*Chlorophoneus sulfureopectus*	Least concern
	Grey-headed Bush-shrike*	*Malaconotus blanchoti*	Least concern
	Northern Puffback	*Dryoscopus gambensis*	Least concern
	Tropical Boubou	*Laniarius aethiopicus*	Least concern
	#Black-crowned Tchagra	*Tchagra senegala*	Least concern
Macrosphenidae	Northern Crombec	*Sylvietta brachyura*	Least concern
Stenostiridae	African Blue-flycatcher	*Elminia longicauda*	Least concern
Monarchidae	African Paradise-flycatcher	*Terpsiphone viridis*	Least concern
Acrocephalidae	Moustached Warbler*	*Acrocephalus melanopogon*	Least concern
Locustellidae	Broad-tailed Warbler* Or Fan-tailed Grass-bird	*Schoenicola brevirostris*	Least concern
Cisticolidae	Grey-backed Camaroptera or Bleating Camaroptera	*Camaroptera brachyura*	Least concern

	Short-winged Cisticola	*Cisticola brachypterus*	Least concern
	Senegal Eremomela	*Eremomela pusilla*	Least concern
	Tawny-flanked Prinia	*Prinia subflava*	Least concern
	Zitting Cisticola*	*Cisticola juncidis*	Least concern
	Croaking Cisticola*	*Cisticola natalensis*	Least concern
	Short-winged Cisticola*	*Cisticola brachypterus*	Least concern
	Red-winged Warbler*or Red-winged Prinia	*Prinia erythroptera*	Least concern
Estrildidae	Orange-cheeked Waxbill*	*Estrilda melpoda*	Least concern
	Lavender Waxbill*	*Estrilda coerulescens*	Least concern
	Rock Firefinch	*Lagonosticta sanguinodorsalis*	Least concern
	#Red-billed Firefinch	*Lagonosticta senegala*	Least concern
	Black-bellied Firefinch*	*Lagonosticta rara*	Least concern
	Red-cheeked Cordon-bleu	*Uraeginthus bengalus*	Least concern
	#Bronze Mannikin	*Spermestes cucullata*	Least concern
	Magpie Mannikin	*Spermestes fringilloides*	Least concern
Dicrudidae	#Fork-tailed Drongo	*Dicrurus adsimilis*	Least concern
Emberizidae	#Cinnamon-breasted Bunting	*Emberiza tahapisi*	Least concern
Fringillidae	#Yellow-fronted Canary	*Crithagra mozambica*	Least concern
Pellorneidae	Brown-capped Babbler	*Pellorneum fuscocapillus*	Least concern
Leiothrichidae	Blackcap Babbler*	*Turdoides reinwardtii*	Least concern
Muscicapidae	Spotted Flycatcher	*Muscicapa striata*	Least concern
	European Pied Flycatcher	*Ficedula hypoleuca*	Least concern
	Northern Black Flycatcher	*Melaenornis edolioides*	Least concern
	Familiar Chat	*Oenanthe familiaris*	Least concern

	Grey tit-flycatcher	*Fraseria plumbea*	Least concern
	Snowy-crowned Robin-chat	*Cossypha niveicapilla*	Least concern
	White-crowned Robin-chat*	*Cossypha albicapillus*	Least concern
Hirudinidae	#Northern House Martin	*Delichon urbicum*	Least concern
	Fanti Saw-wing	*Psalidoprocne obscura*	Least concern
	Barn Swallow	*Hirundo rustica*	Least concern
Motacillidae	Tree Pipit	*Anthus trivialis*	Least concern
Nectariniidae	#Green-headed Sunbird	*Cyanomitra verticalis*	Least concern
	Buff-throated Sunbird	*Chalcomitra adelberti*	Least concern
	Scarlet–chested Sunbird	*Chalcomitra senegalensis*	Least concern
	Collared Sunbird	*Hedydipna collaris*	Least concern
	Copper Sunbird*	*Cinnyris cupreus*	Least concern
	Variable Sunbird	*Cinnyris venustus*	Least concern
	Splendid Sunbird	*Cinnyris coccinigastrus*	Least concern
	Western Violet-backed Sunbird	*Anthreptes longuemarei*	Least concern
Oriolidae	#African Golden Oriole	*Oriolus auratus*	Least concern
Ploceidae	#Northern Red Bishop	*Euplectes franciscanus*	Least concern
	Black-winged Bishop	*Euplectes hordeaceus*	Least concern
	#Village Weaver	*Ploceus cucullatus*	Least concern
	Heuglin's Masked Weaver	*Ploceus heuglini*	Least concern
	Black-necked Weaver	*Ploceus nigricollis*	Least concern
	Little Weaver*	*Ploceus luteolus*	Least concern
	Vitelline Masked Weaver*	*Ploceus vitellinus*	Least concern
Vangidae	White-crested Helmet-shrike	*Prionops plumatus*	Least concern
Pycnonotidae	Red-tailed leaflove or Common leaflove	*Pyrrhurus scandens*	Least concern

	#Common Bulbul	*Pycnonotus barbatus*	Least concern
	Little Greenbul	*Eurillas virens*	Least concern
	Slender-billed Greenbul*	*Stelgidillas gracilirostris*	Least concern
Platysteiridae	Brown-throated wattle-eye	*Platysteira cyanea*	Least concern
	Senegal Batis	*Batis senegalensis*	Least concern
Phylloscopidae	Willow Warbler	*Phylloscopus trochilus*	Least concern
Sturnidae	Violet-backed Starling	*Cinnyricinclus leucogaster*	Least concern
Turdidae	African Thrush	*Turdus pelios*	Least concern
Viduidae	#Exclamatory Paradise-whydah	*Vidua interjecta*	Least concern
	#Jos Plateau Indigobird	*Vidua maryae*	Least concern
	#Pin-tailed Whydah	*Vidua macroura*	Least concern
Zosteropidae	African Yellow White-eye	*Zosterops senegalensis*	Least concern

- *Indicates new sightings of bird species included in the database from the 2015 inventory. # indicates the species or groups with known folk names.

Appendix 3: Questionnaire sample for Urban respondents

SOCIO-DEMOGRAPHIC BACKGROUND OF THE INTERVIWEE

1. Age - (18-25), (25-35), (35-45), (45-55), (55-above)
2. Gender- (Female) (Male)
3. Marital status- (single), (married), (widowed) (divorced) other (Specify)
4. Number of children-
5. Occupation/vocation- (Farmer), (civil servant), (business person), others (specify)
6. Location/village-
7. Educational level- (Primary) (secondary) (tertiary) other (Specify)

8. Dialect-
9. Religion -
10. Number of years of formal education-
11. Where you born in a Mushere Village?
12. Where exactly?

13. Where did you spend your growing up years?

14. When did you move to the city?

15. What was the reason for the move?

16. How often do you go visit the village?

17. Who taught you about birds?

18. How were you taught?

19. What do you think is happening to this cultural knowledge of birds in your community?

20. Do you think the younger generation need this knowledge?

21. Why?

22. Suggest possible ways can this be achieved?

23. List all the birds you know in your local language.

24. Give the cultural significance of each bird in your list

25. What are the many ways in which each bird is used in your culture?

26. Please share all the bird stories or folklore that you know related to the birds you have mentioned

Appendix 4: Children's Folk Bird Names Generated from Free-Listing Exercise.

Folk name	Scientific name	Common name
Nayakar or kwom	*Pternistis bicalcaratus*	Double-spurred Francolin
Gopang	*Ptilopachus petrosus*	Stone Patridge
Dem	*Numida meleagris*	Helmeted Guineafowl
***Nishogor or koshokor*	??	Wild duck/domestic ducks
Ngupiya	*Bubulcus ibis*	Cattle Egret
Njakan	Ardeidae	Herons
***Ko'o*	*Gallus gallus*	Domestic chicken
Yer-am (yer=bird; am=water)	??	Water bird (common name for all waterbirds)
Fyem	*Falco tinnunculus*	Common Kestrel
Keleng	*Accipiter badius*	Shikra
Kuljem	*Scopus umbretta*	Hammerkop
Nigiya	*Necrosyrtes monachus*	Hooded Vulture
Langlakap	Caprimulgidae	Nightjars
Pukul	Accipritidae	Eagles
Yiyi or guguk	Strigidae/ Tytonidae	Owls (Barn Owl picture shown)
'*Bigtree*' (a name only used by children, unknown to the adults)	*Passer griseus*	Northern Grey-headed Sparrow
'canary' (children do not know its folk name, surprisingly, it is known by its common name)	*Crithagra mozambicus*	Yellow-fronted Canary
Chilchap	Hirudinidae	Swallows
Dudut	??	??
Gulak	*Pycnonotus barbatus*	Common Bulbul
Jingjit	??	??
Kadukul	??	??
Kajukut	??	??
Kakajukut	??	??
Mbul	Columbidae	Doves/Pigeons
Mbulkan	Columbidae	African Green-pigeon
Nannan	*Emberiza tahapisi*	Cinnamon-breasted Bunting
Ndibin or ndighim	Ploceidae	Weaver birds, especially known is the Village Weaver.
Ngoro	*Corvus albus*	Pied crow

Nilip	*Euplectes franciscanus*	Northern Red Bishop
Tau	Nectarinidae	Sunbirds
Tidit	Estrildidae	Firefinches, especially the Red-billed firefinch and the Red-cheeked Cordon-bleu
Yerdang or dadak (children alone refer to it as *dadak*, a name unknown to adults; *yerdang* literally means bird of tail, referring to its long tail. Why children choose a different name is unknown, as they do not know what *dadak* means).	*Colius striatus*	Speckled Mousebird
Yerkong (literal: bird of bank, referring to its hole-nesting behaviour along banks)	*Merops bullocki*	Red-throated Bee-eater
Yerzinc	??	??
Zar or jar	*Buphagus africanus*	Yellow-billed Oxpecker
**Ndin or shizhik*	Chiroptera	Bats

?? = species unidentified and unknown; * bats were continuously mentioned as birds by children, although they had no knowledge of any uniqueness of the bats, adults though mentioned that bats were a special category of 'birds' because they are not considered true birds; **both domestic chickens and ducks were classified as birds.

Appendix 5: List of Birds Used in Picture Elicitation Exercise in The Order They Were Presented to Respondents and The Corresponding Recognition Scores of Boys and Girls for Each Bird Species. Note: total score for each respondent per species=21, n=56

Common name	Scientific name	Total Recognition score for species (%)	Males	Females
*Barn Owl	*Tyto alba*	98	34	21
*Laughing Dove	*Spilopelia senegalensis*	93	33	19
*Cattle Egret	*Bulbucus ibis*	89	32	18
*Red-billed Firefinch	*Lagonosticta senegala*	84	30	17
*Northern Red Bishop	*Euplectes franciscanus*	77	29	14
*Purple Heron	*Ardea purpurea*	77	26	17
Double-spurred Francolin	*Pternistis bicalcaratus*	73	28	13
Speckled Mousebird	*Colius straitus*	61	24	10
Hamerkop	*Scopus umbretta*	34	21	13
Cinnamon-breasted Bunting	*Emberiza tahapisi*	29	24	5
Pied Crow	*Corvus albus*	28	20	8
Yellow-fronted Canary	*Crithagra mozambicus*	26	21	5
Village Weaver	*Ploceus cucullatus*	18	15	3
African Green-pigeon	*Treron calvus*	16	15	1
Scarlet-chested Sunbird	*Chalcomitra senegalensis*	15	11	4

Hooded Vulture	*Necrosyrtes monachus*	11	7	4
Stone Patridge	*Ptilopachus petrosus*	10	9	1
**Village Indigobird	*Vidua chalybeata*	5	2	3
African Grey Hornbill	*Tockus nasutus*	5	4	1
**Helmeted Guinea fowl	*Numida meleagris*	3	1	2
**Bronze Manikin	*Lonchura cucullata*	1	0	1

*Note only 6 species stand out in the bird recognition test; notice especially how almost all respondents recognize the Barn owl *Tyto alba*, due the negative cultural belief and association; **also note how females have higher scores in three cases; the village Indigobird *Vidua chalybeata*, the Bronze Mannikin *Lonchura cucullata* and the Helmeted Guineafowl *Numida meleagris*

Appendix 6: Children's Questionnaire and Free list

Socio-Demographic Background of The Interviewee

1. Age -
2. Gender- (female) (male)

3. Location/village-
4. Educational level- (primary) (secondary)
5. School-
6. Religion -
7. Where you born in a Mushere village?
8. If yes, where?
9. If no, where?
10. Do you love birds?
11. Why?
12. Are they important to you?
13. Why?
14. What uses of birds do you know?

15. How do you learn about birds?

16. From whom do you learn about birds?

17. What do they do to help you know about birds?

18. Who do you stay with? Parents grandparents other relatives

BIRD KNOWLEDGE: Freelisting

19. List as many bird names in Mushere that you know

Bird name	Bird uses	Bird cultural association

20. Have you ever heard any story with birds in them told you in Mushere language?

21. If yes, can you share it with me?
22. What about a song about birds in Mushere?

Appendix 7: Adult Villagers Questionnaires on Bird names, Identification and uses

Socio-Demographic Background of The Interviewee

27. Age - (18-25), (25-35), (35-45), (45-55), (55-65) (>65)
28. Gender- (female) (male)
29. Marital status- (single), (married), (widowed) (divorced) other (Specify)
30. Number of children-
31. Occupation/vocation- (farmer), (civil servant), (business person), others (specify)
32. Location/village-
33. Educational level- (primary) (secondary) (tertiary) other (Specify)

34. Dialect-
35. Religion -
36. Number of years of formal education-
37. Where you born in a Mushere Village?
38. Where exactly?
39. Who taught you about birds?
40. How were you taught?
41. What do you think is happening to this cultural knowledge of birds in your community?
42. Do you think the younger generation need this knowledge?
43. Why?
44. Suggest possible ways can this be achieved?
45. List the bird names that you know in your local language.
46. Among the birds you have listed, please explain their cultural relevance in the Mushere culture?
47. What are the diverse ways in which these birds are used in your culture?
48. Can you share bird stories or folklore that you know associated with these birds?

Appendix 8: Questionnaire on Perceptions on Forest Knowledge, Use, Valuing and Conservation

Respondent ID No:

Village:

Age:

Sex:

Occupation:

Language:

Educational level:

Religion:

A. **FOREST KNOWLEDGE AND USE**

1. When you think of Dulu, what immediately comes to your mind?
2. How often do you visit the Dulu forest?
3. What do you use the forest for?
4. When was the last time you visited the forest?
5. How can you rate how important the forest is to you?
6. What is the most valuable resource in the forest to you?
7. What do you cut trees in the forest for?

B. FOREST CONSERVATION

8. Is the forest still like what it was when you were growing up?
9. What do you think is happening to the plants and animals in the forest?
10. What do you think will happen to the plants and animals in the near future?
11. Do you see the animals and plants you used to see in the forest some years back?
12. Why do you think this is so?
13. What do you think needs to be done to improve the forest?
14. How do you think we can conserve the animals in the forest?
15. Who do you think should be responsible for the forest?
16. How long do you think the forest will last?
17. Do you know of any rules governing the use of the forest?
18. Would you support any conservation effort to protect the animals and plants?
19. If yes, why?

20. If No, why?

GENERAL ATTITUDINAL QUESTION

21. How do you spend your spare time in the village?

Appendix 9: Focus Group Questions to Identify Birds, Verify and Determine the TEK Of Respondents on Birds Mentioned

Questions for TEK Assessment

1. What is the name of this bird in Mushere?
2. How do you usually recognize it?
3. Where do you normally find this bird?
4. What does the bird feed on?
5. Is it usually seen alone, in pairs or in groups?
6. Where does the bird lay its' eggs?
7. What does its nest look like?
8. What colour are the eggs?
9. How many eggs are laid?
10. Do both parents care for the young?
11. Do you have any other observation on the bird you want to share?
12. Can you share any story, song or folklore associated with the bird?