AN INVESTIGATION INTO KNOWLEDGE AND ATTITUDES OF TERTIARY INSTITUTION STUDENTS TOWARDS INDIGENOUS ECOLOGICAL KNOWLEDGE FOR SUSTAINABLE DEVELOPMENT: THE CASE OF THE NORTH WEST UNIVERSITY (MAFIKENG CAMPUS)

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Supervisor: Professor H.O. Kaya

Date submitted: November 2006

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BY

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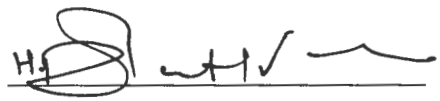
A mini-dissertation submitted in partial fulfillment of the requirements for the degree of Master of Arts (IKS) in the Faculty of Human and Social Sciences, North West University (Mafikeng Campus).

Supervisor: Professor H.O. Kaya

Date submitted: November 2006

DECLARATION

I declare that this mini-dissertation for the degree of Master of Arts (IKS) in the Faculty of Human and Social Sciences at North West University (Mafikeng Campus) hereby submitted, has not previously been submitted by me for a degree at this or any other university, that it is my own work in design and execution, and that all materials contained herein have been duly acknowledged.



Date 22/11/2006

Rebonekgosi. H. Matonkonyane

DEDICATION

To all my family, friends, and colleagues who have been supportive to me throughout my studies.

ACKNOWLEDGEMENT

My warmest words of gratitude go to my supervisor Professor H.O. Kaya for his patience, guidance, and suggestions during the production of this piece of work. I have not enough words to thank you. I also have to thank my dear friend Gotsang 'Bonji' Onkagetse who helped me with the distribution of questionnaires. To all the respondents, your time and responses are greatly acknowledged – God Bless. I am most grateful to the National Research Fund (NRF) for the bursary they awarded to me to pursue my studies. Last but not least, my sincerest appreciation goes to my class colleagues: Julia, Lebo, Dolly, Dineo, Nono, Motheo, and Mokakale. It was real fun having you in my class – keep the faith! *A pula e ne!*

ABSTRACT

The study examined the knowledge and attitudes of tertiary institution students towards indigenous ecological knowledge for sustainable development: The case of the North West University (Mafikeng Campus)

Firstly, the majority of the respondents showed an understanding of the meaning, use, and importance of indigenous ecological knowledge. Second, the respondents believed that the management of indigenous ecological resources is the responsibility of every member of society including government leaders

Thirdly, they solicited information on indigenous ecological knowledge through membership in different organizations, participating in awareness campaigns, and as students of IKS Programme at the North West University.

The following recommendations have been proposed: (i) further research needs to be conducted on indigenous ecological knowledge, especially among nationwide tertiary students; (ii) information on indigenous ecological knowledge should be made as widespread as possible; and (iii) Traditional leadership should therefore play a pro-active role in ensuring that traditional customs and cultures do not perish as they have been proven to be ecologically-friendly.

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LIST OF ABBREVIATIONS

B.Sci	Bachelor of Science
GMOs	Genetically Modified Organisms
IKS	Indigenous Knowledge System
NWU	North West University
SI	Symbolic Interactionism
TEK	Traditional Ecological Knowledge

CHAPTER 1

INTRODUCTION

1.1 Background

Since the 1950s, the world has been urbanizing rapidly. However, the most profound effects of urbanization have been felt in the developing world (De Blij, 1996). Urbanization is defined as the process by which there is an increase in the proportion of people living in urban areas. With the resultant urbanization, many Third World inhabitants, Africans included, cast away their traditional ways of living. In this way valuable indigenous ecological knowledge is lost www.revision-notes.co.uk/revision/175.html.

The term '*Traditional Ecological Knowledge*' came into widespread use in the 1980s (Mathooko, 2006). Traditional Ecological Knowledge (TEK), also called Indigenous Ecological Knowledge, is a system of understanding one's environment. It is built over generations, as people depend on the land and sea for their food, materials, and culture. TEK is based on observations and experience, evaluated in light of what one has learned from one's elders (Huntington and Mymrin, 1995). Davis (1998) adds that indigenous ecological knowledge is expressed in many ways. Some particularly important expressions are customary practices such as hunting, fishing, and gathering.

Vigilante et al. (2001) argue that indigenous ecological knowledge has been developed, tested and passed on over thousands of generations, but it is likely that as a result of tumultuous changes in recent generations, vast amounts of knowledge is lost, probably over the next decade if current trends continue.

MOST and CIRAN (2003), however, maintain that the dominance of the Western knowledge system has largely led to a prevailing situation in which indigenous [ecological] knowledge is ignored and neglected. It is therefore easy to forget that, over many centuries, human beings have been producing knowledge and strategies enabling them to survive in a balanced relation with their natural and social environment.

Western science and technology is increasingly looked to as a way of enabling developing communities to benefit from globalization. Building capacity in science and technology is therefore a high priority for many developing nations, with the idea of 'technological leapfrogging' a particularly appealing prospect (Rhea, 2002).

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Hobson (1992) argues that Western scientists have a tendency to reject the traditional [ecological] knowledge of native peoples [Eskimos] as anecdotal, non-quantitative, without method, and unscientific. From our scientific ivory towers we tend to ignore basic knowledge that is available to us. Often overlooked is the fact that the survival of northern aboriginal peoples depended on *their* knowledge, *their* special relationship with the environment, and *their* ways of organizing themselves and their values.

The Kuna - an Indian tribe living on a chain of islands called San Blas Archipelago, on the Atlantic side of the Republic of Panama - first encountered Western civilization in 1920 (MNH, 2006). In the attempt to "civilize" the Indian, taboos and attitudes of respect toward nature started to become replaced by an opinion in which everything that is good can be bought or sold. Because of this, the Kuna succeeded in removing mass amount of natural resources in exchange for money. Hunting was done indiscriminately, and turtles and lobsters were in serious danger of extinction by the late 1960s. If the Kuna continued to participate in these activities, their ecosystem would be degraded beyond the point of redemption within a few years.

Western education also succeeded in eroding the Kuna view of the world. Schools taught students to be ashamed of their culture. They were told the Kuna language was a lowly "dialect" and education would prepare them for a more "civilized" life. Traditional history and rituals were regarded as primitive superstitions. Because of the negative portrayal of Kuna life, some youngsters were unwilling to listen to hours of chants in order to learn traditions. They were even less willing to learn the curing chants which contained the most secret and profound knowledge: how to identify plants and animals, the behaviour of animals, and the yearly cycles of the rivers (MNH, 2006).

Hereniko (2006) argues that the ways in which schools, colleges, and universities value the written word over and above oratory is another cause for concern. When the mode of teaching or testing is primarily in the written form, indigenous ways of being are marginalized. Furthermore, the written word has undermined the fluidity of indigenous

history. Oratory allowed for debate and negotiation. On the other hand, the written word fixes the truth. The afore-said holds the truth for the North West University (Mafikeng Campus). Many students at the Mafikeng campus seem to be only concerned with academic qualification. Many students seem to posses very little on no indigenous ecological knowledge at all.

According to Twinomugisha (2005), in rural Ugandan communities, indigenous [ecological] knowledge is an integral part of poor people's lives. It is the basis for decision-making regarding food security, human and animal health, and natural resource management. Local cropping strategies provide the foundation for people's own ideas on how to survive during harsh times. It is based on past experiences that are passed from one generation to another. However, the forces of globalization in operation today are affecting Ugandan communities and have already destabilized many cultural patterns. For instance, for many years Ugandans have depended on indigenous seeds for subsistence and commercial production. However, recent trends have encouraged the use of imported Genetically Modified Organisms (GMOs) despite the controversies such as: they may not be appropriate to the local context; they have the potential to negatively impact human health, for example, through the transfer of antibiotic resistance markers; and they may also negatively affect the environment, for example through the unintended transfer of genes through cross-pollination, unknown effects on other organisms such as soil microorganisms, and loss of local floral and faunal biodiversity. When scientific technology and traditional [ecological] knowledge come into contact with each other, traditional [ecological] knowledge is typically swept aside. The GMO example above

illustrates this. The degradation of indigenous seed stocks traditionally used by poor Ugandans has increased dependence on foreign seeds.

The North West Province of South Africa and the Republic of Botswana (major student catchment areas of NWU Mafikeng Campus at present) are predominantly rural like it is the case in Uganda. It would, therefore, go without saying that similar globalization forces operational in Ugandan communities have also destabilized the North West and Botswana's cultural patterns – forcing NWU (Mafikeng Campus) to ignore and abandon indigenous ecological knowledge which was practiced by their forefathers and mothers.

Consequently, one might want to know if NWU students at Mafikeng Campus: know about indigenous ecological knowledge and its uses, have aspects of Indigenous Ecological Knowledge that they would like to know, know about management of different types of ecological resources, and what are they doing to ensure that Indigenous Ecological Knowledge is conserved and protected.

There is, again, a tendency to compartmentalize Indigenous Ecological Knowledge within a wide-held view that Indigenous Ecological Knowledge belongs to certain disciplines. Often, ecological knowledge is assumed to be the responsibility of such disciplines as Biology, Geography, and Indigenous Knowledge Systems. At the NWU (Mafikeng Campus) it is seemingly only the Indigenous Knowledge Systems Programme and the Department of Geography that are actively involved with the teaching and researching about indigenous ecological knowledge. This tends to relegate other

disciplines to the periphery and this should not be so. Ecological knowledge is the responsibility of all disciplines and everyone.

The above-mentioned problems are not only typical to places like San Blas Archipelago and Uganda, but are rife even in South Africa as well. However, Twinomugisha (2005) argues that whilst indigenous [ecological] knowledge has its merits, we cannot ignore the fact that we seem to live in a global village and cannot fence our local communities off from global influences. But we can strive to connect our local communities to these influences so that local traditions are not lost, but rather become a point of reference within a broader system. It is against this background that the researcher decided to research the topic "An investigation into knowledge and attitudes of tertiary institution students towards indigenous ecological knowledge for sustainable development: The case of the North-West University (Mafikeng Campus)".

1.2 Statement of the Problem

A statement of the problem is formulated on the following research questions:

- What do students of NWU (Mafikeng Campus) know about indigenous ecological knowledge and uses?
- What aspects of Indigenous Ecological Knowledge would students of NWU (Mafikeng Campus) like to know?

- What do students of NWU (Mafikeng Campus) know about management of different types of ecological resources?
- What are students of North West University (Mafikeng Campus) doing to ensure that Indigenous Ecological Knowledge is conserved and protected?

1.3 Rationale of the Study

Much of the Traditional Ecological Knowledge (TEK) has been severely eroded by national and international development and interaction with western cultures. Some scholars worry that Western science destroys African traditional ecological knowledge systems (Becker and Ghimire, 2003). It is against such a background that the researcher is motivated to undertake this research. The researcher has had ties with UNW (Mafikeng Campus) spanning almost two decades since he first registered at the institution as an undergraduate in 1989. It was during the researcher's student years that he came to realize that indigenous ecological knowledge was relegated to the periphery.

The other motivation for undertaking this study stems from the fact that the researcher had a four-year stay as a Geography lecturer at UNW (Mafikeng Campus). It was during this period that he sadly realized that not much had changed since his student days - indigenous ecological knowledge was still relegated to the periphery. Apparently only two departments from the entire university – Indigenous Knowledge Systems Programme and the Geography Department – were teaching and researching on indigenous ecological Knowledge.

The last motivation for this research can be attributed to the fact that the UNW (Mafikeng Campus) is located in Mafikeng – the researcher's hometown. The researcher has lived in this town for more than a quarter of a century and has with the passage of time developed an undying love for the town. Consequently, he would love to see the town developing but not at the expense of indigenous ecological knowledge.

There is an urgent need, therefore, for a systematic approach to reversing the loss of indigenous [ecological] knowledge and to support programmes that will help groups maintaining it (Twinomugisha, 2005). Berkes et al., in Shebitz (2005) maintain that knowledge developed over generations of interaction between indigenous people and land can make valuable contributions to contemporary sciences such as conservation and restoration, the study of ecological processes, and sustainable resource use.

1.4 Aim of the Study

To investigate knowledge and attitudes of tertiary institution students towards indigenous ecological knowledge for sustainable development among tertiary students in the North West Province (South Africa), with special reference to the North West University (Mafikeng Campus).

1.5 Objectives of the Study

The study investigates the following specific aspects:

- The knowledge of NWU (Mafikeng Campus) students about indigenous ecological knowledge and its uses.
- The aspects of Indigenous Ecological Knowledge that NWU (Mafikeng Campus) students would like to know.
- NWU (Mafikeng Campus) students' knowledge about the management of the different types of indigenous ecological resources.
- The students of NWU (Mafikeng Campus) activities to ensure that Indigenous Ecological Knowledge is preserved and protected.

1.6 Literature Review and Theoretical Perspectives

1.6.1 Literature Review

According to UNC (2005), literature review interrogates published information in a particular research problem. Harlen and Schlapp (1998) maintain that in all areas of research, literature reviews are used to inform researchers of the background to research projects and to provide context and ideas for the design of new studies. The various roles of reviews fall into two main categories:

- Guiding decisions about further research and providing a context for interpreting new findings.

- Informing policy and practice, based on existing research.

On the other hand, UNC (2005) argues that literature reviews provide you with a handy guide to a particular topic. If you have limited time to conduct research, literature reviews can give you an overview or act as a stepping stone. For professionals, they are useful reports that keep them up to date with what is current in the field. For scholars, the depth and breadth of the literature review emphasizes the credibility of the writer in his or her field. Literature reviews also provide a solid background for a research paper's investigation. Comprehensive knowledge of the literature of the field is essential to most research papers.

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Clarksean (2003) outlines the following significances of literature review:

- Demonstrates we are knowledgeable with relevant research.
- Makes sure we are not repeating work that other people have reported in the open literature.
- Tells us what is still unknown, or what we could do differently in our research.
- Allows us a way to make sure we are not missing any significant issue.
- Orients reader to the importance and scope of the problem.
- Completed before ever starting your research.
- Periodically updated to check for new research activity.

Indigenous ecological knowledge

Becker and Ghimire (2003) argue that TEK encompasses everything from cursory awareness of natural histories associated with local wildlife to cultural norms for land management and resource allocation. On the other hand, Pursche (2004), points out that traditional owners possess specialist knowledge about plants and animals, ecological systems and processes, and environmental and land-use change. The recognition of Aboriginal science or 'traditional ecological knowledge' has increased worldwide and is an invaluable resource for Western scientists in developing a better understanding of a region's natural resources.

Chinsembu (2006) argues that as a result of this vast knowledge, Africans have used plants to treat wounds and disease. Long before the discovery of antibiotics, Africans had identified plants that could treat bacterial infections. Families guarded – not patented – such indigenous [ecological] knowledge, passing it down from generation to generation. African agriculture used to be based on multi-cropping ecosystems where crops such as cassava, maize, and beans grew together. There were no chemical fertilizers – manure and compost were used instead.

Characteristics of Traditional Ecological Knowledge

Traditional Ecological Knowledge is characterized by the following http://laurel.ocs.mq.edu.au/~cjone005/index_conference.htm:

- Recorded and transmitted through oral tradition.
- Learned through observation and hands-on experience.
- Based on the understanding that the elements of matter have a life force. (All parts of the natural world are therefore infused with spirit).
- Viewing human life as superior to other animate and inanimate elements; all life-forms have kinship and are interdependent.
- Holistic (whereas western science is reductionist).
- Intuitive in its mode of thinking (whereas western science is analytical).
- Mainly qualitative (whereas western science is mainly quantitative).
- Based on data generated by resource users (As such it is more inclusive than western science, which is collected by a specialized group of researchers who tend to be more selective and deliberate in the accumulation of facts).
- Based on diachronic data (whereas western science is largely based on synchronic data).
- Rooted in a social context that sees the world in terms of social and spiritual relations between all life-forms. (In contrast, western science is hierarchically organized and vertically compartmentalized).
- Deriving its explanations of environmental phenomena from cumulative, collective and often spiritual experiences. Such explanations are checked, validated, and revised daily and seasonally through the annual cycle of activities.

Indigenous Ecological Knowledge and Knowledge

The various areas in which we can have knowledge, such as morality and mathematics, all have their distinctive ways in which knowledge is g ained. Among these distinctive ways if functionalism. While causal explanations, both in the social and the natural sciences, are such that a present event (the effect) is explained in terms of past events (the causes) there is another kind of explanation specific to the social sciences, where an event is explained in terms of its consequences: functionalism conceives of society (or an individual) as a self-regulating system which will try to maintain itself in some kind of equilibrium, usually without the members of the society (or the individual himself) being aware of that further purpose or meaning (the 'true function') of their actions (and institutions) http://www.kahome.co.uk/socia.htm.

Indigenous Ecological Knowledge and Attitudes

Residents in both communities from Loma Alta, Ecuador had similar knowledge of biological diversity in the forest (Becker and Ghimire, 2003). Snakes and big cats were species that they wished were less abundant, because they were dangerous to people and killed livestock. Some respondents desired fewer monkeys, parrots, squirrels, raccoons, and skunks because they damage crops. The majority of respondents wished that deer, rabbits, wild pigs, and forest rodents, all edible, were more abundant. Thus, despite environmental education aimed at generating existence value for wildlife, especially rare birds, utilitarian values about wildlife prevailed in both communities. With regard to biodiversity, TEK at Loma Alta appeared to be little influenced by western scientific knowledge at the time of this survey. Recent community showings of videos about the

value of the protected area for bird conservation, school programs about endemic birds and bird watching, school visits to the forest, and numerous activities promoting nature tourism have probably altered local knowledge and attitude about biodiversity.

Becker and Ghimire (2003) surveys suggest that whatever wildlife protection norms exist in indigenous communities of the Colonche Hills, they are predominately based on utilitarian relationships. Several families mentioned that they avoid killing female game animals, and that they varied the locations of where they hunted for wild game. This sort of ecological knowledge is not unusual. Much of the ethical management provided to natural systems seems to depend upon use to generate value, with the exception of mythical values. Mythical values may lead to either preservation or extinction of a species. In Guatemala, for example, mythical value for the Quetzal (*Pharomachrus mocinno*) has promoted survival of this species throughout recent times. In contrast, Aye ayes (*Daubentonia madagascarensis*) of Madagascar have nearly been extirpated because local people believe that they are evil creatures.

In Australia, McLicky and Day (2004) found out that there are very few Indigenous scientists who remain closely connected to their own Indigenous communities. Indigenous students across many contexts have struggled with Western science as it has been taught to them in schools. Science has been traditionally hostile to Indigenous ways of knowing. Science teaching in schools has also been fraught with hostile attitudes towards Indigenous cultures, and the way Indigenous students learn. These 'hostile attitudes' have contributed strongly to perceptions in the Indigenous Australian community that western Science and Technology is opposed to traditional ways of

knowledge, disrespectful of Indigenous rights and sovereignty, and thus 'irrelevant' and even damaging in the education of their children.

McLicky and Day (2004) quote an 18 year old education student saying:

"*I personally don't know what science subjects are being offered. But maybe from my point of view Aboriginal people like to help other Indigenous peoples so therefore [they] study subjects that help their communities internally*".

Science and Technology, the student implies, do not fall into this category of 'helping' other Indigenous people. Amongst others, they recommend:

> Consider developing of a new B.Sci. (Traditional Indigenous Science and Technology) degree, which would focus on subject areas such as Traditional Ecological knowledge, the ownership and copyright issues regarding traditional Indigenous intellectual property, the ethical problems inherent in researching Indigenous peoples as 'subjects', the relevance of Indigenous perspectives to contemporary scientific theory, and the innovation in Western Science which has been achieved, and continues to be achieved by Indigenous scientists who combine Western and traditional world-views to create radical new theories and inventions.

Significance of Indigenous Ecological Knowledge

According to Johnson (1992), for thousands of years, indigenous peoples around the world have utilized the natural resources of their local environments, in an ecologically sustainable manner. Today, a growing body of literature attests not only to the presence of a vast reservoir of information regarding plant and animal behaviour, but also to the existence of effective systems of self-management of natural resources.

For about a half century anthropologists and some animal and plant taxonomists have recognized the accuracy with which various non-western peoples have identified different species; indeed, such "folk-taxonomies" include more than just those food or medicinal species having obvious practical utility (Freeman, 1992). The knowledge possessed by such tradition-based, non-industrial societies is essentially of an "ecological" nature, that is to say, it seeks to understand and explain the workings of ecosystems, or at the very least biological communities, containing many interacting species of animals and often plants, and the determinative role played by certain key biological and physical parameters in influencing the behaviour of the total biological community. It is important to note that such traditional ecological knowledge has been found to have management relevance, especially in regard to sustainable use of renewable resources.

People have relied on this detailed knowledge for their survival - they have literally staked their lives on its accuracy and repeatability. TEK is an important source of information and understanding for anyone who is interested in the natural world and the

place of people in the environment. Many scientists recognize the value of working with people who live in an area and who have great insight into the natural processes at work in that area. While the scientific perspective is often different from the traditional perspective, both have a great deal to offer one another. Working together is the best way of helping us achieve a better common understanding of nature (Huntington and Mymrin, 1995).

TEK research is important to scientists, because it is a valuable source of environmental information. It also helps communities realize their own expertise, and apply their own knowledge and practices to help protect their way of life. The information, advice, and wisdom that have evolved over centuries of living as part of the environment are still important for what people do today. Skills like knowing where to find food, how to survive a storm or avoid danger, and how to make sure the resources will be there next year are as vital today as in the past (Huntington and Mymrin, 1995).

However, NPDC (2006) maintains that traditional ecological knowledge is meaningful and relevant to modern Western society on at least four major levels:

- On the personal level indigenous people teach ways to reestablish more intimate relationships with the natural world. Making a musical instrument from native hardwoods, or a piece of furniture from small-diametered native conifers, or weaving a basket satisfies American Indians' inner urge for self-expression and reenacts hand movements and hand, heart, eye linkages familiar to their ancestors.

- American Indians offer us many examples of tempered use of the natural world over many successive generations of humans without destroying it. The study of harvesting and management strategies for different native plants - season, frequency, aerial extent, and intensity of harvest or management - offer Western culture the opportunity to experimentally assess, through conservation field trials, American Indian interactions with nature that lead either to plant conservation or to extirpation.
- The current paradigm in the fields of conservation biology and restoration ecology is that the use of nature is always the *antithesis* of preservation. Thus, restoration groups throughout the United States work to restore biodiversity on wild lands during a finite time period, and then humans are removed and nature is left alone. This may not be the best scheme for the long-term restoration of native plants that require periodic intermediate disturbance to rejuvenate their populations. Those ancient indigenous harvesting and management practices and regimes that prove beneficial can be reintroduced as strategies to restore and maintain biodiversity on certain private and public wild lands.
- By studying nature interactions among cultures that didn't adopt agriculture or domesticate plants, which are the majority of California, Plateau, and Great Basin tribes, we can gain a greater understanding of the foundation upon which agriculture rests. The birth of plant domestication in North America is a very recent phenomenon, perhaps 7,000 years old in the northeastern United States and younger still in the American Southwest. Cultivation of native plants is ancient,

and it undoubtedly extends far beyond the brief history of domestication and the rise of agriculture.

Furthermore, Calamia (1999) outlines the following practical and tangible benefits of traditional environmental knowledge:

- Traditional ecological knowledge may be useful for new biological and ecological insights. New scientific knowledge is sometimes derived from perceptive studies of traditional environmental knowledge systems.
- Traditional ecological knowledge for resource management is of great value. Much traditional ecological knowledge is useful for contemporary natural resource management in areas such as tropical fisheries.
- Traditional ecological knowledge is often used for protected areas and for conservation education. Protected areas may be designed to allow resident communities to continue their traditional lifestyles while enjoying the benefits of conservation.
- With respect to development planning, traditional ecological knowledge may benefit development agencies in providing more realistic evaluations of environment, natural resources, and production systems. Involving local people in the planning process improves the chances of successful development.
- Traditional ecological knowledge is useful for environmental assessment. Local people who depend on local resources for their livelihood are in good positions to assess the true costs and benefits of development better than outside researchers.

1.6.2 Theoretical Perspectives

Wikipedia (2006B) states that there are five major perspectives of contemporary sociology: functionalism, conflict theory, symbolic interactionism, phenomenology, and theories of rational choice.

1.6.2.1 Functionalism

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Sociology at Hewett (2006) points out that functionalism is often referred to as 'consensus' theory because it doesn't address the issue of conflict in society, rather it projects and ideal picture of harmonious social relationships. According to Levin (2004), functionalism is a doctrine that what makes something a thought, desire, pain (or any other type mental state) depends not on its internal constitution, but solely on its function, or the role it plays, in the cognitive system of which it is a part. More precisely, functionalist theories take the identity of mental state to be determined by its causal relations to sensory stimulations, other mental states, and behaviour.

Functionalism is the oldest, and still the dominant, theoretical perspective in sociology and many other social sciences (McClelland, 2000A). Functionalist analyses often focus on the individual, usually with the intent to show how individual behaviour is molded by broader social forces. Functionalists have tended to be less concerned with the ways in which individuals can control their own destiny than with the ways in which the limits imposed by society make individual behavior scientifically predictable.

Functionalism and ecology

Functionalists argue that disasters are as much the outcome of processes in the social world as the natural one. Subsequently disasters have been understood as part of the 'normal' functioning of ecosystems (Tony, in Lazarus, 2005) and conditions of inequality and subordination in society. The impacts of climate change in Tuvalu underscore current anthropological understandings of disasters as processes which entail a human population and a potentially destructive agent embedded together in a mutually constitutive, systemic relationship that unfolds across space and over time.

Ecological functionalism assumes that simple societies are closed systems in perfect harmony with their environment. 'They' adapt and ensure the sustenance of renewable resources while 'we' ruin the environment and drive the ecosystem out of balance and control. Given such assumptions, in 'simple' societies people always develop sound analyses of ecology and environmental problems, unable to make mistakes. The behaviour of hunters and gatherers, especially, is assumed to be responsive to ecological relations (Palsson, 2000).

Bronisław Kasper Malinowski state that the goal of the cultural anthropologist, or ethnographer, is http://en.wikipedia.org/wiki/Bronislaw_Malinowski:

> to grasp the native's point of view, his relation to life, to realise *his* vision of *his* world.

Criticisms

Edwards and Neutzling (2006) have highlighted the following criticisms of functionalism:

- Interactionist theorists criticized functionalism for failing to conceptualize adequately the complex nature of actors and the process of interaction. Marxist theory argued against functionalism's conservativism and the static nature of analysis that emphasized the contribution of social phenomena to the maintenance of the status-quo. Advocates of theory construction questioned the utility of excessively classificatory or typological theories that pigeonholed phenomena in terms of their functions. Functional theory also has been criticized for its disregard of the historical process and for its presupposition that societies are in a state of equilibrium.
- Logical problems of functional explanations also have been pointed out, namely that they are teleological and tautological. It has been argued that the presence of an institution cannot precede the institution's existence. Otherwise, such a teleological argument would suggest that the institution's development anticipated its function. Functional analysis has also been criticized for being circular: needs are postulated on the basis of existing institutions that are, in turn, used to explain their existence.
- Furthermore, functionalism's anti-historic approach made it impossible to examine social processes, rejection of psychology made it impossible to

understand attitudes and sentiments, and the rejection of culture led to a lack of recognition of the ecological context.

Other key criticisms include www.sociology.org.uk:

- Supports political and economic status quo (everything has a function).
- Over-emphasis upon "beneficial" aspects of institution, structures.
- Difficult to explain rapid social change.
- Tautology (a statement that contains its own proof): "If something exists it has a function. It has a function because it exists…").
- Error of reification (Belief that non-human things like "society" can have human qualities such as "needs and purposes").

1.6.2.2 Conflict theory

According to Wikipedia (2006B), conflict theory states that the society or organization functions so that each individual participant and its groups struggle to maximize their benefits, which inevitably contributes to social change such as changes in politics and revolutions. The theory is mostly applied to explain conflict between social classes in ideologies such as capitalism. The theory attempts to refute functionalism, which considers that societies and organization function so that each individual and group plays a specific role, like organs in the body. There are radical basic assumptions (society is eternally in conflict, which might explain social change), or moderate ones (custom and

conflict are always mixed). The moderate version allows for functionalism to operate as an equally acceptable theory since it would accept that even negative social institutions play a part in society's self-perpetuation.

The essence of conflict theory is best epitomized by the classic 'pyramid structure' in which an elite dictates terms to the larger masses. All major institutions, laws, and traditions in the society are designed to support those who have traditionally been in power, or the groups that are perceived to be superior in the society according to this theory. In summary, conflict theory seeks to catalogue the ways in which those in power seek to stay in power.

The following are four primary assumptions of modern conflict theory:

- *Competition*. Competition over scarce resources (money, leisure, sexual partners, and so on) is at the heart of all social relationships. Competition rather than consensus is characteristic of human relationships.
- *Structural inequality*. Inequalities in power and reward are built into all social structures. Individuals and groups that benefit from any particular structure strive to see it maintained.
- *Revolution*. Change occurs as a result of conflict between competing interests rather than through adaptation. It is often abrupt and revolutionary rather than evolutionary.
- *War*. Even war is a unifier of the societies involved, as well as war may set an end to whole societies.

Conflict Theory and Indigenous Ecological Knowledge

Inglis (1993) argues that in general, contemporary societies which have traditional ecological knowledge exist at the margins or beneath the notice of dominant societies, position frequently sanctioned legally, if not not morally persuasive. Today traditional communities are frequently found in borderlands, hinterlands, or undedirable areas (wastelands). They survive often because , by being out of the way, they avoid conflict with dominant societies, or because they have been resetlled under duress form more desirable areas. Increasingly, isolation offers no escape , however as the economies of dominant societies reach into these hinterlands to feed upon their resources, often displacing people who live there, damaging their lands and extracting their resources. In the process, traditional lifestyles are disrupted and traditional ecological knowledge is cut adrift, perhaps ligering on in irrelevance before disappearing from living memory forever.

Criticisms of the Conflict Theory

Key criticisms include, amongst others, http://www.sociology.org.uk/cardthy1.htm:

- Unscientific (the "Faith of Marxism" - Popper).
- Conspiracy theory (especially aimed at Instrumental Marxists).
- Communism does not appear imminent.
- Left Functionalism (Jock Young: argues most "Marxism" is little more than form of Functionalism that replaces interests of "society" with "ruling class").
- Subjective beliefs and interpretations of individuals ignored (Weber).

- Economic determinism.
- Forms of (non-economic) conflict (gender, ethnic group) ignored in favour of economic conflicts.

1.6.2.3 Symbolic Interactionism

Symbolic interactionism, or interactionism for short, has a long intellectual history, beginning with Max Weber (1864-1920) and George H. Mead (1863-1931), both of whom emphasized the subjective meaning of human behavior, the social process, and pragmatism (McClelland, 2006B).

According to Nelson (1998), Herbert Blumer outlined *Symbolic Interactionism,* a study of human group life and conduct. Blumer came up with three core principles to his theory. They are *meaning, language,* and *thought.* These core principles lead to conclusions about the creation of a person's self and socialization into a larger community Blumer outlined *Symbolic Interactionism,* a study of human group life and conduct.

Interactionists focus on the subjective aspects of social life, rather than on objective, macro-structural aspects of social systems. One reason for this focus is that interactionists base their theoretical perspective on their image of humans, rather than on their image of society (as the functionalists do). For interactionists, humans are *pragmatic actors* who continually must adjust their behavior to the actions of other actors. We can adjust to these actions only because we are able to interpret them, i.e., to denote them symbolically and treat the actions and those who perform them as symbolic objects. This process of adjustment is aided by our ability to *imaginatively rehearse* alternative lines of action

before we act. The process is further aided by our ability to think about and to react to our own actions and even our *selves* as symbolic objects. Thus, the interactionist theorist sees humans as active, creative participants who construct their social world, not as passive, conforming objects of socialization (McClelland, 2006B).

Symbolic Interactionism and Indigenous Ecological Knowledge

SDIMC (2006) argues that the indigenous peoples of the Americas in the path of Spanish colonization lost their cultural traditions in the process of assimilation. This parallels German people's loss of their indigenous cultures following the expansion of Christianity of the Roman Empire. Certain symbolic sacred symbols were allowed to continue, for example the oak trees were carried on in symbolism, though significant portions of sacred oak grove forests were lost to road building and conversion of land to plantation agriculture. The Christmas tree is carried over from pagan traditions of celebrating the winter solstice (December 21) with lighting and decorating an evergreen tree on the darkest day of the year. Aztec and indigenous symbols remaining in modern Mexican culture include the eagle on the Mexican flag and the nopales cactus in the diet and gardens of Mexican Americans.

Criticism of the Criticism of Symbolic Interactionism

The core of symbolic interaction came from many different areas. Psychologists felt the work of symbolic interactionists lacked rigor and systematic procedures to gather evidence in a way that could be replicated. Ethnomethodologists criticized Blumerian

symbolic interactionism, regarding it as a gloss-over of simple human interaction that stated and researched the obvious. They also criticized the subjectivity of symbolic interactionist research and had a problem with symbolic interactionists departing from the detached observer role to take a closer, more involved position with research subjects. The other major critique came largely from the political left, who, at the time, began emphasizing Marxist ideas on power, social class, and social structure. The political left argued that symbolic interactionism neglected social structure and its effects and that, because of this, symbolic interactionism perpetuated the ideology defending the stratification and inequality rooted in the American political and economic structures http://socsci.colorado.edu/SOC/SI/si-decline.htm.

George Ritzer, in http://socsci.colorado.edu/SOC/SI/si-criticisms.htm analyzes criticisms of symbolic interactionism:

- The mainstream of symbolic interactionism has abandoned the practice of empirically based research techniques. Many social theorists have argued that, due to its subjective nature, the research product of symbolic interactionism has been allowed to remain untested.
- Symbolic Interactionist research is often criticized for use of qualitative research methods. Many of the concepts that symbolic interactionism holds central, such as Mead's "I and Me," are too vague and abstract and often times contradictions can be found within Meadian Theory.
- SI has been accused of downplaying or ignoring major social structural issues, overestimating the power of individuals to create personal realities.

- Opposing the third criticism, another suggests that SI does not focus enough on the more micro-level psychological details such as needs, motives, emotions, and the unconscious. SI ignores the motives that lead the actor to engage in actions and the use of symbols and, therefore, it does not adequately account for unconscious processes.

1.6.2.4 Phenomenology

Stanford Encyclopedia of Philosophy (2003) states that literally, phenomenology is the study of "phenomena": appearances of things, or things as they appear in our experience, or the ways we experience things, thus the meanings things have in our experience. Phenomenology studies conscious experience as experienced from the subjective or first person point of view. This field of philosophy is then to be distinguished from, and related to, the other main fields of philosophy: ontology (the study of being or what is), epistemology (the study of knowledge), logic (the study of valid reasoning), ethics (the study of right and wrong action), etc. In recent philosophy of mind, the term "phenomenology" is often restricted to the characterization of sensory qualities of seeing, hearing, etc.: what it is like to have sensations of various kinds. However, our experience is normally much richer in content than mere sensation. Accordingly, in the phenomenological tradition, phenomenology is given a much wider range, addressing the meaning things have in our experience, notably, the significance of objects, events, tools, the flow of time, the self, and others, as these things arise and are experienced in our "life-world".

Phenomenology and Indigenous Ecological Knowledge

Strang (2000) points out that in an Aboriginal cosmology, the land is not merely a material surface: it was formed in the Dreamtime by ancestral beings, deities in the forms of animals and birds, who emerged or 'became visible', created all the features of the landscape, all its inhabitants, and so forth. Each ancestral myth - or song - describes these journeys in detail: what the ancestral being did, where she or he went, all the events of their travels. Having completed their journeys, the ancestors 'sat down' into the land - i.e. shifted back to an invisible plane of existence - where they remained, creating a living, sentient landscape that watches and responds to human action and provides a source of spiritual power. Held in the land, the various ancestral beings became totems for the different human clans who, in Aboriginal terms, inherited their 'country' from these ancestors, and therefore own it in perpetuity. According to Aboriginal beliefs, human spiritual being emerges from these ancestral forces, and every individual has - usually within their own clan land - a particular place from which their spirit has emerged. More often than not this is a water source of some kind, and the 'spirit children' held in the place 'jump up', as Aboriginal people say, to give the spark of life to the foetus in a woman's womb. In this way, every human being emerges from a particular place, a spiritual conception site which they call their Home or in Kunjen (one of the three major Aboriginal languages spoken in Kowanyama), their *errk elampungnk* Like the ancestral beings, people come out of the land, grow and mature.

Criticism of Phenomenology

Daniel Dennett, in www.blackvault.com/wiki/index.php/Phenomenology, has criticized phenomenology on the basis that its explicitly first-person approach is incompatible with the scientific third-person approach, going so far as to coin the term *autophenomenology* to emphasize this aspect and to contrast it with his own alternative, which he calls *heterophenomenology.*

1.6.2.5 Rational Choice

Scott (2000) argues that sociologists and political scientists have tried to build theories around the idea that all action is fundamentally 'rational' in character and that people calculate the likely costs and benefits of any action before deciding what to do. This approach to theory is known as *rational choice theory*, and its application to social interaction takes the form of *exchange theory*. The fact that people act rationally has, of course, been recognised by many sociologists, but they have seen rational actions alongside other forms of action, seeing human action as involving both rational and non-rational elements. Such views of action recognise traditional or habitual action, emotional or affectual action, and various forms of value-oriented action alongside the purely rational types of action. Max Weber (1920), for example, built an influential typology of action around just such concepts. His ideas were taken up by Talcott Parsons (1937) and became a part of the sociological mainstream. In a similar way, the social anthropologists Bronislaw Malinowski (1922) and Marcel Mauss (1925) looked at how social exchange was embedded in structures of reciprocity and social obligation. What distinguishes

rational choice theory from these other forms of theory is that it denies the existence of any kinds of action other than the purely rational and calculative. All social action, it is argued, can be seen as rationally motivated, as instrumental action, however much it may appear to be irrational or non-rational.

Rational choice and Indigenous Ecological Knowledge

Berman and Kofinas (2004) maintain that local knowledge provides a realistic choice set of hunting areas and seasons that local experts consider relevant to their decisions. It also describes hunting effort (time, money, gear), and climatic conditions likely to affect caribou movements and accessibility of caribou hunting areas. More generally, local knowledge contributes by generating relevant variables to model, reconciling discrepancies among data sets, and establishing parameter values, allowing us to take advantage of the strengths of the rational choice approach.

Criticism of the Rational Choice Theory

Hechter and Kanazawa (1997) maintain that one criticism of rational choice focuses on the lack of realism in its assumption that we calculate the expected consequences of our options and choose the best of them. A vast body of social research reveals that people often act impulsively, emotionally, or merely by force of habit. Think how agonizing decisions about jobs, spouses, and children can be. Were people the informed and calculating agents that rational choice theorists assume them to be, such decisions would

not be particularly wrenching. Since these choices often take an emotional toll, it is easy to conclude that the theory is implausible.

Having outlined and briefly discussed the afore-mentioned theories, the researcher will follow the Conflict Theory route in analyzing the knowledge and attitudes of NWU (Mafikeng) students towards indigenous ecological knowledge.

1.7 Hypothesis

This study is grounded on the following hypothesis:

- The NWU (Mafikeng Campus) students are doing little to ensure that Indigenous Ecological Knowledge is preserved and protected.

1.8 Significance of the study

The researcher hopes that this study will contribute in a significant number of ways to the following:

It is hoped that the study will add to the existing source of literature on indigenous ecological resources and their management. Presently there is a lot of literature on indigenous ecological knowledge form other countries but very minimal literature on the

subject, particularly relating to matters of knowledge and attitudes in South African institutions of higher learning.

The significance of this study is that it will inform policy makers on matters relating to indigenous ecological resources and their management. South Africa has just developed an Indigenous Knowledge Systems Policy (see Mosimege, 2006). This study is intended to fill in the gaps in this policy and to widen the scope of information available to policy makers in the country.

Another significance of this study is that it will stimulate the North West University (Mafikeng Campus) community to look introspectively into their knowledge of indigenous ecological resources and their management, ultimately aiming to improve their knowledge where it lacks.

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The study will, as well, assist in improving the attitude of the North West University (Mafikeng Campus) community towards indigenous ecological knowledge. It is apparent that the students at NWU (Mafikeng Campus) value western education more than indigenous ecological knowledge. Thus, this study will serve as an eye-opener to the students on the value of indigenous ecological knowledge.

1.9 Methodology

This study follows a case-study approach because it will provide the researcher with a deep understanding of NWU Mafikeng Campus students' knowledge about indigenous ecological resources, their uses, and management. A case-study is done by giving special attention to completeness in observation, reconstruction, and analysis of the cases under study. Case-study is done in a way that incorporates the views of the "actors" in the case under study (Tellis, 1997).

Robinson, (in Saunders et al., 2000), points out that a case-study is the development of a detailed, intensive, knowledge about a single "case" or a small number of related "cases". For example, a case-study explores and probes in depth the circumstances of an organization.

Wikipedia (2006), on the other hand, defines a case study as a particular method of qualitative research. Case studies are important in that: rather than using large samples and following a rigid protocol to examine a limited number of variables, case study methods involve an in-depth, longitudinal examination of a single instance or event: a case. They provide a systematic way of looking at events, collecting, data, analyzing information, and reporting results. As a result the researcher may gain a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research. Case studies lend themselves especially to generating (rather than testing) hypotheses.

1.10 Scope of the study

The study concentrated on students from the NWU (Mafikeng Campus) because the researcher was and is a student at the university. Again, the researcher was a Geography lecturer for several years at the institution. This made it easy for the researcher to gain access to the sources of information. It also reduced research costs in terms of transport, accommodation, etc.

1.11 Subjects

The sources of information for this study were:

(i) Key person are people who are well-placed and knowledgeable. For this study, key persons are made up of:

- Lecturers from different faculties and departments in order to get a cross-sectional view of staff from the different disciplines on the research problem.

(ii) A stratified random sampling approach of nineteen (19) undergraduate and nineteen (19) post-graduate students, in order to get the views of each of the two academic levels of the university was used. Bless and Higson-Smith (2000:89) states that the principle of stratified random sampling "is to divide a population into different groups, called strata, so that each element of the population belongs to one and only one

stratum. Then, within each stratum, random sampling is performed using either the simple or the interval sampling method".

The reason for choosing simple random sampling is that stratified random sampling permits great accuracy even for small samples, which reduces the cost of sampling considerably.

1.12 Data Collection Methods

Taking into consideration of the characteristics of the different sources of information and in order to cross-reference and validate the information from the different sources, a combination of different research methods were used.

Interviews

Structured and semi-structured Interviews were conducted with key persons. Graves (1982) argues that interviews are a research technique that calls for the collection of information in a face to face situation. In this technique, information is obtained directly in a face to face situation. Robinson (1998) maintains that face to face interviews vary according to the characteristics of the respondents, the research topic, and the environment in which the meeting is taking place.

Ferron (1982) points out that in a *formal (structured) interview* the questions that are to be asked, their sequence and wording, the instructions and methods of coding the answers

are worked on prior to the interview. A respondent is interviewed for a short period of time, an hour for example.

Semi-structured interviews, on the other hand, involve lists of questions to be addressed to knowledgeable individuals in a relaxed and informal way. Unlike questionnaires with standardized questions and closed-ended answers, semi-structured interview only include general questions. This leaves the interviewer free to rephrase them as appropriate and to add further inquiries such as "Who?", "Where?", "When?", "Why?", and "How?" based on the respondent's answers and conversation flow. Semi- structured interview can be used to obtain specific, in-depth, quantitative and qualitative information on specific points of interest. Decision-making systems, gender-related issues, use of natural resources, household economics and many other topics can be effectively explored with this tool. Information can be given as well as received during the interview (Borrini-Feyerabend, 1997).

Questionnaires

A questionnaire was for the stratified random sample of both undergraduate and postgraduate respondents. A questionnaire "involves asking people a series of questions" (Beuajeu-Garnier, 1976:19). Lenon and Cleve (1983) claim that a questionnaire is the most important primary source of data.

A questionnaire with both closed-and open-ended questions was used in this study because according to Behr (1988), questionnaires: are used in more than half of total

research in education; may look for factual information; determine opinions, attitudes and interests; are the best instruments to obtain reliable data from widespread sources; and that they have inherent co-operative nature, concerning what may be asked of busy respondents.

There are three types of questionnaires, a close-ended, an open-ended, and a questionnaire incorporating both the closed and open types *Close-ended questionnaires*: According to Behr, (1988) in a closed-ended questionnaire, the respondent ticks, marks or draws lines along provided possible answers. This makes it easier to answer questions and classify and code information. However, this may force the respondent to think along certain lines. In an open-ended questionnaire, the respondent is free to respond as he wishes and is not only limited to only one alternative. Information about motivations, attitudes, interests, and preferences of the respondents may be obtained through an open-ended questionnaire.

Focus Group Discussions

Focus group discussions were held with a random sample of about ten (10) students in order to solicit in-depth information on their attitudes and knowledge towards indigenous ecological knowledge. Focus group discussions were used to cross-reference information gathered from students through questionnaires. According to NSF (1997), focus groups are a gathering of 8 to 12 people who share some characteristics relevant to the evaluation. Focus groups combine elements of both interviewing and participant observation. The focus group session is, indeed, an interview not a discussion group,

problem-solving session, or decision-making group. At the same time, focus groups capitalize on group dynamics. The hallmark of focus groups is the explicit use of the group interaction to generate data and insights that would be unlikely to emerge without the interaction found in a group. The technique inherently allows observation of group dynamics, discussion, and firsthand insights into the respondents' behaviors, attitudes, language, etc.

1.13 Ethical Consideration

All social researchers share a number of ethical concerns. These are variously defined and differentiated; as, for example, a series of obligations to society which all researchers must fulfill, obligations to funders and employers, to colleagues, and to subjects; or as three major scientific norms that should govern all social research - *beneficence* (maximizing good outcomes while minimizing unnecessary risk or harm), *respect* (protecting autonomy of persons), and *justice* (ensuring reasonable, non-exploitative and carefully considered procedures with fair distribution of costs and benefits) (Freed-Taylor, 2003).

SRA (2003) outlines and discusses the significances of ethical consideration such as: avoiding undue intrusion, obtaining informed consent, modifications to informed consent, protecting the interests of subjects, preventing disclosure of identities, and enabling participation.

CBD (2006) has drafted, amongst others, the following code of ethics for researchers working with indigenous or local communities which this researcher will use:

Full disclosure: Indigenous and local communities should be fully informed about the nature, scope and purpose of any proposed activities carried out by others, occurring on or likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities (including research, methodology, data collection, and the dissemination and application of results).

Respect: This principle recognizes the necessity of those interacting with indigenous and local communities to respect the integrity, morality and spirituality of the cultures, traditions and relationships of indigenous and local communities, and to avoid the imposition of external concepts, standards and value judgements. Respect for cultural heritage, ceremonial and sacred sites, as well as sacred species and secret and scared knowledge should be given specific consideration in any interactions including research.

Acknowledgement of collective rights: Interactions, including undertaking research related to biodiversity, should respect the collective rights of indigenous and local communities to their cultural and intellectual property, including knowledge, innovations and practices and associated biological diversity and genetic materials.

Equitable sharing of benefits: Indigenous and local communities should receive fair, and equitable benefits for their contribution to any activities (including research) and outcomes proposed to take place on, or which are likely to impact on, sacred sites and

lands and waters traditionally occupied or used by indigenous and local communities and/or involving their knowledge and culture.

Protection: All interactions with indigenous and local communities should include active measures to protect and to enhance the relationships of indigenous and local communities with their environment and thereby promote the maintenance of cultural and biological diversity.

Precautionary approach: The precautionary approach advocates taking pro-active, anticipatory action to identify and prevent harm that may result from activities, even if cause-and-effect relationships have not yet been scientifically proven.

The purpose of this research shall be explained to the respondents. Again, the researcher will ensure the respondents that the responses they shall provide will be completely anonymous and confidential and would not be handed over to any other party. It will be explained to the respondents that the data that will obtained will be used solely for research purposes and this MA (IKS) mini-dissertation of Mr. R.H. Matonkonyane.

1.14 Data Analysis

Bless and Higson-Smith (2000) point out that once data collection and checking have been completed, the researcher should begin the process of analysing data. This analysis is conducted so that the researcher can detect consistent patterns within the data, such as consistent covariance of two or more variables. Furthermore, the data analysis process

allows the researcher to generalize from the sample used in the research, to the larger population in which the researcher is interested.

Both qualitative and quantitative data were collected in this research study. Qualitative data such as attitudes, opinions, etc. were analyzed on the basis of content. Lacey and Luff (2001) maintain that qualitative data analysis summarizes and describes mass of words generated by interviews or observational data. The question may require the researchers to seek relationships between various themes that have been identified, or to relate behaviour or ideas to biographical characteristics of respondents such as age or gender. There are no 'quick fix' techniques in qualitative analysis. Many would argue that qualitative research is an interpretative and subjective exercise, and the researcher is intimately involved in the process, not aloof from it. Analysis of qualitative data usually goes through some or all of the following stages (though the order may vary):

- Familiarization with the data through review, reading, listening, etc.
- Transcription of tape recorded material.
- Organization and indexing of data for easy retrieval and identification.
- Anonymising of sensitive data.
- Coding (may be called indexing).
- Identification of themes.
- Re-coding.
- Development of provisional categories.
- Exploration of relationships between categories.

- Refinement of themes and categories.
- Development of theory and incorporation of pre-existing knowledge.
- Testing of theory against the data.
- Report writing, including excerpts from original data if appropriate (e.g. quotes from interviews).

On the other hand, quantitative data such as the demographic characteristics of the respondents were analyzed by using descriptive statistical procedures. According to Analysis of Asset Allocation, descriptive statistics involves either reducing the data set to a very few numbers or representing the data set in graphical format, and preferably both. The purpose of descriptive statistics is to give a clear view of raw data.

1.15 Limitations of the Study

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Two significant limitations of this study can be identified first as the response rate. Not all questionnaires distributed were returned to the researcher. Even among those that were returned, not all questions them were answered. The second notable limitation of this study is that the respondents were generally not willing to fill in the questionnaires.

1.16 Organization of the Final Report

The report is organized as follows:

Chapter 1: Introduction. It provides the background, aim/objectives and methodology of the study.

Chapter 2: Presents the demographic and socio-economic characteristics of the respondents.

Chapter 3: Knowledge and attitudes towards indigenous ecological resources and uses.

Chapter 4: Looks at the management of indigenous ecological resources..

Chapter 5: Provides conclusions and recommendations.

CHAPTER TWO

DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

This chapter presents personal information of the respondents at NWU (Mafikeng Campus). The chapter is divided into five (5) sections: the first section deals with the respondents' age. The second section contains information on the gender of the respondents. In the third section attention is focused on the places of origin of the respondents. The fourth section places focus on the programmes respondents are currently registered for. Finally, there is a discussion on degrees students are currently registered for.

2.1 Age Distribution

The first question was regarding the student's age. The reason for asking this question was to determine the influence of age on indigenous ecological knowledge. The older the student is, there is more likelihood that the student will have more indigenous ecological knowledge than younger students. The answers are summarized in Table 2.1.

Table 2.1: Percentage Age Distribution of Respondent Students

N = 38

Age	Percentage
17 – 21	24
22 – 26	39
27 – 31	32
32 – 36	5
37 and above	0
Total	**100**

Many respondents (39 percent) were in the age category 22 – 26. They were followed by age category 27 – 31 at 32 percent. Generally, most students (63 percent) were in the first two categories (17 -21 and 22 – 26). Surprisingly, there were no respondents who were 37 years old or older.

2.2 Gender Distribution

The question on the researcher's mind was "could the gender difference influence the acquisition and extent of indigenous ecological knowledge?" The respondents were then asked to state their gender. The gender of the respondents is illustrated in Table 2.2.

Table 2.2: Percentage Distribution of Gender of Respondent Students

N = 38

Gender	Percentage
Male	55
Female	45
Total	**100**

There were more males (55 percent) than females who only accounted for 45 percent of the respondents.

2.3 Place of Origin

Another element that could influence the acquisition and the level of indigenous ecological knowledge an individual possesses is whether a person has been brought up in a rural or an urban area. The respondents were asked about their origins. The other intention of this question was to determine if Setswana-speaking students, from the North West Province in particular, possessed any indigenous ecological knowledge. Another reason for asking this question was to determine if the students' indigenous ecological knowledge was evenly distributed across the provinces or countries from which students originated. The responses are summarized in Table 2.3 and Table 2.4.

Table 2.3: Percentage Distribution of Respondents' Rural or Urban Origin

N = 38

Origins	Percentage
Rural	53
Urban	47
Total	**100**

More than half (53 percent) of the respondents grew up in the rural areas. The remaining 47 percent were raised up in the urban areas.

Table 2.4: Percentage Distribution of Respondents' Place of Origin

N = 38

Province	Percentage
Eastern Cape	0
Free State	0
Gauteng	11
KwaZulu-Natal	5
Limpopo	0
Mpumalanga	3
Northern Cape	0
North West	53
Western Cape	0
Other: Botswana Lesotho	23 5
Total	**100**

The majority of the respondents (53 percent) resided in the North West Province. They followed by respondents who originated from Botswana (23 percent) who are coincidentally are also Setswana-speaking. There were no students who originated from the Eastern Cape, Free State, Limpopo, and Western Cape Provinces.

2.4 Educational Level

The respondents were asked about their educational levels. The reason for asking this question was to make it easier to stratify the respondents into undergraduate and postgraduate students. Their responses are contained in Table 2.5.

Table 2.5: Percentage Distribution of Respondents' Educational Levels

N = 38

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Programme	Percentage
Diploma	0
Degree	50
Honours	39
Masters	11
Ph.D	0
Total	**100**

A half (50 percent) of the students were studying towards their first degree. Two-fifths (39 percent) were honours students and just more than one-tenth (11 percent) were masters students. There were no doctorate students who were surveyed.

Again, the respondents were asked which undergraduate degrees they were currently registered for. The objective of asking this question was to make it easier to be able to conduct a stratified random sampling of twenty (20) undergraduate and twenty (20) postgraduate students. The intention was to determine if students' indigenous ecological knowledge varied according degrees they registered for. The students' responses are shown in Table 2.6.

Table 2.6: Percentage Distribution of Undergraduate Degrees Registered

N = 19

Degree	Percentage
BA.	53
B.Admin.	5
B.Com.	11
B.Ed.	5
B.Sc.	21
LLB.	5
Total	**100**

More than a half (53 percent) of the respondents were Bachelor of Arts (BA) students. The next big group were Bachelor of Science (B.Sc.) students at 21 percent. They were followed by Bachelor of Administration (B.Admin.), Bachelor of Education (B.Ed), and Bachelor of Law (LL.B) students each at 5 percent.

The respondents were then asked which postgraduate degrees they were registered for. The objective of asking this question was to make it easier to be able to conduct a stratified random sampling of twenty (20) undergraduate and twenty (20) postgraduate students. The other objective was to determine if students' indigenous ecological knowledge varied according degrees they registered for. The responses are outlined in Table 2.7.

Table 2.7: Percentage Distribution of Postgraduate Degrees Registered

N = 19

Degree	Percentage
BA Hons.	47
B.Com Hons.	16
B.Sc Hons.	16
M.A.	16
M.Sc.	5
Total	**100**

Almost half (47 percent) of the respondents were Bachelor of Arts Honours (BA Hons.) students. The next big category were students who were studying for Bachelor of Commerce Honours (B.Com Hons.), Bachelor of Science Honours (B.Sc Hons.), and

Master of Arts (M.A.); each at 16 percent. The least category (5 percent) was of students studying towards Master of Science (M.Sc.).

CHAPTER THREE

KNOWLEDGE AND ATTITUDES TOWARDS INDIGENOUS ECOLOGICAL RESOURCES AND USES

This chapter discusses knowledge about indigenous ecological resources and uses among the respondents at NWU (Mafikeng Campus). The chapter is divided into three (3) sections: the first section deals with the students' general indigenous ecological knowledge. The second section pays attention attitudes of the university community towards indigenous ecological knowledge and lastly, attention is focused on the uses of indigenous ecological knowledge.

3.1 Knowledge of Indigenous Ecological Knowledge

The intention of this section was to determine the depth of the students' knowledge and attitudes towards indigenous ecological resources and uses. The responses are summarized in Table 3.1.

Table 3.1: Percentage Distribution of Respondents' Attitudes Towards Indigenous Ecological Resources and Uses

N = 38

ATTITUDE	SD	D	A	SA	TOTAL
Indigenous ecological knowledge is a system of understanding one's environment.	5	19	37	39	100
Indigenous ecological knowledge is based on observations and experience.	3	16	42	39	100
Indigenous ecological knowledge is expressed in customary practices such as hunting, fishing, and gathering.	8	13	45	34	100

KEY:

SD = Strongly Disagree

D = Disagree

A = Agree

SA = Strongly Agree

More than three-quarters (76 percent) of the respondents agreed that indigenous ecological knowledge is a system of understanding one's environment. Of these, 39 percent strongly agreed and 37 percent agreed. Only 24 percent of the respondents disagreed that indigenous ecological knowledge is a system of understanding one's environment as 19 percent disagreed and 5 percent strongly disagreed.

More than four-fifths (81 percent) agreed that indigenous ecological knowledge was based on observations and experience. Thirty nine and (39) percent strongly agreed while 42 percent agreed. Only 19 percent of the respondents disagreed that indigenous ecological knowledge was based on observations and experience. Of these, 16 percent disagreed and 3 percent strongly disagreed.

More than three-quarters (79 percent) of the respondents were in the affirmative that indigenous ecological knowledge was expressed in customary practices such as hunting, fishing, and gathering. Close to a half (45 percent) strongly agreed with the statement and more than a third (34 percent) agreed. It was only 21 percent of the respondents who thought that indigenous ecological knowledge was not expressed in customary practices such as hunting, fishing, and gathering. Little over a tenth (13 percent) disagreed, whereas 8 percent strongly disagreed.

Pertaining to lecturers, 60 percent understood indigenous ecological knowledge to be knowledge that indigenous people possess about their cultural environment and such a knowledge has been passed on from generation to generation. Forty percent said

indigenous ecological knowledge refers to how the fore generations took care took care of and interacted with their surrounding environments.

3.1.1 What Respondents Want to Know About Indigenous Ecological Knowledge

The respondents were asked what was it that they would like to know about, pertaining to indigenous ecological knowledge. The aim was to determine if the respondents had the keenness to acquire more indigenous ecological knowledge that they hitherto did not possess. The responses are contained in Table 3.2.

Table 3.2: Percentage Distribution of What Respondents Would Like to Know About Indigenous Ecological Knowledge

N = 38

What Respondents Would Like To Know About Indigenous Ecological Knowledge	**SD**	**D**	**A**	**SA**	**TOTAL**
Biological diversity of the forest.	8	11	44	37	100
Cultural norms for land management and resource allocation.	5	13	34	48	100
Environmental and land-use change.	3	13	50.0	34	100
Traditional medicine and healing.	8	18	26	48	100
Traditional agriculture.	8	11	37	44	100

KEY:

SD = Strongly Disagree

D = Disagree

A = Agree

SA = Strongly Agree

The overwhelming majority (81 percent) concurred that they wanted to know more about the biological diversity of the forest. Of these, 44 percent agreed and 37 percent strongly agreed. Only19 percent of the respondents disagreed that they wanted to know more about the biological diversity of the forest. Analyzing this percent, 11 percent disagreed and 8 percent strongly disagreed.

Slightly more than four-fifths (82 percent) of the respondents held the view that they would like to know more about the cultural norms for land management and resource allocation. Taking a close scrutiny at this percentage, 48 percent strongly agreed while 34 percent agreed. The remaining 18 percent held the opposite view. Of these, 13 percent disagreed and 5 percent strongly disagreed.

Over four-fifths (84 percent) of the respondents showed interest in knowing more about environmental and land-use change. Of these, a half (50 percent) agreed and 34.2 percent strongly agreed. Just 16 percent showed no interest in knowing more about

environmental and land-use change. Just over one-tenth (13 percent) disagreed and just 3 percent strongly disagreed.

Close to three-quarters (76 percent) of the respondents indicated the willingness to know more about traditional medicine and healing. Almost a half (48 percent) strongly agreed, whereas 26 agreed. It was only 24 percent who did not indicate the willingness to know more about traditional medicine and healing. Almost a fifth (18 percent) disagreed and 8 percent strongly disagreed.

The overwhelming majority (81 percent) of the respondents displayed eagerness to learn more about traditional agriculture. Close to a half (44 percent) strongly agreed, whilst 37 percent agreed. Only 19 percent of the respondents did not display any eagerness to learn more about traditional agriculture. Slightly more than a tenth (11 percent) disagreed whereas only 8 percent strongly disagreed.

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3.2 Attitude of the University Community Towards Indigenous Ecological Knowledge

This section sought to discuss the attitude of the university community towards indigenous ecological knowledge. The aim was to determine if the students had positive attitudes towards indigenous ecological knowledge. With students having positive attitudes, the task of conserving and protecting indigenous ecological knowledge will be made much easier. The responses are contained in Table 3.3 and Table 3.4.

Table 3.3: Percentage Distribution of Respondents' Attitudes Towards Western Knowledge System

N = 38

	Percentage
Yes	53
No	21
Don't know	26
Total	**100**

Just more than a half (53 percent) of the respondents agreed that Western knowledge system was to blame for the loss of indigenous ecological knowledge. They were followed by those who did not know (26 percent) if Western knowledge system was to blame for the loss of indigenous ecological knowledge. Just over one-fifth (21 percent) disagreed that Western knowledge system was to blame for the loss of indigenous ecological knowledge.

Table 3.4: Percentage Distribution of Respondents' Views Towards the Future of Indigenous Ecological Knowledge

N = 38

	Frequency
Yes	61
No	13
Don't know	26
Total	**100**

Close to two-thirds (61 percent) of the respondents agreed that something could still be done to conserve and protect indigenous ecological knowledge. Little more than a quarter (26 percent) of the respondents did not know if something could still be done to conserve and protect indigenous ecological knowledge. Only 13 percent of the respondents disagreed that something could still be done to conserve and protect indigenous ecological knowledge.

Almost half (40 percent) of the lecturers concurred that the university encourages the students to use their indigenous ecological knowledge within the academic environment. Another 40 percent of the lecturers indicated that they did not know if the university was encouraging the students to use their indigenous ecological knowledge within the academic environment. Only 20 percent disagreed that the university was encouraging

the students to use their indigenous ecological knowledge within the academic environment.

Sixty (60) percent of the lecturers agreed that indigenous ecological knowledge has a significant role to play in an academic environment. Forty (40) percent disagreed that that indigenous ecological knowledge has a significant role to play in an academic environment.

Sixty (60) percent of the lecturers disagreed that their departments used indigenous ecological knowledge when lecturing to students. Twenty (20) percent agreed that their departments used indigenous ecological knowledge when lecturing to students. Another 20 percent indicated that they did not know if their departments used indigenous ecological knowledge when lecturing to students.

All (100 percent) of the lecturers indicated that their research students did not use indigenous ecological knowledge when researching on matters relating to their disciplines.

3.3 Uses of Indigenous Ecological Knowledge

The aim of this section was to obtain information on students' knowledge about the uses of indigenous ecological knowledge. Having determined the students' general knowledge and attitudes towards indigenous ecological knowledge, the researcher sought to

determine whether with this information the students would know what indigenous ecological knowledge is used for. The more students know what indigenous ecological knowledge is used for, the likelihood is that they might be more interested in indigenous ecological knowledge. The students' responses are summarized in Table 3.5.

Table 3.5: Percentage Distribution of Uses of Indigenous Ecological Knowledge

N = 38

	SD	**D**	**A**	**SA**	**TOTAL**
	%	%	%	%	%
Traditional ceremonies and celebration.	11	8	45	36	100
Knowledge about biological diversity of the forest.	8	21	47	24	100
Plant and wildlife protection.	5	16	45	34	100
Food and medicine.	5	19	34	42	100
Whole-life upbringing of individuals.	8	18	50.0	24	100
Natural resource management.	3	16	50.0	31	100
Conservation education.	8	18	34	40	100

KEY:

SD = Strongly Disagree

D = Disagree

SA = Strongly Agree

A = Agree

The overwhelming majority (81 percent) of the respondents concurred that indigenous ecological knowledge was being used in traditional ceremonies and celebrations. Of these, 45 percent strongly agreed while 36 percent agreed. The remaining 19 percent of the respondents held the opposite view. Analyzing this percentage, 11 percent strongly disagreed, while 8 percent disagreed.

Almost three-quarters (71 percent) of the respondents held the view that indigenous ecological knowledge was being used for knowledge about biological diversity of the forest. Almost a half (47 percent) agreed, whereas almost a quarter (24 percent) strongly agreed. Just 29 percent of the respondent felt that ecological knowledge was not being used for knowledge about biological diversity of the forest. Of these, 21 percent disagreed and 8 percent strongly disagreed.

More than three-quarters (79 percent) of the respondents agreed that indigenous ecological knowledge was being used for plant and wildlife protection. Of these, 45 percent agreed, while 34 percent strongly agreed. Only 21 percent of the respondents did not concur. Of these, 16 percent strongly disagreed and 5 percent disagreed.

More than three-quarters (76 percent) of the respondents were in the affirmative that indigenous ecological knowledge was being used for food and medicine. Breaking this figure down, 42 percent strongly agreed whereas 34 percent agreed. The remaining 23 percent of the respondents disagreed. Analyzing this percentage, almost one-fifth (19 percent) disagreed, while only 5 percent strongly disagreed.

Just under three-quarters (74 percent) of the respondents agreed that indigenous ecological knowledge was being used for whole-life upbringing of individuals. Analyzing this figure, 50 percent agreed, while 24 percent strongly agreed. It was only 26 percent of the respondents who did not agree with the statement that indigenous ecological knowledge was being used for whole-life upbringing of individuals. Breaking this figure down, 18 percent disagreed, whereas 8 percent strongly disagreed.

The overwhelming majority (81 percent) of the respondents were of the view that indigenous ecological knowledge was being used for natural resource management. Of these, a half (50 percent) agreed and 31 percent strongly agreed. The remaining 19 percent held the opposite view. Of these, 16 percent disagreed, while 3 percent strongly disagreed.

Almost three-quarters (74 percent) of the respondents agreed that indigenous ecological knowledge was being used for conservation education. Of these, 40 percent strongly agreed, while 34 percent agreed. The remaining 26 percent disagreed that indigenous ecological knowledge was being used for conservation education. Breaking down this percentage, 18 percent disagreed and 8 percent strongly disagreed.

Forty (40) percent of the lecturers indicated that indigenous ecological knowledge was used for the management of the surrounding ecology. Twenty (20) percent said indigenous ecological knowledge was used for cultural and traditional rituals and celebrations. Another twenty (20) percent said indigenous ecological knowledge was

used for learning about the surrounding environment. A further twenty (20) percent pointed out that indigenous ecological knowledge was used in the daily interaction of human beings with their natural environment.

CHAPTER FOUR

MANAGEMENT OF INDIGENOUS ECOLOGICAL RESOURCES

This chapter focuses on discussions into management of indigenous ecological resources and uses. The chapter is divided into two sections: section on management of indigenous ecological resources and the section on the management of conservation and protection of indigenous ecological knowledge.

4.1 Management of Indigenous Ecological Resources

The aim of this section was to determine if the respondents placed the responsibility of managing indigenous ecological resources on someone else's shoulders or if they would put the responsibility on their own shoulders. The tendency to abdicate the responsibility often leads to negligence and loss of interest. The students' responses are summarized in Table 4.1.

Table 4.1: Percentage Distribution of Respondents' Views on Responsibility for Management of Indigenous Ecological Resources

N = 38

Responsibility	SD	D	A	SA	TOTAL
Traditional leadership	8	24	42	26	100
Government	3	39	39	19	100
Everyone	13	24	18	45	100

KEY:

SD = Strongly Disagree **A** = Agree

D = Disagree **SA** = Strongly Agree

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More than two-thirds (68 percent) of the respondents agreed with the statement that it should be the role of the traditional leadership to manage indigenous ecological resources. As much as 42 percent agreed with the statement and 26 percent strongly agreed. The remaining 32 percent of the respondents did not agree with the statement as 24 percent disagreed and 8 percent strongly disagreed.

More than a half (58 percent) of the respondents agreed that if it should be the role of the government to manage indigenous ecological resources. Of these, 39 percent strongly agreed, while 19 percent agreed. The remaining 42 percent of the respondents were not in

the affirmative. More than a third (39 percent) disagreed, whereas just 3 percent strongly disagreed.

Just under two-thirds (63 percent) of the respondents concurred that it should be the role of everyone to manage indigenous ecological resources. Of these, 45 percent strongly agreed and 18 percent agreed. The remaining 37 percent did not concur that it should be the role of the government to manage indigenous ecological resources. Breaking this figure down, 24 percent disagreed, while 13 percent strongly disagreed.

Almost all (80 percent) of the lecturers indicated that it was the responsibility of the government (the Department of Environmental Affairs) to manage indigenous ecological resources. Only a few (20 percent) said it was the role of the community to manage indigenous ecological resources.

Again, 80 percent of the lecturers pointed out that indigenous ecological resources are well-managed. They cited reasons like institutions for managing such resources exist; there are world heritage sites in the country; and that the Department of Science and Technology is paying a particular attention to indigenous knowledge. Just 20 percent indicated that they did not know whether that indigenous ecological resources are well-managed.

4.2 Conservation and Protection of Indigenous Ecological Knowledge

This section sought to determine how the respondents managed the conservation and protection of indigenous ecological knowledge. The reason for doing so was to determine if there were steps the respondents were taking to ensure that Indigenous Ecological Knowledge is preserved and protected. The responses are summarized in Table 4.2.

Table 4.2: Percentage Distribution of How Respondents Managed the Conservation and Protection of Indigenous Ecological Knowledge

N = 38

Management of Indigenous Ecological Knowledge/Resources	**SD**	**D**	**A**	**SA**	**TOTAL**
Being a member of cultural society.	11	13	39	37	100
Being a member of a conservation club.	11	31	37	21	100
Soliciting information from the elders.	8	14	39	39	100
Participating in awareness campaigns.	16	5	45	34	100
A registered Indigenous Knowledge Systems student.	16	32	39	13	100
Supporting indigenous research initiatives.	8	5	53	34	100
Doing nothing at all.	68	8	8	16	100

KEY:

SD = Strongly Disagree

D = Disagree

A = Agree

SA = Strongly Agree

More than three-quarters (76 percent) of the respondents agreed with the statement that they managed the conservation and protection of indigenous ecological knowledge by being members of cultural societies. As much as 39 percent agreed with the statement and 37 percent strongly agreed. The remaining 24 percent of the respondents did not agree with the statement as 13 percent disagreed and 11 percent strongly disagreed.

Over a half (58 percent) of the respondents held the view that they managed the conservation and protection of indigenous ecological knowledge by being members of conservation clubs. More than a third (37 percent) agreed, whereas almost a quarter (21 percent) strongly agreed. Just 42 percent of the respondent felt that they did not conserve and protect indigenous ecological knowledge as they were not members of conservation clubs. Of these, 31 percent disagreed and 11 percent strongly disagreed.

More than three-quarters (78 percent) of the respondents agreed that they managed the conservation and protection of indigenous ecological knowledge by soliciting information from the elders. Of these, 39 percent agreed, while the other 39 percent

strongly agreed. Only 22 percent of the respondents did not concur. Of these, 14 percent disagreed and 8 percent strongly disagreed.

More than three-quarters (79 percent) of the respondents were in the affirmative that they managed the conservation and protection of indigenous ecological knowledge by participating in awareness campaigns. Breaking this figure down, 45 percent agreed whereas 34 percent strongly agreed. The remaining 21 percent of the respondents disagreed. Analyzing this percentage, almost one-fifth (16 percent) strongly disagreed, while only 5 percent disagreed.

Just over a half (52 percent) of the respondents agreed that they managed the conservation and protection of indigenous ecological knowledge by being registered Indigenous Knowledge Systems students. Analyzing this figure, 39 percent agreed, while 13 percent strongly agreed. It was only 48 percent of the respondents who did not agree with the statement that they conserved and protected indigenous ecological knowledge by being registered Indigenous Knowledge Systems students. Breaking this figure down, 32 percent disagreed, whereas 16 percent strongly disagreed.

The overwhelming majority (87 percent) of the respondents were of the view that they managed the conservation and protection of indigenous ecological knowledge by supporting indigenous research initiatives. Of these, over a half (53 percent) agreed and 34 percent strongly agreed. The remaining 13 percent held the opposite view. Of these, 8 percent strongly disagreed, while 5 percent disagreed.

Over three-quarters (76 percent) of the respondents disagreed that they managed the conservation and protection of indigenous ecological knowledge by doing nothing at all. Of these, 68 percent strongly disagreed, while 8 percent disagreed. The remaining 24 percent agreed that they conserved and protected indigenous ecological knowledge by doing nothing at all. Breaking down this percentage, 16 percent strongly agreed and 8 percent agreed.

Close to two-thirds (60 percent) of the lecturers said that indigenous ecological knowledge was being conserved and protected through academic research. Twenty (20) percent pointed out that indigenous ecological knowledge was being conserved and protected through documentation of such knowledge. Another 20 percent indicated that indigenous ecological knowledge was being conserved and protected by being taught at educational institutions as a part of the formal curriculum.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

The preceding three chapters reflected analysis of the findings of the study. This chapter focuses on c oncluding remarks and recommendations. The chapter is divided into two sections: the first section outlines the recommendations that the researcher proposes. The last section contains some concluding remarks

The hypothesis has been proven wrong. It was hypothesized that the NWU (Mafikeng Campus) students were doing little to ensure that Indigenous Ecological Knowledge is preserved and protected. However, the study finding have revealed that the NWU (Mafikeng Campus) students were actively: members of cultural societies; members of conservation clubs; soliciting information from the elders; participating in awareness campaigns; registered Indigenous Knowledge Systems students; supporting indigenous research initiatives; and not doing nothing at all.

5.1 Conclusions

Indigenous ecological knowledge that our ancestors possessed helped them to survive the environmental characteristics in which they lived. Today humankind is faced with hitherto environmental changes of unprecedented rate. We cannot only look to modern science for answers. Indigenous ecological knowledge has been tested and has stood the test of time. It is encouraging that the study findings have revealed that it is not all lost

and forgotten: the NWU (Mafikeng Campus) students concurred that something could still be done to conserve and protect indigenous ecological knowledge.

5.2Recommendations

Further research needs to be conducted on indigenous ecological knowledge, especially among tertiary students in Africa. There is information available on indigenous ecological knowledge, however it is limited when relating to tertiary students. Little amount of this information exists mainly when referring to Australasia and Latin America. There is therefore the need that the knowledge and attitudes of African students towards indigenous ecological knowledge be thoroughly researched so that the continent is not left behind the rest of the world.

Again, information on indigenous ecological knowledge should be made as widespread as possible. Electronic media such as television and radio can play a significant role in this regard. Therefore, the public broadcaster – the SABC – should be approached to help in this endeavour. Print media can also play a significant role in raising the levels of awareness. For example, academics and students can be given spaces to contribute regular articles on indigenous ecological knowledge in local and national newspapers as well as magazines.

Furthermore, it is worrying that the minority of the respondents agreed that indigenous ecological knowledge still had a significant role to play. Traditional leadership should

therefore play a pro-active role in ensuring that traditional customs and cultures do not perish as they have been proven to have been ecologically-friendly. Traditional leader should encourage their subjects to attend the 'traditional schools'. However, emphasis should be placed on health and hygiene. There are nurses and doctors who have been to these 'traditional schools' and they should therefore be allowed to supervise the proceedings when boys and girls 'come out of age'. Western knowledge systems should not be allowed to totally overwhelm us lest this leads to the 'decolonization' of the African mind.

Lastly, indigenous knowledge should become part of the formal national curriculum, especially at the elementary levels. The earlier the pupils are taught indigenous ecological knowledge there is more likelihood they will grow to espouse what they will have learned while they were still young. At universities, colleges, and technikons, Indigenous Knowledge Systems (IKS) should become an elective across all humanities disciplines. Therefore, the national Department of Education has to be canvassed into ensuring that indigenous ecological knowledge becomes a permanent part of the mainstream curriculum.

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APPENDICES

APPENDIX A: RESEARCH QUESTIONNAIRE

NORTH-WEST UNIVERSITY (MAFIKENG CAMPUS)

FACULTY OF HUMAN AND SOCIAL SCIENCES

Rebonekgosi Herman Matonkonyane
MA (IKS) student

Supervisor:
Professor H.O. Kaya

TARGET AUDIENCE

To be completed by North-West University students (Mafikeng campus). Please do not leave any question unanswered as this will render your questionnaire unusable.

PURPOSE

The information gathered through this questionnaire will be used as part of the empirical research on *An Investigation into Knowledge and Attitudes of Tertiary Institution Students Towards Indigenous Ecological Knowledge for Sustainable Development: The Case of the North-West University (Mafikeng Campus).*

CONFIDENTIALITY

Please note that the responses you provide are completely anonymous and confidential. The data obtained will be used solely for research purposes and MA (IKS) mini dissertation of R.H. Matonkonyane.

1. DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

1.1 Age.

16 – 20	
21 – 25	
26 – 30	
31 – 35	
36 and above	

1.2 Gender.

Male	
Female	

1.3 Originate from village or town.

Town	
Village	

_____ Province (or country if not South African) _____

1.4 Programme for which you are currently registered.

Diploma	
Degree	
Honours	
Masters	
Ph.D	

1.5 Degree for which you are currently registered? _____

2. INDIGENOUS ECOLOGICAL RESOURCES AND USE

6. Please read the following statements carefully and use a scale of 1-4, where:

1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree

2.1 Indigenous ecological knowledge is a system of understanding one's environment.	1	2	3	4
2.2 Indigenous ecological knowledge is based on observations and experience.	1	2	3	4
2.3 Indigenous ecological knowledge is expressed in customary practices such as hunting, fishing, and gathering.	1	2	3	4

3. MANAGEMENT OF INDIGENOUS ECOLOGICAL RESOURCES AND USES

3.1 Management of indigenous ecological resources and uses is the responsibility of:

3.1.1 Traditional leadership	1	2	3	4
3.1.2 Government	1	2	3	4
3.1.3 Everyone	1	2	3	4

3.2 I am ensuring that Indigenous Ecological Knowledge is conserved and protected by:

3.2.1 Being a member of cultural society.	1	2	3	4
3.2.2 Being a member of a conservation club.	1	2	3	4
3.2.3 Soliciting information from the elders.	1	2	3	4
3.2.4 Participating in awareness campaigns.	1	2	3	4
3.2.5 A registered Indigenous Knowledge Systems student.	1	2	3	4
3.2.6 Supporting indigenous research initiatives.	1	2	3	4
3.2.7 Doing nothing at all	1	2	3	4

3.3 Indigenous ecological knowledge is used for:

3.3.1 Traditional ceremonies and celebration.	1	2	3	4
3.3.2 Knowledge about biological diversity of the forest.	1	2	3	4
3.3.3 Plant and wildlife protection.	1	2	3	4
3.3.4 Food and medicine.	1	2	3	4
3.3.5 Whole-life upbringing of individuals.	1	2	3	4
3.3.6 Natural resource management.	1	2	3	4
3.3.7 Conservation education.	1	2	3	4

4. ATTITUDE OF THE UNIVERSITY COMMUNITY TOWARDS INDIGENOUS ECOLOGICAL KNOWLEDGE

4.1 Indigenous ecological knowledge has a significant role to play in our modern-day society.

Yes	No	Don't know

Please elaborate. _____

_____

_____

4.2 The dominance of the Western knowledge system is to blame for the loss of indigenous ecological knowledge.

Yes	No	Don't know

Please elaborate. _____

_____

_____

4.3 Something can still be done to ensure that indigenous ecological knowledge is conserved and protected.

Yes	No	Don't know

Please elaborate. _____

_____

_____

4.4 I would like to know about the following aspects of indigenous ecological knowledge:

4.4.1 Biological diversity of the forest.	1	2	3	4
4.4.2 Cultural norms for land management and resource allocation.	1	2	3	4
4.4.3 Environmental and land-use change.	1	2	3	4
4.4.4 Traditional medicine and healing.	1	2	3	4
4.4.5 Traditional agriculture.	1	2	3	4

APPENDIX B: INTERVIEW WITH LECTURERS

NORTH-WEST UNIVERSITY (MAFIKENG CAMPUS)

FACULTY OF HUMAN AND SOCIAL SCIENCES

Rebonekgosi Herman Matonkonyane
MA (IKS) student

Supervisor:
Professor H.O. Kaya

TARGET AUDIENCE

To be completed by North-West University lecturers (Mafikeng campus). Please do not leave any question unanswered as this will render your questionnaire unusable.

PURPOSE

The information gathered through this questionnaire will be used as part of the empirical research on *An Investigation into Knowledge and Attitudes of Tertiary Institution Students Towards Indigenous Ecological Knowledge for Sustainable Development: The Case of the North-West University (Mafikeng Campus).*

CONFIDENTIALITY

Please note that the responses you provide are completely anonymous and confidential. The data obtained will be used solely for research purposes and MA (IKS) mini dissertation of R.H. Matonkonyane.

1. PERSONAL INFORMATION

1.1 What is your designation? _____

1.2 In which department are you employed?_____

1.3 How long have you been with NWU (Mafikeng Campus)? _____

2. MANAGEMENT OF INDIGENOUS ECOLOGICAL RESOURCES AND USES

2.1 What is your understanding of indigenous ecological knowledge? _____

_____

_____

_____

2.2 What is indigenous ecological knowledge used for? _____

_____

_____

_____

2.3 In your opinion whose responsibility is it to manage indigenous ecological resources?

_____

_____

_____

_____

2.4 Do you think that indigenous ecological resources are well managed?

Yes	No	Don't know

Please elaborate. _____

_____

_____

_____

2.5 How do you ensure that indigenous ecological knowledge is conserved and protected?

_____

_____

_____

_____

3. ATTITUDE OF THE UNIVERSITY COMMUNITY TOWARDS INDIGENOUS ECOLOGICAL KNOWLEDGE

3.1 Do you think that the University encourages students to use their indigenous ecological knowledge within the academic environment?

Yes	No	Don't know

Please elaborate. _____

_____

_____

_____

3.2 Do you think that indigenous ecological knowledge has a significant role to play in an academic environment?

Yes	No	Don't know

Please elaborate. _____

_____

_____

_____

3.3 Does your department use indigenous ecological knowledge when lecturing to students?

Yes	No	Don't know

Please elaborate. _____

_____

_____

_____

3.4 Do your research students use indigenous ecological knowledge when researching on your disciplinary matters?

Yes	No	Don't know

Please elaborate. _____

_____

_____

_____

3.5 What do you think can be done to ensure that indigenous ecological knowledge is conserved and protected?_____

_____

_____

_____