PROCEEDINGS

First Annual International Conference
26-28th October, 2016.

Theme:

"Encouraging Interdisciplinary Research and Innovation for the Betterment of Humanity"

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UNIVERSITY OF KABIANGA
INNOVATION AND EXCELLENCE

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DIVISION OF PLANNING, RESEARCH & DEVELOPMENT, UNIVERSITY OF KABIANGA

FOREWORD

U niversity of Kabianga (UoK) upholds great importance to the carrying out of beneficial strategic research, innovation, and dissemination of knowledge thus generated. This is embodied in the unversitity's motto - "Innovation and Excellence". During the First Annual International Conference of UoK, the research papers presented by the participants illustrated the benefits of interdisciplinary approach in carrying out strategic and applied research. This research is aimed at providing viable solutions to basic societal needs, as enshrined in Kenya's Medium Term Plan II (MTP II), Vision 2030, and UN's Sustainable Development Goals (SDGs). These papers covered the most recent knowledge in the fields of Science and Humanities, Science and Culture, and Science and Religion. Hence, the conference provided an atmosphere of in-depth exposure and learning experience to all the participants on the importance of synergistic interdisciplinary research collaborations, for the betterment of humanity. Furthermore, highlights on the interface between science and religion dwelt on the importance of upholding morality and ethical practices in research to ensure its beneficial worth to humans and the environment. It is no doubt that, these proceedings will be a life-long excellent reference document that will continue to encourage further focused research not only in all the areas covered, but in other strategic ones.

We wish to acknowledge the very informative paper contributions by the four invited keynote presenters Prof. Marty Rice (Australia), Dr. Peter Kanyandago (Uganda), Prof. Mary Getui (Kenya) and Prof. Jifeng-Chen (China). In addition, we recognize the continued support by the UoK Council and the sponsors including the Office of Governor of Kericho County, Kenya Commercial Bank, Cooperative Bank, Geokarma Construction Company, Tea Hotel (Kericho), Finlays Tea Co., and others who contributed in kind.

Prof. Wilson K. Kipngeno, PhD.
VICE - CHANCELLOR

PREFACE

The Directorate of Research, Linkages and Extension (RL&E) in the Division of Planning, Research and Development (PR&D) at the University of Kabianga (UoK) provides strategic guidance for the improvement of the research culture at UoK. The underlying vision is that the knowledge thus generated and appropriately disseminate will ultimately contribute to improvement of the general well-being of society. This is in line with the three core mandates of institutions of higher learning that include Academics, Research and Extension.

In this First UoK International Conference a broad range of papers covering various disciplines were presented under an all encompassing theme "*Encouraging Interdisciplinary Research and Innovation for the Betterment of Humanity*", that had three subthemes namely Science and Humanity, Science and Culture and Science and Religion. Of the papers presented, twenty four are published in these proceedings that include a keynote paper and twenty three research papers. While among these there are pure scientific research papers, a large proportion of the publications explore the interface between religion and other disciplines as a way of making the latter more relevant to the norms of our daily lives. There is no doubt that integrating religion with other disciplines will strengthen the moral and ethical considerations in all research areas. Overall this will contribute to ensuring that, to a large extent, research outputs are beneficial to humans and play a crucial role in the sustainability of a productive and healthy environment.

Thus, the content of these proceedings provides a window and challenge to the readers to advocate for and carry out research that is responsive to the multi-faceted needs of the various societies. This requires development and execution of projects that incorporate their various ways of life by taking keen interest and in-depth understanding of the cultural and religious beliefs of the target society. Only then shall we succeed in our endeavours to make long-lasting positive impact on the well-being of humanity.

On behalf of UoK, the continued financial support by the UoK Council and sponsorship by the various friends of the University now and in future, is acknowledged with gratitude. This will go a long way in the actualization and sustenance of UoK's Vision - "To be a leading University in Scientific Innovation for the Betterment of Humanity".

Prof. Peter G. N. Njagi, PhD.
DIRECTOR: RESEARCH, LINKAGES & EXTENSION

WELCOMING REMARKS

On behalf of the Division of Planning, Research, and Infrastructural Development, I wish to welcome all participants to this First University of Kabianga International Conference. The University recognises that together with training and extension, research is one of the three mandates of Institutions of higher learning. In this regard, the University Council has wisely allocated resources annually to ensure that research is encouraged and the results thereof disseminated in such a conference.

The theme; "*Encouraging Interdisciplinary Research and Innovation for the Betterment of Humanity*" is timely for it highlights the importance of strategic research. Research for research sake is no longer popular and focus is now on projects that explore solutions for challenges facing humanity. Recognising that man has physical, social, psychological, economic and spiritual needs, research is now mostly multidisciplinary. Such research considers a person within his environment and is more likely to provide long lasting solutions that will improve both the quantity and quality of life. This consideration informed the subthemes of this conference that highlight the intersection of the scholarly areas of science and humanities (culture and religion). We recognise our main speakers who have travelled to be with us and share their insights on this important subject. We also wish to recognise all presenters who took time to prepare papers that clearly indicate interdisciplinary research approaches to bettering humanity. The organizing committee has worked tirelessly for over a year under the able leadership of the Chairman Prof Adam Chepkwony and we are grateful. We want to thank the Tea Hotel for providing a beautiful venue. To our sponsors who have graciously provided resources to make this conference a reality; *Asante Sana.*

With the overwhelming response from our speakers and sponsors, the University of Kabianga has decided that this shall be an annual event. We thus hereby invite you to our second International Conference next year. Plan to attend and encourage others to do likewise.

Prof. Marion Mutugi, PhD., EBS,
DEPUTY VICE CHANCELLOR PLANNING, RESEARCH AND DEVELOPMENT

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KEYNOTE PAPER

Humanitarian Cosmology: Dancing with the Arts, Sciences and Sociology

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a) Basic premise

> *Ignoranti, quem portum petat, nullus suus ventus est.*
> No wind is favourable when we don't know what port we are sailing to.
> Seneca the Younger (*c*. 4 BC - AD 65)

We can be sure that everyone at this conference, including this speaker, believes that scientific discoveries will continue to make life easier for humankind. Yet there are some serious contextual issues which we neglect at our peril. In this keynote address it is suggested that, as science has advanced by a necessarily materialist and provisional methodology, it has illegally pervaded human understanding with absolutist philosophical materialism and fragmenting pragmatism. This has fostered unwarranted mechanicalism, now widely exploited as an *ad hoc* way of explaining almost everything. The practical successes of the sciences become extravagantly extrapolated into physicalist futures, with scant attention to human personal, aesthetic, cultural, religious, and environmental holism. This narrow but greedy physicalist paradigm has appealed to educationists and advocates of a 'Brave New World'. Too many of us are hypnotized by a preposterously shallow physicalist 'Futurama', where menageries of exotic machines are propelled by an unlimited source of energy to progressively colonise the entire cosmos. Humankind is demeaned by this 'increase is success' philosophy; surely, we are more than bacteria? Disconnected physicalist worldviews are also given appeal by the current increase in facts, in that the unmanageable volume of complex knowledge pressures people to adopt simplistic, scientistic explanations which enable them to feel they have a grip on reality. Because orientation is both an intellectual and spatial function of our brains,

it influences everything we do. Impoverished or fraudulent maps of reality distort our cognition and, in the end, must lead to personal and societal futility. *Kukimbia si kufika*.

This paper offers a short critique of the current parlous states of physics and of biology and it suggests a need to initiate the arduous process of re-visioning a more holistic and humanitarian inter-disciplinary worldview. Inter-disciplinary perspectives are provided, both on the physical 'Scale of Being' and on the biological 'Tree of Life'. Historical distinctives are noted between First and Second Peoples' cultures and they are related to the ethnology of the author(s) of the book of Genesis. The ultimate object of integrative research (and surely of all humankind) is to name a realistic port that everyone agrees is worth sailing towards. The greater truths and virtues - global social wellbeing - universal respect - and a fulfilled life for every individual are not disposable qualities that we should set aside in mad pursuit of quantity. A new, interdisciplinary, cosmic vision is needed; one that defers to First Peoples' integrated, anthropophilic wisdom. It's not too late to restore a more truthful and personalizing public perception and re-locate science and technology as our valued helpers, rather the lost leaders they are now proving to be.

b) Introduction

> *Our task is to make ourselves architects of the future.*
> *Jomo Kenyatta, First President of Kenya*

> *We all share one planet and are one humanity,*
> *there is no escaping that reality.*
> *Wangari Maathai, Nobel Price Laureate*

I congratulate the organizers of this 1st International Interdisciplinary Conference at the University of Kabianga in Kenya (October 26th and 27th 2016). It is rare for conferences to bring together social and cultural studies, religious studies, and the sciences. If you will hear me through, in this invited keynote address, you'll find that I think you are right on-target. Your type of multi-disciplinary conversation is the way towards a secure and satisfying vision for humankind. Around the world this is what all universities need to be doing much more of, to ensure future generations

inherit a livable planet.

When we hear the word 'Cosmology' it makes us think of the sun and moon and stars; even of our Milky Way galaxy and the so-called 'constellations'. We think of rockets, satellites, space stations, and of big optical telescopes, radio telescopes, and remarkable space telescopes, such as the famous "Hubble" telescope and the "Chandra" x-ray telescope, whose wonderful, high-resolution photographs have so enlarged our perceptions of the universe. Then we see videos of people in space-suits doing space walks and living for months in the International Space Station – powerfully but, as I will show, erroneously suggesting we can live happily by our own technology, separate from nature.

This year, astronomers found our universe has about 2 trillion galaxies, scattered through the vast space opened-up by an ever-expanding Big Bang that began from a single point almost 13.8 thousand million years ago. Yet it always comes as a surprise to non-scientists to learn that telescopes are limited and can only detect radiant energy up to a certain distance. We remain blind beyond a horizon equivalent to the distance light can travel in 13.8 billion years. We know there's much more beyond that because the universe has continued expanding during the time needed for that light to reach us. Things we now see as originating from 13.8 billion light years away have themselves moved to about 45 billion light years away from us; which is the current radius of the known universe. Thus, the actual-universe has a diameter of at least 90 billion light years. This is at least twenty times more voluminous than the now-universe which we are able to see with our telescopes. This means there could be 40 trillion galaxies or more. Another stunning discovery about our universe is that it is almost completely flat. Yet space-time itself is dimensional and definitely not flat. Current explanations of cosmic dimensionality are very complex and greatly exceed the simple models we learned in school.

Even though our most powerful telescopes see only a small part of the actuality that astronomers know must exist, what we can see is so gigantic that this Earth, its solar system and even our galaxy appear as mere specks in comparison. Astronomy has shown us that the actual-universe is an enormous, inaccessible matrix which surrounds the now-universe, itself a vast structure only visible to us in terms of

radiant energy from the far distant past. In its turn, the now-universe surrounds our Milky Way galaxy, which itself is the matrix for our star, the Sun and its nine planets, including Earth, the third planet out from the Sun. Yet, by completely ignoring the gigantic scale of physical reality, an amazing 'cartoon' vision of human conquest of the universe is being propagated and has established itself as a commonplace global paradigm and an inspiration for scientific investment. This socially-distorting fraud is discussed further in section **c.** below.

Everything that seems gigantic to us is actually trivial when compared with the age and size and complexity of our universe, where time itself is simply another dimension, along with height, width and breadth. Cosmologists have calculated that time began in the Big Bang that set our universe in motion, about 13.8 billion years ago and they predict our universe will end some billions of years from now in the total kinetic dissipation called "heat death". Although physicists have been able to paint this outline of Big History - the from-go-to-whoa of our universe - yet many humanly-important details have eluded scientific description. On top of that, the amazing things that science itself is currently discovering, utterly alter the simpler and more orderly physical and biological realities proclaimed by a previous generation of scientists. For example, it is less than 300 years since Sir Isaac Newton died in 1727. In the interim, a Newtonian view of the orderly and predictable character of physical reality has been thoroughly undermined by 'the new physics'. Not only is reality vastly more complex than Newton conceived but - highly significantly - what we are now discovering also shows the magnitude of what we may never be able to know. In less than a hundred years, forefront science has moved us from a confident certainty of completeness, to a dawning realization of the un-know-ability of reality and the intransigent incompleteness of human knowledge.

As mentioned, physical cosmologists understand our matrix of reality as an incredibly vast and ancient universe, most of which we are unable to see. Within this stupendously large and ancient matrix, the galaxy and solar system that we are familiar with are but ephemeral specks. To get the scale right, please bear in mind our galaxy is over 900,000 trillion kilometers in diameter. Even if we were able to do the impossible and travel at the speed of light, it would take us 100,000 light years just to go from one side of the Milky Way galaxy to the other side.

Yet, this is only 0.00004% of the known universe. Without doubt, the more we discover of physical cosmology, the more severely humbling it is. Some physicists now confess that physical reality is testing our human brains beyond their limits of understanding. If we humans are to attain the significance implied in our biological designation by Carl von Linné (1758) as *Homo sapiens*, we have to cognitively locate ourselves within a cosmos that is greater than the physical universe that we've now found impossible to describe. A sociologist might say: *We need to become 'freedom fighters' and shake off the paternalistic 'master discourse' of physics and its deceptive promises.* It has to be asked, if the human qualities we value so greatly are simply random derivatives of a material cosmos or, if they pre-existed it and are part of the explanation for why our cosmos exists with certain properties. Maybe we need to re-imagine the cosmos as an interdisciplinary matrix. A drama where ethics and aesthetics dance with physics in a paradigm we might think of as 'humanitarian cosmology'. It requires a cognitive shift for us to perceive the physical cosmos as more of a production process than an end in itself; physical things are the stage-props not the play itself. As will be described in the next section, physical cosmology has moved from certainty to a parlous state. Of itself, this suggests the time has now arrived for a more humanitarian cosmology.

Some scientists claim ours is an anthropically-tuned universe. If so, that would justify a paradigm shift because there are many other unique achievements of humankind, apart from science and technology. Humanity's primary achievements have been in applied anthropological ecology; the working of wooden and stone tools; the controlled use of fire; then development of languages, story-making and sophisticated cultures; aesthetics, ethics, philosophies, and religions; literacy, singing, music, dance, poetry, and drama; various medical and healing skills; farming, animal husbandry, and forestry; architecture, house-building, villages and cities; economics, politics and diplomacy; the list is endless. It's only in the last hundred years that empirical and theoretical sciences and their applied technological disciplines have come to dominate. In reacting against the current over-physicalisation of our society, humanitarian cosmology asks if the capacity for the huge diversity of anthropic abilities was implicit at the moment our universe began. Such a conclusion could be justified theistically or deistically but it doesn't have to be. It's just as reasonable to

consider that everything which has emergently complexified during cosmogenesis is necessarily an actualization of potentials implicit before our universe began. There's a huge philosophical difference between the anthropic pre-existence view and thinking, as many do, that everything is unconnected and feral.

Identification of the so-called 'fine-tuning' of physicality exemplifies how a much wider suite of unseen, pre-existing potentials could have been sequentially influential since the Big Bang. When atheists talk in terms of a physically 'evolving' cosmos they are also affirming, often without realizing it, the reality of pre-existing, supra-cosmic realities. Importantly: visibly emergent, complexifying reality seems to have always been more expressive of unseen realities than we would expect in a random physical assembling of forces and particles within a hugely expanding arena of space-time. Significantly, the physical framework of cosmogenesis (as we understand it) has proved to have at least one niche for the emergence of anthropic individuality and ultimately for human personality. There is no need to appeal to 'creationism' or 'designism'; but, we'd be blind not to see that: "The message greatly exceeds the medium!" Actualizations of non-material complexifications have certainly relied on a prolonged and extensive physical and biological cosmogenesis, yet it is these non-physical - artistic, cultural, aesthetic, and ethical realities - that dance on the physical stage. The time has arrived for re-envisaging the purpose of existence, in accord with the probability that the physical universe is not an end in itself but merely a requirement for the luxurious blossoming of personal and social anthropological expressiveness. To be freely and fully expressed, ethics and aesthetics depend on a vast and enduring universe; yet they pre-existed it and are what finally give it reason for its existence. This is the hard truth that scientism refuses to face.

c) Today's very factual but paradigmatically fallacious scientific cosmology

> *Oh! Let us never, never doubt what nobody is sure about! Hilaire Belloc (1897)*

> *Fashion, Faith & Fantasy. Roger Penrose (2016). Princeton University Press*

For thousands of years, in many cultures, theological pedagogues have taught that

the matrix of reality represents God's work, as observed from its logical coherence, ultimate simplicity, and awesome beauty. Even after the work of Copernicus and Isaac Newton overturned some long-held religious concepts, it was still *de rigueur* to think of the solar system and hence of our universe as elegantly comprehensible because they were directly divinely-created. Also, whilst Enlightenment free-thinking strongly challenged traditional political and ecclesial perspectives, it had its own creed, including such 'meaningfulness' concepts as:

(1) The human mind is able to investigate all things and to clearly describe them and their inter-relationships. Reality is intellectually accessible and meaningful in its own right.

(2) All objects are made of solid matter; with atoms and molecules constituting the chemical foundation of all material entities – of the universe, the earth, and we ourselves.

(3) The certainty of the unique superiority of the human species. Even after Darwin described biological evolution, humans were still placed on top of the tree of life. In fact, evolution came to be understood by many as the very machine of biological, cultural, and even cosmic progress. This philosophical position inspires many today to keep pushing forwards – to 'advance', to 'progress', to 'create change', and to 'invent the future'.

(4) We humans are cognitively exceptional - an attitude that has its roots in ancient theologies. Some experts even coined the term *Homo divinus* to express what they perceived as a 'god-resembling' capacity within human beings. However, advances in anthropology challenge this, together with traditional theological preconceptions such as:

(5) The natural universe, including humankind, is inherently good; and,

(6) If natural evils can no longer be thought of as visitations of just punishment upon wicked people, they are still good because they help to advance cosmic evolution.

Turning to point (1): as we saw in section **a.** above, the human mind has no access to the actual universe and science has to struggle to come to grips with even the now-universe. As mentioned, the actual universe itself has a diameter of about 90 billion light years, far beyond what is possible to observe even with the best telescope. We know that the now universe we can see is a vast, ultra-freezing vacuum, with a very

low average density of gravitationally-attractive material that could be described as atomic. Only 4.9% of this very tiny proportion can be identified as 'baryonic', that is of the sort that composes the neutrons and protons of atoms. Two, uncharacterized sources of gravitational attraction are speculated to make up the remaining 95.1% of the universe:

- 26.8% is the dark matter that is slowing down the expansion of the universe;

- 68.3% is the dark energy that is speeding up the expansion of the universe.

The philosophical implications of this are enormous. In a vast universe, in which we can only get very stale data from a very small part, we now find that even this small part is largely composed of materials and energies we are unable to understand. Quantum physicist Peter J. Bussey (2006: 185) speculates that our cosmos:

> *. . is rational but outside of human rationality.*

We sure need to think about that. If physical reality is too complex for the best human minds, scientism has to be recognised as a doubly false philosophy: in addition to making grandiose claims, scientism has been unaware of its ignorance of fundamentals.

Let's turn now to the opposite extreme of 'The Scale of Being' – to the infinitesimally small; that is to the structure of the atoms which sustain the apparent solidity of material. Take for example an atom of helium having just two electrons distributed around a nucleus composed of four baryons – two protons and two neutrons. When you see this depicted in textbooks, you'd think it is quite a solid structure. Yet, the only solid part is the nucleus and that has a diameter of about 1 femtometre (10^{-15} m), whilst the atom itself is about 100,000 femtometres in diameter. This means that what we call solid matter is actually more that 99.99% empty space! This non-substantial quality of matter is readily observed when neutrons and neutrinos speed through what looks and feels so solid to us. Matter is transparent to these uncharged particles; only on rare occasions are they deflected by impacting the miniscule but very dense nucleus of an atom.

Sub-atomic circumstances are even more scientifically insecure. We do know that four forces hold matter together: electromagnetic, weak nuclear, strong nuclear, and

gravity. In addition, baryonic nuclear particles have been thoroughly researched and form the basis of our Periodic Table of about a hundred and eighteen chemical elements. However, there is much uncertainty about sub-baryonic particles and complex associations. These 'particles' have been identified from their diverse qualities of hypothetical mass, charge, and spin; and, a Standard Model has been proposed to account for the main speculative fundamental particles, though they have never been separately observed. There are about one hundred 'particles' or entities listed for inclusion in speculative models of the basic composition of matter. Most have been called 'exotic' particles and only a few are major constituents of protons and neutrons, such as 'up quarks' and 'down quarks' and 'leptons' such as the electron. In an attempt to unify this confusing diversity of exceedingly small 'particles' and fields, some physicists have proposed that all are composed of tiny, vibrating strings of energy.

In this case it seems that physical reality has no material basis but is an artefact of a cosmic flux of energy fields. In addition - as many popular articles have made us aware - quantum mechanics contributes further to radical material uncertainty in its discovery of wave/particle duality, a basic randomness in matter, and that the status of a particle can be switched by human observation. Again, prior understanding was shattered by the discovery that widely separated entangled particles communicate with each at speeds far exceeding the speed of light. The planetary model of the atom is no more, although it still features in high-school physics and chemistry. Decisively, the universe can no longer be viewed as an enormous clockwork machine. Yet, in the new physics, there is no clear alternative because many contending theories try to account for the same data.

Amidst all this confusing certainty about uncertainty, there is one reliable construct: what can be called 'The Scale of Being'. This scale lists the whole of physicality in terms of thirty or more orders of magnitude. It is best to approach this from the center – that is from a thing the size of a one-meter rule. From this simple object we can ascend through fifteen orders of magnitude; up to something the size of our universe. We can also descend through fifteen orders of magnitude; down to the size of protons and neutrons. The fingers of our hands can easily be used to memorise the terminology. For those who are interested: going from one meter up:

a thousand meters is a kilometer = 10^3m; a thousand kilometers is a megameter = 10^6m; a thousand megameters is a gigameter = 10^9m; a thousand gigameters is a terameter = 10^{12}m; and a thousand terameters is a petameter = 10^{15}m. On the other hand; going from one meter down: a thousandth of a meter is a millimeter = 10^{-3}m; a thousandth of a millimeter is a micrometer = 10^{-6}m; a thousandth of micrometer is a nanometer = 10^{-9}m; a thousandth of a micrometer is a picometer = 10^{-12}m; and a thousandth of a picometer is a femtometre = 10^{-15}m. These humanly-imposed terms express the orderly arrangement of the physicality that surrounds all of us and holds us in existence; it's not something we can alter. Let's stop for five minutes and talk together about this totally amazing absolute scale of being: Are we normally aware of it? How does the scale of being impact our lives? Can an artist depict this foundational frame of materiality? Where is God in this scale of physical being; is there value in religious perspectives?

> *For since the creation of the cosmos God's invisible qualities –*
> *divine nature*
> *and eternal power – have been clearly seen from what has been*
> *made . . .*
> *Romans 1:20*

Why should physical reality be like this? Is all of reality, at least potentially, available for scientists to research? If it is not, does that have implications for philosophy, sociology, and theology? How do we understand the ancient adage: *Work and pray*?

Every thinking person, in every discipline, should know how fast we are moving:

1. We think we are standing still on the Earth but actually where we are standing (here on the equator) is rotating at over 1,000 km/hr. If something interrupted this rotation of the Earth, our momentum would catapult us all into space;

2. We know Earth revolves around the Sun once a year. This feels like a slow, stately journey but we are all actually traveling at nearly 100,000 km/hr? Imagine what it would be like to collide with something that's going the other way.

3. We think of the Solar system as a fixed entity, but it actually circles the

Milky Way galaxy at about 800,000 km/hr. What a powerful lesson is this: that the majestic constancy of the night sky greatly deceives us.

4. Finally, although our Milky Way galaxy has a huge mass, of about 10^{42}kgm, it's being attracted off-course at a velocity of about 2.2 million km/hr (about 3,000 times faster than a jetliner). Astronomers have invoked a 'Great Attractor', which must exert an almost unimaginably powerful gravitational force on our galaxy. However, no such cosmic attractor has been located, despite an intense searching of space at radio-wave, x-ray, and infra-red frequencies. Some physicists say this may indicate science has failed to get its basic understanding of the cosmos right. Einsteinian physics now appears to be in jeopardy.

One result of understanding our physical location in The Scale of Being and our velocity within it, should be an increase in our humility before the absolute and therefore towards each other. As is argued in sections **d.** and **e.**, below, genuine humility is a quality that assisted the original hunter-gatherer human cultures to endure.

The extremes of cosmology and of quantum mechanics have become wild territory indeed. And their enormous complexity has erased the Enlightenment certainty that the human mind can investigate all of reality and explain it to everyone in simple and beautiful models, like the Newtonian solar system or the planetary model of the atom. Thus, justifiable questions arise: *Are we starting to approach a level of reality, in both cosmic and subatomic dimensions that is fundamentally inaccessible to the human mind? Has scientific certainty proved to be just another failed philosophy?* It would be no use asking those physicists who don't admit to any limits to knowledge. Obviously, they would not want to jeopardize their research grants and careers. As far as they're concerned, the more unanswered problems there are the more jobs there'll be for physicists, for ever. Instead, it's up to educated lay people to inform themselves and judge whether all of the vast resources devoted to science are likely to produce answers that are of benefit to humankind. It will be difficult to get a straight answer because of socio-political factors. For example: the invention of nuclear weapons has given physics research top military priority. Socio-commercial factors

also favour fundamental physics research on the miniaturization of electronics, computer design, and robotics, etc. Within this cultural ethos it will be difficult to arrive at any disinterested consensus about the general utility and ethical impact of an unwarranted 'physicalisation' of human society, industry and commerce. Something everyone can do, though, is to learn how to defend the literary tradition, humanitarian philosophy, the arts, human cultures, and the Earth's ecology against misuses of the reductive physicalist paradigm. Interdisciplinary thinking - that is a sort of 'cognitive self-defense' - needs to be taught in all of our high-schools and universities. Let's look at a topical example of this: inter-stellar space travel.

Space travel is promoted as the flagship application of cosmological research, and of fundamental particle and quantum-mechanical research; and epitomizes the highest goals of physicalism. It is reasoned that space travel is especially important, since when our Earth becomes uninhabitable, the human species may be able to survive on planets circling stars elsewhere in our galaxy. In addition: "Reach for the Stars!" appeals to the Hollywood-encultured romantic adventurer in us all. Then, of course, we all like to have a 'plan B', such as another home planet to flee to. The question must be asked: *Is inter-stellar travel at all realistic?* The firm answer has to be: *No! This will never be possible.* Reality is infinitely harsher than science-fiction writers and Hollywood fantasy film producers would have us think. The nearest planet to us is about 4.5 light years away (about 43 trillion km). Even with our best spaceships it would take about 800 years to make the journey, with no idea how suitable the other planet would be on arrival. We must understand that 'warp-drives', to bend space-time and allow us to travel faster than light, are scientifically-baseless ploys used by space-agency public-relations kids to coerce public investment. Recent cases of scientific fraud show that scientists are not impeccable servants of truth, quite a few are crooks and all of us have vested interests.

True, rocket propulsion might improve and enable us to travel at, say, one tenth the speed of light? OK, but the journey would still take about 45 years and it would encounter an insurmountable problem, that of erosion. Whilst space is an almost perfect vacuum, it does contain particles of dust. Space-ships couldn't get far at very high velocities without being damaged by the impact of dust particles and incinerated by friction. Sadly, we must face the truth: all grandiose visions of inter-

galactic or even inter-stellar space travel are unrealistic. So, instead of running towards where we can never arrive - *kukimbia si kufika* - why don't we concentrate on our own beautiful planet? True: the moon and Mars are rational possibilities, but they are both far less hospitable than the most terrible deserts of Arabia. Maybe we should utilise our deserts on Earth before dreaming of the deserts on the Moon and Mars? For example: brilliant, applied scientific work in South Australia has recently shown that the world's deserts can be ideal places to establish non-polluting, solar-powered, hydroponic agriculture. It is perverse to cry for the Mars when so many golden opportunities await us, right here on our own endangered planet.

In view of the hard evidence, we must conclude that since the nearest solar planets are inhospitable and even the closest extra-solar planet inaccessible, the time has come to re-assign our research priorities and focus all our attention and scientific efforts on making life more secure on this Earth, our one and only home. Our dreams - and this includes those of brilliant physicists - should be all about our Earth and its precious passengers (many of whom are destitute and in great need of the basics of life); and, not about fictional new planetary homes and 'space cowboys'. This same answer can be given to those who use scare-tactics to persuade us to increase physics research funding so as to acquire weapons to protect ourselves from aggressive interstellar aliens (Hawking 2016). Since it's impossible for us to reach their planets we can safely assume that, if they exist at all, they can't reach us. Also, cynics might conclude that such scare-mongering is a way of justifying more funding for research on terrible weapons that are most likely to be used against humans on Earth rather than against aliens from outer space. Fear is useless; instead of thinking about how to kill aliens (or one another), all of us need to think about saving our precious planet and caring for suffering humanity. Science must serve not exploit. Only rational and beneficial objectives accord with Humanitarian Cosmology.

Fundamental physics projects associated with the concept of space-travel have been absorbing many of the best minds produced by our education system and swallowing the lion's share of available research funds. To continue in this way does not seem to be appropriate for the wisdom of *Homo sapiens*; rather, it might be thought of as more like the ambitious adolescent hubris of a wannabe *Homo divinus*. Those who follow the BBC 'time-lord', Dr Who, need to accept his exploits are science

fantasy. Dr Who appeals to the most phantasmagoric longings of the human psyche. Why is it then that so many people consider those fantasies to be models for our future? Does disconnected or deceived psychology play a part in these unrealistic yearnings? If humankind is observed in terms of early biblical symbolism: can we detect manifestations of the self-loathing and expulsion syndromes of Adam and Eve? Are we, who are the Second Peoples on planet Earth, condemned like murderer Cain to wander; incessantly building bigger cities and inventively working metals into new machines, all to the accompaniment of brass bands, until this planet can bear us no longer? If true wisdom is to "know yourself", isn't it time for us all to 'get real' about who we are and what our true situation is?

Now, let's turn to the fraught discipline of evolutionary biology. Most scientists have accepted the evidence that life originated on this planet, about 3.5 billion years ago and manifested itself in an increasing diversity of forms, to finally generate conscious and contemplative beings - that is our very selves - roughly 200,000 years ago. Charles Darwin strongly believed in the 'Tree of Life' concept, where better adapted species constantly replace less well-adapted species, and ceaselessly advance life's perfection, like a tree growing upwards. Rarely is it acknowledged that this is a 'rolling genocide' model of the advance of life. In the conclusion of 'The Origin of Species' Darwin wrote:

> *From the war of nature, from famine and death, the most exalted object we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a grandeur in this view of life . . .*
> *Charles Darwin, The Origin of Species (1859: 459).*

Following Darwin, it has been almost universally accepted that the selective shears of famines (theologians call that 'natural evil') and of wars ('moral evil') are the means that produce fit and healthy individuals and advances in the novelty and competency of life on earth. This could be abbreviated as: *Life is tough. Nature shows us that it's necessary to be cruel to progress.* Darwin saw no higher purpose in this process:

(If) the existence of so-called natural laws implies purpose . . .
I cannot see this. Charles Darwin, correspondence (July 3rd, 1881)

Economists and political scientists would recognise Darwin's biological beliefs as a variety of 'laissez faire' philosophy, without a higher purpose. Everything is allowed to play itself out without imposition of ideals or regulations; by work and wits you can get whatever you want; war is just an extreme means for nations to get what they want; etc. The assumption is that nature itself is 'god' and so you can do whatever you want because this is how nature works; and look, it must be good for biological evolution has produced 'exalted' beings like us humans through its laissez faire processes.

Contemporary biologists recognise two major problems with the Darwinian struggle-for-survival, progress paradigm. The first issue is that most - probably all - living organisms are totally dependent on cooperation. Embedded in the genome of every species there is DNA from a diversity of other species. Also, every macro-organism partners with micro-organisms; micro-organisms partner with each other; different species are crucial to one another's survival. Even more basically: the theory of 'symbiogenesis' shows that the first cells that gave rise to the eukaryotes, including our species, arose from cooperative associations between Archaea and Bacteria. Turning from the smallest biological scale to the largest: it's noteworthy that living organisms occupy ecological niches where, by adaptive selection of their genomes, they establish balanced physiological and behavioural relationships with a multitude of other living species. Relating well – that is, fitting in with other species - is the character that is most highly positively selected in nature. If there is a lesson in Biology, it concerns cooperation more than competition. You don't have to compete to survive but you always have to cooperate; and living organisms can't escape from having to en-niche with many other different species. Darwin was wrong: the wonders of nature are based on peaceful cooperations more than on violent struggles.

A second problem concerns the 'Tree of Life' paradigm. The erection of this famous phylogenetic sequences is very valuable in Biology, but it is usually accompanied by a fallacious metaphysical preconception suggesting that the higher up the tree

a species is, the more 'advanced' it is. A belief that more recently-derived and complex life-forms are more 'advanced' or more 'progressive' is not scientific. There are numerous contra-examples. What counts in biology is niche-integration. If you occupy a secure and enduring niche, then that *per se* is biological success. Naturally, the most secure and enduring niches have been occupied for hundreds of millions of years by such despised organisms as archaea, bacteria, fungi, protozoa, worms, snails, and insects; not to mention the numerous plant species on Earth. I'm sure you'll see from this that - if we claim to reason in truly biological terms - we must invert the Tree of Life that's found in most text-books. The more ancient species in the tree trunk and main branches are the truly successful ones, having long-ago commandeered the most enduring niches. Those in the side branches and twigs are the less successful, having had to make do with less safe and secure niches. The farther-out species are the less successful ones. What does that say about our own species, which we usually consider to be the most advanced of all? In terms of biological success, it is the exact opposite, since the top of our Tree of Life is actually the bottom. We are the least en-niched, the least secure and (as can be seen from current climate trends) likely to be among the least enduring species. Clearly, humankind has not always been in such a precarious situation. In section **d.** below we contrast two different types of human-beings: the original First Peoples and today's vast majority of Second Peoples. The current global crisis highlights our need to know more about First Peoples, for their story illustrates that *Homo* species have always had an option of being ecologically-integrated and less biologically vulnerable than we are today.

One of the earliest interdisciplinary theologian/scientists was Pierre Teilhard de Chardin, a French palaeoanthropologist. He was so impressed by what he saw as the evolutionary progress of the Tree of Life, that he founded his whole philosophical theology on it. De Chardin predicted that the final phase of evolution would be when mutual human understanding reached the so-called Omega Point, a stage where our species would become united with God. This is a sort of 'theodicy of nature' - an attempt to justify the blundering wastefulness and horrid cruelty of many natural processes in terms of a worthwhile, godly destination. In claiming that nature is godly, de Chardin adds an Aristotelian and Thomist flavour to Darwin. Critics have

claimed that he was irrationally conflating personal sanctification with species complexification. Others have noted the callousness of discarding all earlier humans so that a final group could be divinized. It is strange that, although de Chardin was a dedicated Christian, much of his theory is at odds with the New Testament and with his church's teachings. Despite these serious problems, the general thrust of de Chardin's vision has been picked up by many thinkers who envisage an evolutionary straining of life from the start of the universe, towards human being. This draws on Henri Bergson's vitalist concept of an *élan vital* within nature. Today, some claim to perceive this as the thrust of a nature spirit by means of human scientific advance towards divination. Such theories may be categorized as deist, vitalist or renovationist cosmologies; all readily identified by their view of evolution as 'self-advancement' and of history as disposable. These differ from the paradigm discussed in section **b.**; where pre-existing potentials progressively emerge during cosmogenesis. Humanitarian Cosmology depends on such actualization processes to support a paradigm of 'salvage', as discussed in this section below; and, in section **e.**

For de Chardin, it was the 'omega' end-point that mattered above all else and this was to be achieved by human struggle; so, his paradigm is inevitably a type of 'war effort'. That approach has similar characteristics to the atheist physical cosmological motive we discussed in section **b.**, above: whatever the costs along the way, humanity's destiny is to colonize the whole universe (or all universes). The emphasis of physicalism is then on competitive striving towards that goal. Individual persons, organisations and indeed nations are disposable, as with history itself. Individuals are to be ranked, like army personnel, in terms of their 'war contribution'. The extremes of the physicalist goal of 'meta-evolution' can be found in e.g. Barrow and Tipler (1987), Tipler (1995), and Tow (2006). Sociologically, this simplistic paradigm tends to be scientistic, misanthropic, militarist, mechanicalist, anti-biological, anti-cultural, and de-personalizing. Theologically, we note the physicalist vision has no place for a Sabbath rest and that, as disembodied 'masters of the universe(s)', humanoid robots will have all knowledge and control all things; apparently achieving some sort of physicalist self-deification. This is the ultimate materialist telos and meaning of scientific cosmology, yet with a certain resemblance,

to the lure of:

> *. . you will become like God.* Genesis 3:5.

The main alternative to vitalist and renovationist theologies and their materialist, meta-evolutionary counterpart is 'salvage theology'. The idea here is that as the universe develops, some parts of it will prove godly and acceptable and will be conserved, whilst other parts will not (Schelling 1809; Cooper 2006). In this paradigm, the universe is the matrix of innumerable ethical encounters with divine perfection, leading to a just and comprehensive 'ethical dialysis' (Rice 2011). This is consonant with the New Testament philanthropic vision, in which individual humans are salvaged through concordance with divine ways, not by any personal effort or long-term collective work. That contrasts with the renovation worldview, which depends on a competitive progressing of physicality. The salvage worldview sees responsiveness to divine, ethically-perfect ways as the efficacious *modus vivendi*. The salvage paradigm is readily distinguished because all of history is conserved; whereas in vitalist and renovation paradigms history is disposable.

There are other differences: the renovation model hinges on naturalistic *laissez faire* sociology, the salvage model is normalizing through a sociology that accounts for who we are as individuals; what is godly right-ethical; and, what is ungodly wrong-ethical. Renovation resembles a de-humanized, cosmic extension of free-market economics. Salvage resembles a humanitarian sociology, with a metamorphosis to perfect ethicality. In short, both worldviews are conditioned by what they take to be the purpose and goal of human life; the port we are sailing towards. Renovation thinking is based on unlimited improvement and growth, even to human self-divination. In contrast, salvage thinking envisages progressive metanoia, in sympathetic resonance with the pre-existing ethical perfection of God. It is important to note some future conditioning factors:

> (1) There is no consonance between vitalism, physicalist-renovation, and revelatory-salvage paradigms; the ports they are sailing towards are far removed;
> (2) Without a means of safe, fast interstellar transport the renovationist vision is severely curtailed;

(3) Renovation physicalism also fails if it renders the Earth unfit for human life (e.g. through nuclear or biological war; or, by causing extreme climate change);

(4) The salvage paradigm fails without a comprehensive divine ethical judgment (or something equivalent) leading to an eternal life of ethical perfection;

(5) Sociopolitical and religious factors may continue to irrationally conflate and distort the different worldviews in ways that are unpredictable;

(6) Other paradigms exist; e.g. 'nihilism' envisages no port worth sailing to.

As mentioned, 'renovation' - the paradigm of 'what works is what is right' - harmonises with physicalist cosmology and is an extension of it; requiring no conservation of history.

The vitalist paradigm - a spirit within nature is emergently evolving – also has no future use for historical stages. Unlike renovation and vitalism, the 'salvage' paradigm and its inter-disciplinary theology/science consonance, could gain credibility if the conservation of history can be shown to be a physical possibility. Remarkably, one of the strangest features of space-time is that every event in every place is recorded and conserved. This is because radiant energy and high velocity particles such as neutrinos constantly interpenetrate every part of the universe and are reflected or diverted by the fine details of whatever is taking place. Traveling at the speed of light, or close to it, they faithfully transmit the detailed information they've recorded for billions of years. Thus, our expanding universe is revealed to be a huge memory device. At any and every moment, somewhere in the universe there are records of everything that has ever happened. This is a truly extraordinary scientific reality that has resonances with a theological claim that:

> *There is nothing concealed that will not be disclosed, or*
> *hidden that will not be made known. Matthew 10: 26*

As mentioned, conservation of history is irrelevant in purely physicalist vitalist and renovation models, where it is only the latest evolved and most 'advanced' state that counts. However, the salvage model requires all right- and wrong-ethical choices

in the universe to be conserved as part of the justification of a summarising divine judgment. What is justly worthy of salvage will be readily recognisable from what the universe has recorded during its history. In this paradigm, human exceptionalism is conspicuous because of the massive amount of new information generated by human lives and cultural activities. Taking an 'anthropic universe' perspective, our Earth can be seen to have become increasingly prominent in the cosmos as a 'hot spot' of physical memory generation, following on the evolution and enormous multiplication of humankind. Our world's contribution of idiosyncratic data to the cosmos has been rising to a crescendo following-on the sci.-tech. revolution and advances in digital communication, etc. The possibility has to be considered that such an explosive growth of information-generation would be implicit right from the beginning, in any anthropically-tuned universe. This leads to the idea that the end of the universe is always right now (see 'apocalypse now' concept in section **e.**)

Two major sociological questions arise from such a physical situation:

> *(1) If every human function as a unique means for the universe to gain information, is it possible to set values on the sorts of information each of us contributes? and,*
> *(2) How should we treat our planet, once we realise it is an epicenter of radiant information-generation, fulfilling the purpose of our vast and ancient universe?*

These are very debatable issues. From the viewpoint of a humanitarian environmentalist the first question would be answered in the affirmative: kind and unselfish actions are valued more than cruel and selfish actions; right ethics such as humility are valued above wrong ethics such as hubris; cooperation is valued more than competition; etc. In answer to the second question, a humanitarian environmentalist might judge it a serious crime to damage the Earth's ecology and so hinder our planet's ability to sustain addition of a diversity of new, radiant information to the universe. Because the cosmic arrow-of-time allows us to contribute particular sorts of information to the universe at kairos moments, our personal history and humanity's collective history contain many missed opportunities.

Human choices may, therefore, do more harm than simply hurting others or

impoverishing our planet's ecology (and that's bad enough). Our choices may subtract from the universe's fund of good memories (and that could be infinitely worse). It's worth noting that this paradigm can be equally-well expressed in terms of atheist, agnostic, deist, and theist philosophies but is incompatible with nihilism. Questions then arise about what changes humankind could make so as to contribute maximally diverse and virtuous experiences to the general cosmic memory. That high calling takes us to the heart of Humanitarian Cosmology.

d) Asking ancestors for answers to today's problems

> *Modern ecology can learn a great deal from a people who managed and maintained their world so well for 50,000 years.*
> *Burnum Burnum (Renowned Australian Aboriginal writer)*

> *Humanity is part of nature, not something that it is possible to isolate from nature. Nature can be an abundant provider and home for all creatures if we share whatever we take properly, and behave with consideration and respect to each other, and the planet that we all depend upon.*
> *Jerome Lewis (Renowned expert on First Peoples. University College, London)*

Palaeoanthropological discoveries suggest that early human populations of *Homo ergaster* spread out from Africa and colonized most of the world from about 1.8 million years ago. In the context of Humanitarian Cosmology, it's important to note ancestral human hunter/gatherer species have been successfully occupying the planet for 2 million years or so. As dated from early aesthetic artifacts and material constructions, several large brained species like *Homo neanderthalensis* existed before 200,000 years ago. Over 300,000 years ago, *Homo heidelbergensis* left us excellent evidence of their competence in hunting-weapon manufacture and use. One of these big-brained hominin species developed into *Homo sapiens* and they followed the much earlier lead of *H. ergaster* in an 'out of Africa' exodus. Genetically, the most significant exodus from Africa took place about 70,000 years ago. This is what eventually filled the world with anatomically-modern *Homo sapiens* hunter/gatherer First Peoples; but, not without some inter-breeding with other hominins

along the way. These people can't be thought-of as unsophisticated; they had the same large brains we do. The art works of ancient hunter/gatherers show they were proficient astronomers and, as is described later in this section, they were probably consummate ecologists, adaptive survivalists, successful socio-psychologists, and deeply-caring educationists.

Following that key, modern exodus event, hunter/gatherer people began to occupy Australia about 50,000 years ago (then it was truly 'terra nullius' since no evidence of *Homo erectus* or other hominins has been found in Australia). Amazingly, some Australian Aboriginal traditions recall their origin in stories about a female Dreamtime character called 'Warramurrungunji'. Iwaidja people say she arrived in far northern Australia and moved inland. Every so often, stepwise, Warramurrungunji would deposit her children and tell them: *This is your home country; this is the language you will speak; these are the foods you will eat.* Such a widely-shared creation myth effectively legitimized the different tribes and their characteristic distinctives. In northern parts of Australia, common recognition of a shared mother and law-giver has probably been of benefit in inter-tribal relations for many millennia. One lesson that can be drawn from this is that tribal, linguistic, and national differences need not cause alienation if their genesis is accounted-for by shared, socially-positive myths. The way people imagine identity has crucial consequences. Implementation of diversity-honouring, inter-disciplinary education curricula could make an important contribution to global peace and planetary survival. In every way this is a major proposition.

Subsequent to the first 'out-of-Africa' world colonization event, the original *H. ergaster* hunter/gatherers and their descendent species have lived as an integrated part of nature for about two million years. Van Arsdale writes: *In many ways modern humans are just an updated version of our Homo erectus ancestors.* These people can be viewed as the original First Peoples. First Peoples did no major harm to world ecology - except of course in furthering the genocide of mega-fauna and other hominid and hominin species through competitive exclusion and/or violence. There are many scientific disputes about the exact details of early human activities, but these need not concern us here. What is of the utmost interest is the huge change that began with the progressive subjugation of nature by Neolithic farmer/civic cultures.

In this paper they are referred to as Second Peoples. Starting sporadically about 12,000 years ago, some First Peoples became Second Peoples, by settling down to farm, domesticate stock animals, and build villages and towns. By 10,000 years ago, Second Peoples were well-established in the Middle-East. Surprisingly, it took another 4,000 years for this way of life to become established in northern Europe and it was nearly another 6,000 years before Second People farmer/civic cultures began colonising Australia. In the long story of humankind, it's important to note just how recent are the geneses of Second Peoples and their world colonisations. Because of an abundance of written records and monumental architecture, almost all of history is monopolised with the affairs of farmer/civic peoples. Yet for much of the approximately 12 thousand years of our existence, we have been less numerous and cosmopolitan than the hunter/gatherer First Peoples, whose way of life began about 2 million years ago.

Because there is little recorded information, the far more ancient and extensive histories of First People have only been able to be researched through extrapolating from remnant groups of hunter/gatherers and from prehistoric archaeology. The work of anthropologists such as Jerome Lewis (who lived with the Mbendjele hunter/gatherers in the Congo forests for about seventeen years) has proved highly illuminating. Marked cultural differences from Second People societies have been identified as key factors in ensuring First Peoples' integration into natural ecology. We now have a broad understanding of how it was that the original hunter/gatherers were able to thrive for many hundreds of thousands of years by maintaining a balanced exchange with nature. A superficial answer is that they maintained their population densities much lower than those of farmer/civics; but, there is more to their cultural longevity than that. The ancient wisdom of the original hunter/ gatherers' worldviews needs to be understood and some of it adapted to help today's civilizations achieve a lasting balance with the Earth's natural environments.

Since humans first made the change to living as farmer/civic peoples - in China and India, through the Middle East and Mediterranean, throughout Europe, and later in Africa and America - we have engaged in almost continuous sequences of civil wars, inter-national wars, and world wars. Much of our historical record is concerned with a great diversity of never-ending conflicts. As mentioned above, the

switch-over to farmer/civic cultures took several millennia and until, perhaps 1,000 years ago, First Peoples were in the majority in most parts of the world but were historically invisible. From about 300 years ago matters began to change under the influences of Enlightenment thinking, increasing world trade, colonialism, and the Scientific and Industrial Revolutions. Farmer/civic cultures greatly expanded and progressively majored in what could be called Western, aggressive, technological-industrial-commerce (WATIC). With this advantage, their genocidal colonization of much of the world proceeded apace. In retrospect, we see that, under the flag of progressing civilization, religion and progress, WATIC has comprehensively polluted the air, water and soil of the globe. Along the way it has progressively extinguished many human cultures, and many plant, and animal species needed for ecological stability. The same 'advance of civilization' is now leading to a process of atmospheric change and global warming that threatens all human life on Earth. This fact needs repeating: in less than 300 years, WATIC has brought us to a global crisis point.

Is it not scandalous, that after hundreds of thousands of years of humans living in reasonable harmony with nature, the Neolithic revolution has so swiftly and irrationally driven us towards global ecological catastrophe? How few see the irony of the common belief that we civilised, scientific people have evolved, advanced and become superior. Self-deception is also evident in the proposal to call this era the 'Anthropocene'; as if only global polluting Second Peoples are genuinely anthropic. What is being referred to as the Anthropocene era could more accurately be called the 'Waticocene era'.

No anthropic species ever threatened global survival, until the advent of WATIC. This evil has been solely a result of the hubristically incautious expansion of farmer/civic Second People cultures. We have thoughtlessly looked down on the ecologically-integrated lives of the majority of historic and pre-historic anthropic cultures, calling them 'primitive and un-civilised' or worse. It may be too late, but we Second People need to repent and seek help from our humbler forebears.
To quote Douglas Cardinal, a Canadian Indian architect, artist and writer:

Technologically advanced cultures dismiss the contribution

of the aboriginal peoples, yet I believe our contribution can dramatically change everyone's life on this planet.

We have to ask why it is that farmer/civic cultures have not listened and learned from the far more ancient hunting and gathering peoples. One reason is probably that of military conquest. Fed by farmed crops and livestock, cities supported a much higher density of population, division of labour, great wealth, and technological innovations. Farmer/city cultures were able to train and equip a cadre of hierarchically-organised, professional soldiers who readily over-ran the non-hierarchically-organised and less well-equipped hunting and gathering peoples. Military dominance probably generated contempt for the defeated and their ecologically-balanced, 'primitive' life style. It also set a social climate where the ancient, accumulated wisdom of human ancestors was despised. Yet, in retrospect, one can't help thinking of the edict of Matthew 26:52:

Those who live by the sword will die by the sword.

Indeed, the history of most civilized peoples over the last 5,000 years has been that of repetitive wars, slaughter, and genocide. This reached its worst extent just 75 years ago in the destruction of about 80 million people during World War II (civilians comprised about 70% of those who were killed or died later from severe injuries). Surely Stephen Pinker and others, who claims modern humans are less violent than ancient humans, have simply chosen to ignore the elephant in the room. Other social commentators and historians are more realistic, in their suggestion that WWII never actually ended because serious conflicts have continued unabated up to today. We might also note the global popularity of violent war games as 'entertainment'. Another strong indicator is that the world's stock-pile of armaments and war weapons is at an all-time high. Nations armed with mega-death nuclear weapons include: Russia, America, China, Britain, France, India, Pakistan, India, North Korea, and Israel. Between them they have enough explosive and radioactive power to kill everyone on Earth ten times over. With such a 'Sword of Damocles' hanging over all of our heads, one would expect wars to cease. Not a bit of it! Currently, raging around the world, there are 16 wars having annual casualties numbering between 1,000 and 100,000; not to mention numerous smaller fatal conflicts and acts of terrorist

mayhem and mass murder.

Is there some way we could turn back the clock of history and return to a life-style like that of the more peaceful variety of hunter-gatherers, so as to no longer destroy nature, pollute the atmosphere, and kill one another in such vast numbers? For the majority of us this is not an option because we are too numerous, too nationalized, and too domesticated to various forms of city-living (even to the extent that average human brain size has shrunk by 10% or so; as is typical in wild animals that are domesticated). So, if technological-industrial-commerce can't go forward safely and if we can't go back, what can we do? Well, there are many ways we could lessen the damaging effects of Second Peoples' cultures on the environment; and, some of these are already being implemented and others are being actively researched and developed. What I want to add in this paper is that First Peoples' wisdom - developed over hundreds of thousands of years - still needs to be consulted and adapted for modern society, wherever it is appropriate and feasible. As already mentioned: education in socially-cooperative rather than competitive worldviews are skills we must work to regain. The world's First Peoples have shown that irenic inter-cultural myths can have more social benefits than factual scientific accounts. We must ask: *If a factual account of a reality exacerbates human disconnectedness, should it be taught at all?* Physicalist mocking of myths, as 'primitive superstitions', is blind to the social potential of highly culturally-evolved ways of representing reality. This point becomes pressing, as already outlined in sections **b.** and **c.**, when science at best proves incapable of describing reality; and, at worst, is increasingly misanthropic.

Were we able to look back to the times of Abraham (maybe about 4,000 years ago); or to Moses (maybe about 3,500 years ago); or to the Second Temple redactors (about 2,500 years ago); or to the times of John the Baptist and of Jesus Christ (about 2,000 years ago), we would observe a huge sociological difference. As already described, the First Peoples - the original hunter/gatherers - were predominant. Starting with *Homo ergaster/erectus* they had occupied the whole world for up to 2 million years. And through their descendent, *Homo sapiens*, they still occupied the world, apart from the small villages, towns, cities and farm lands newly established by Second People Neolithic farmer/civics. In this dual occupation, anthropologists would notice

conspicuous differences. First People, like the pre-colonial Australian Aboriginals, lived largely off the seasonal products of nature; hundreds of thousands of years of ancestry had adapted them to wisely use the country they lived in. They had few needs and often wore no clothes; not because they couldn't make good clothes from animal skins but because they were well acclimatized. Many of these people were not ashamed to be naked and lacked the embarrassed, lascivious responses to bare bodies, characteristic of Second Peoples.

Hunter/gatherer sociology is not a uniform science. There is enormous cultural variation between different societies; even among those who hold this way of life traditionally rather than opportunistically. If generalization is impossible it is still possible to notice, for example, some differences from Second Peoples' attitudes to work. First Peoples have mainly worked for what they need to live on rather than to produce a large surplus for trade. Items for trade are sometimes acquired or manufactured but in small amounts. This relates to their need to be seasonally mobile across sometimes rough terrains, which precludes storing or carrying large amounts of produce. There is no need for cities with walls and armies to defend their store of valuable products. Whilst conflict is not entirely absent from their lives, organised wars and the capturing of booty is unknown.

Un-spoilt hunter/gatherer societies have strong cultural characteristics, including song and dance, religion and story-telling, and their own languages. Their lives are governed by respect: respect for God and other spiritual beings, for their women and men elders, for their country and its plants and animals, for neighbouring tribes, and for one another. Usually a law-abiding people, they share everything; and, truthfulness, humility, and especially equity are their ruling ethics. First Peoples typically have few possessions; most they make themselves, a few are traded. Their spear-technology and/or bow-and-arrow technology is advanced and with their physical fitness and courage they are able to master every sort of animal. Despite this dominance they avoid environmentally degrading exploitation and they don't over-populate their country. Culturally sophisticated, they have rules regarding all circumstances, including the care and provisioning of strangers who accidentally wander onto their country. As accomplished travelers and navigators, they trade

valued goods over thousands of kilometers. First People ancestors were the original human painters and sculptors. Wherever they are settled they engage in characteristic artistic and musical expressions. After viewing some of their magnificent parietal art-works, Pablo Picasso remarked that humans have never progressed beyond such artistic excellence. This is the broad picture; around the world there are, of course, many variations.

In light of this, admittedly brief and inadequate ethnology, we might at least be able to ask: "What impression did the contrasting ethnographies of First and Second Peoples make on the writers of the Bible. In particular, at the time of Moses and of the Second Temple redactors, what sort of human cultures would the scribes have been familiar with on a day-to-day basis?" A ready answer to that question can be provided if we compare the first chapter of Genesis with the second and subsequent chapters. Genesis 1 says that on the sixth day, the First Peoples are made in the divine image and likeness, both male and female. They are instructed to multiply and occupy and order the planet and, to rule the different sorts of animals (presumably by the power of the spear). They are also told to use the seeds of plants and the fruits of every type of tree for food. The chapter concludes by observing that God found the whole situation "very good", and this would no doubt have concurred with the opinions of the author(s) regarding the peaceful and helpful character of those First People that they and their acquaintances certainly would have encountered whilst traveling 'up country'.

In stark contrast, in Genesis 2 the author(s) specify a different sort of human, not in the divine image and likeness and not male and female. Male only and made of dust (perhaps signifying a farm labourer) and needing God's breathe to come alive. Adam (this God-enlivened dust) seems to fulfil the role of the first of the Second Peoples. He was placed in an enclosed farm to watch God planting food trees. Unlike the First People, Adam was not told he could eat all the grains and the fruit of every tree. He was told to work the soil and to care for the food plants, eating from any of them except the fruit of 'the tree of the knowledge of good and evil'. God's farm - 'Eden' - was ideally positioned with a very reliable river of water that originated from four separate headwaters. In fact, Eden is depicted as an ideal location in terms of early Middle Eastern agricultural understanding; where a consistent, ample water supply

was life. The author(s) recognised that, unlike hunter/gatherers, who are capable of surviving independently, agriculturists must have helpers. God put Adam to sleep and split him in two to make Eve as his helper. Eve is from the same dust as Adam and receives her life from him, not directly from God. Here, the author(s) may be indulging a patriarchal leaning.

The previous paragraphs present a case for considering the first two chapters of Genesis to be one of the earliest existing texts of anthropology and ethnology. The First Peoples, of Genesis chapter 1, are divinely commended as 'very good'. Conspicuously, no such commendation is given to the Adamic Second Peoples of chapter 2. This may be a prolepsis of events in chapter 3. Here, the Adamic Second Persons prove grossly immoral by cooperating with a malicious detractor, disobeying specific divine instructions, exercising ambitions to seize divinity, and by blaming others and refusing to take responsibility for their wrongdoing. They hide from God who has given them everything and are now ashamed of their nakedness - signifying cognitive dissonance about their identity. The Adamics are driven from God's farm, to face the labours and hazards of unprotected agriculture. The woman is told she will be the house-servant of the man and that her childbearing will be painful. Here, the author(s) are probably drawing a contrast with the independence of First People women and their comparative ease of childbirth. Unmistakably, the author(s) have provided texts in Genesis 2, 3, and subsequent chapters that offer a negative view of Second Peoples. Distinguished palaeoarchaeologist, Professor Juris Zarins also concluded that the Genesis texts have ethnological implications. He speculates that the newly-arrived Ubaid farmer/civics, who first settled Mesopotamia before 6,000 BCE, must have been critically observed by the long-established hunter-gatherers of the region. However, he notes the difficulty of explaining why Sumerian Second People scribes would write critically of their own civilization (Interview with Dora Jane Hamblin, *Smithsonian Magazine* 18 (2), May 1987).

Of course, in Genesis chapter 4, matters go from bad to worse with Cain defying God and murdering his brother Abel. The soil will have nothing of him and he is cursed to be a country-less wanderer, only protected from punishment for murder (presumably under First People's law) by the threat of sevenfold revenge (probably

an allusion to Second People's excessive vengeance on First Peoples). Cain is represented as the first city builder and father of the originator of metal working and of the inventor of metal musical instruments. In this account we may detect persistence in the author(s) unfavourable contrasting of Second and First Peoples. As we saw, the texts describe a very different origin for Adam and Eve to that given for the First People. Adam is uniquely divinely instructed in agriculture yet is tricked into grossly offending God and is cursed and exiled. Eve is reduced to servanthood and painful parturition. Their eldest child flouts divine instructions and murders his brother. Nature opposes Cain even more than Adam and he is cursed to have no farm. He builds the first city (perhaps the harbinger of the account of a second human attempt at self-deification, in Genesis 11). As the account continues, Cain's children discover metal working and metal instrument manufacture.

All the described activities of the Adamic line are seemingly in direct contrast to those of the biblically 'very good' hunting and gathering First Peoples who worked in wood and stone, did not build cities, and had considerable respect for authority and an awe of God. Clearly, nothing in the texts suggests First People were morally perfect or that murder was unknown among them. What would have probably been known by the readers of the texts is that local hunter/gatherers were self-sufficient, lived well off nature, were usually unashamedly naked, and were observably more respectful towards God and towards the spiritual character of their country and its plants and animals. Typically, hunter/gatherer worldviews are inherently lawful and irenic.

> *Personal identity, human community and cosmic harmony are one-and-the-same.*
> *Joan Hendriks and Gerard Hall (2009)*

The claim in this paper is that the original author(s) of Genesis chapters 1 to 4 intended to distinguish two major types of humans that were readily observable around them, in the Mediterranean region of their day. First, those who depended on nature, and were lawful and pleasing to God; secondly, farmers and city-dwellers at war with nature and with each other and separated from God.

This sort of exegesis of the early Genesis anthropology texts has profound

consequences. For example, it reverses long-standing farmer/civic prejudices against hunter/gatherer peoples; such as settler views that Australian Aborigines were sub-human and had no human rights; as well as similar African Bantu prejudices against pygmy hunter/gatherers. This exegesis also puts pressure on the customary assumption that the divine *likeness and image* and the *very good* commendation of Genesis 1 were intended to apply to us farmer/civic Second Peoples and to all of our activities. Rather, the author(s) of the Genesis texts appear to be distinguishing an approved and observable original state of nature from the subsequent rebellion, murder and self-deifying hubris associated with farmer/civic, Neolithic city-builders. Were they attempting to explain how arrogant, idolatrous, and very violent and dominating empires of farmer/civics came into being? For example, the tumultuous phases of the Sumerian Empire would have been recent history for them. Were they sociologically addressing a theodicical problem?

Since God naturally makes all things well,
how did all the genocidal, self-deifying, city evil arise?

As part of the inter-disciplinary programme of Humanitarian Cosmology, a comparative First People/Second People exegesis of the early Genesis texts helps bring consonance between the theological understandings of human origins and the modern scientific anthropology with which it has been in conflict.

Theologically, we need to ask what was perceived by the Genesis author(s) to be most offensive to God about the Second Peoples' behaviour. The texts highlight Adam's disobedience to a direct command and warning; and, Cain's disregard of an explicit warning. In a whole-Bible context, the basic pattern of serious sin can be seen to be: knowing exactly what God sets down but choosing to flout it. Inherent in this is a rejection of God's personal goodness and wisdom and a self-deifying and even deicidal urge. The Greek dramatists understood this as 'hubris': excessive pride and defiance towards the gods, leading to nemesis. In many ways the 27 texts of the New Testament can be seen as an advice manual on how to overcome our fatal, Second People pride and re-establish a humble relationship before God. It is noteworthy that the egalitarian culture of un-spoilt First People societies ensures that humility is deeply engrained through education. Children and youths depend

on the examples of venerable relatives and on women and men elders who are truly devoted to serve their people and instruct the young, without personal gain. From their elders, they learn great respect for God and for the creation spirits; also, for their country and for other people. Each child is taught cultural- and gender-specific knowledge and develops a strong sense of personal identity within their community. Unlike Second People, a person's identity is not based on individual ownership of private property. It is by their sophisticated education system that they breed respectful and humble people, not attached to possessions, who also have egalitarian self-confidence and a healthy personal identity.

The fund of First People's memorised knowledge had accumulated and been selectively refined over thousands of generations; possibly even for 2 million years. Whilst much of this information is local country-specific, regular celebrations between neighbouring tribes enabled all the elders' knowledge-bases to be broadened. The custom of marrying into unrelated neighbouring clans would have similar benefits. A pattern of robust local identity combined with extensive external connections has been important for the success of hunter/gatherer peoples. Because most knowledge is transmitted orally, it can be combined with instruction in inter-personal relations and help build a sense of identity. Sadly, with the ageing and passing of so many knowledgeable First People elders, a vast amount of psycho-sociological know-how, practical survival skills; together with unique artistic, musical, ceremonial and language skills are being lost.

Many First People societies have died-out or been spoilt through rough impacts with dominating Second People cultures. However, research like that of Jerome Lewis with largely un-spoilt Mbendjele Yaka people has provided the beginnings of an insight on what has made hunter/gatherer cultures ecologically successful for some two million years. Two of the most important Yaka cultural processes are 'ekila' and 'massana'. 'Ekila' refers to the involvement of all those with interests in resource distribution, in decisions that maintain abundance of necessities and protect against induction of scarcity. This and other social strategies function to ensure the efficacy of their profoundly egalitarian way of life. 'Massana' refers to the comprehensive education system of the Yaka. It progressively communicates a complex set of beliefs and practices: from early childhood play-acting, to adult rituals and cultural

adaptations. Again, we see that a deep and unselfish commitment to consistently educating and mentoring their children and young people is foundational to First People's cultural adaptation and ecological success.

This humanitarian education process contrasts with the often impersonal, sporadic, and mechanistic education systems of Second Peoples. With the advent of today's 'on-line', web-based, computerised education the differences may become even bigger. Universities are heavily investing in on-line learning because many students prefer to get their education that way. The question is: *Might these methods exacerbate Second People disconnectedness that this paper has identified as partly responsible for bringing humanity to the brink of global disaster?* Are there any brave enough today to question the benefits of the latest, commercially-promoted sci./tech. devices? Have we now become so addicted to smart, new technology that, like Skinner's pigeons, industry and commerce can do whatever they want with us?

> *I used to be a human being! Every hour I spent online was not spent*
> *in the physical world. Every minute I was engrossed in a*
> *virtual interaction I was not involved in a human encounter.*
> *Every second absorbed in some trivia was a second less for*
> *any form of reflection, or calm or spirituality. 'Multitasking' was a*
> *mirage. This was a zero-sum equation. I either lived as a*
> *voice online or I lived as a human being in the world*
> *that humans had lived in since the beginning."*
> *Andrew Sullivan*

e) An integrated model of the matrix of reality

> *Religion has proved to be by far the most tenacious, enduring,*
> *widespread, deep-seated symbolic system humanity has ever*
> *known, not least because it is able to connect the everyday*
> *practices and customs of billions upon billions of ordinary*
> *people with the most august, transcendent, imperishable truths.*
> *Professor Terry Eagleton, Lancaster University*

What of God and nature? Traditional theologians are usually certain that God is

not a product of nature and is therefore, by definition, supernatural. In contrast, physicalists often think of God as an artifact of natural human thinking and thus an unwarranted part of nature. Yet, theologians mostly take nature to be a product of God's goodness and so nature has, unavoidably, to be thought of as fundamentally supernatural. If, as theist theologians usually claim, God also supervises all of nature from-start-to-finish, this reinforces the logic of the claim that nature is in fact entirely supernatural. So, if we can think back to section **c.** above - to the incredibly vast complexity of our cosmos as well as the exceedingly minute complexity of its constituent particles and energies - these may all be thought of as supernatural.

In contrast, deist theologians believe nature is a product of God that has had to progress independently. This allows for nature to have a degree of non-supernatural identity. The actual amount of natural independence depends on just how much pre-programming was divinely incorporated in nature from the start. If nature, as a system, is pre-determined by God to attain certain ends by means of its apparently independent actions, then it must still be considered to be largely supernatural. The religious beliefs of First Peoples often centre on the unique features of the country they relate with and its spiritual connections. For them, humans, country, and God are integrated; everything has supernatural connotations.

Is it not incoherent for religious people to believe that there are natural things which are independent of their supernatural God? From this primary error of logic - of separating nature, ourselves, and God - many other errors arise. Looking back to section **d.**, we could ask if the author(s) of Genesis 2 were not highlighting disconnection as the fundamental lesion of the sick personhood of Second Peoples. Today, we could phrase that as a sequence: *A dis-integrated cognition produces a disintegrated society with a disintegrating impact on nature.* With that in mind, logic suggests that the words 'natural' and 'supernatural', as used by many Second Peoples, represent a false and damaging dichotomy. This is intelligible to those Christian theists who understand the good news that God is the supreme spirit of perfectly self-giving love; the Source, or Father/Mother of all; and always 'close' and 'within'. From that perspective, Christian thinkers understand, because nature is inter-penetrated by God's love, it always and everywhere functions supernaturally. Is this a (partial) return to First People cosmology?

As 2 Corinthians 5:19 put it:

God was reconciling the world to God's own self in Christ.

This monistic paradigm does not, in any way disparage other religions and philosophies; though, it can set a bench-mark for them and for the Christians who proclaim it. Such a benchmark is given further substance throughout the New Testament, for example, in Matthew 5:44; John 15:17; 1 Corinthians 13:1-13; etc.

With our Second Peoples' disintegrated cognition, do we separate nature from God and from humanity because we are appalled at the natural and moral evils of this world? This is the well-known 'problem of evil', summarised as: "If God is both omnibenevolent and omnicompetent, how can evil exist?" Others have tried to solve this by simplistically (and problematically) claiming God to be both good and evil. Yet others think of reality as a war between God's goodness and the devil's evilness. However, a more logical and coherent way to approach this perennially tough question is to reason-out a cognitively-efficient theodicy; and, in today's scientific culture that is assisted if we base our argument on an effective inter-disciplinary Theology/Science worldview. Here is where Creatio ex Ethica, Ethical Encounter Theology, and Salvage Eschatology come into the picture.

By 'Creatio ex Ethica' is meant, creation of our universe as an answer to an otherwise insoluble ethical problem. That problem is: the rebellion of divinely-loved humankind against divine self-giving love. You may ask: *How could the rebellious, self-deifying human spirit have contributed to cosmogenesis, such as the Big Bang, 13.7 billion years before humans even evolved?* Some physicists would answer: *Because ours was always an anthropically-tuned universe from its start; with everything quantum entangled.* Some theologians would add: *Since God had proleptic knowledge of the entirety of cosmology, human iniquity was fully-understood from the start.* Theologians would probably point to texts such as 1 Peter 1:20 and Revelation 13:8 in support of the concept of the pre-existence of this knowledge." For more details see Gathercole, S. J. (2006); Rice (2011; 2012 a., b.).

By 'Ethical Encounter Theology' is meant, the ontology or paradigm of existence

where all entities and events in the universe reflect choices between obedience to the perfection of God's benevolent will; or, self-motivated, disaster-doomed alternative choices. This is in accord with the proposition, in section **b.** above, that physical cosmology is merely the stage on which a protracted ethical drama of obedience and disobedience to God is played out. As this drama of existence unfolds, our universe can be seen to accumulate 'Binary Ethical Apocalypses', which additively contribute to the grand, final judgement. So, don't ask about the Last Judgement for the Last Judgement is always now. For more details see Rice (2011; 2012 a., b.).

'Salvage Theology' has been introduced in section **c.** above. The unfolding physical, emergent complexifications of our universe show that it is neither self-renovating nor self-recoverable. It therefore makes sense to refer to the theistic understanding that a specific divine act is required to finalise the universe's extremely prolonged and exhaustive series of binary ethical apocalypses. This finalising event is the 'Salvage Eschaton', when divine justice pronounces on the entire, conserved history of this universe. This accords with the view of some physicists that, ultimately time does not exist. When the totality of the cosmos is present, perfect judgment is needed so as to justly remove all that is discordant with divine perfection; and, salvage all that accords with it. This is not a process of metamorphosis; whereby human physicality is renovated into a divine form. It is an ultimately beneficial process that incorporates human souls into pre-existing, non-corruptible bodies, to fulfil God's original humanitarian plan to have a genuinely loving family of enfleshed human beings.

One of the most interesting discoveries of Theology/Science research on Humanitarian Cosmology is that an inter-disciplinary vision of the unity of all things, from beginning to end, is close to the ancient, inherited worldview of Australian Aborigines:

> *Indigenous Australian peoples' experience of nature is more cosmic, more communal, more natural. It is not the ecstatic unrepeatable experience of a chosen individual, but the ordinary, every-day abiding experience of the sacred and interconnected unity of all beings with the earth, cosmos and ultimate reality.*

Hendriks and Hall (2009)

This is consonant with Ethical Encounter Theology, in that everything that happens, each day, is understood to be a divine encounter. This does not deify the cosmos as in vitalism and atheistic physicalism; and, it does not distance God as in deism. In contrast with the misanthropy of vitalism and renovation theology, both the ancient indigenous paradigm and the very recent Theology/Science paradigm are philanthropic. God, in and through natural circumstances, is vitally involved with each human being. This is probably the most effective philosophy for engendering humble and ecologically-constructive attitudes in human society. Here, it is argued that the erosion of this ancient and indispensable wisdom is the disease that, commencing with the Neolithic and peaking in our WATIC era, has led to most of the serious problems humankind has had to face.

f) Concluding comments

> *Even with a seven-foot tall body I am an insignificant object*
> *compared to the Earth and Heaven; yet in regard to the nature of*
> *my soul and mind, I am united with Heaven and Earth and*
> *all things.*
> *Chang Tsai (1076)*

> *It is only to the individual that a soul is given.*
> *Albert Einstein (1939) in an address at the Princeton Theological*
> *Seminary*

> *What good is it to you if you gain the whole cosmos but lose your*
> *soul?*
> *Matthew 16: 26.*

A critic of this paper on 'Humanitarian Cosmology' might say something like:

> *This presentation identifies serious flaws in the orientation of*
> *the Western aggressive techno-industrial-commercial (WATIC)*
> *worldview. The realization that inter-stellar travel is impossible*

has sunk its flagship; this worldview has also come up against insuperable barriers to scientific knowledge; and, it is justifiably accused of mindlessly destroying the treasures of human cultures and of the web of life that sustains all life on Earth, including human life. Yet, the critic continues, *the major nations are all committed to the WATIC model of progress. Most politicians, from the right and the left, assume this is the best way for a country to generate wealth, employment and the good life that causes people to vote for them. If we have thoughtlessly painted ourselves into a corner, is there some way for us to escape the looming 21ˢᵗ Century nemesis? These are unprecedented times - there are no parallels in human history - what do you suggest we do to get out of this fix?*

In reply, one could say that there may be no solution or no solution that a democratically-elected government would be willing to implement. No one has the certain answer as to how to escape the rapidly approaching global catastrophe that is the 'wages of the sin' of WATIC. Yet, surely there are some positive measures we can take. Unlike the old, long-established universities which are set in their ways, young, actively-growing universities like *Kabianga* and *Griffith* are surely flexible enough to find radically new ways to meet the challenges of the near future.

There is a need for genuinely multi-disciplinary programmes that combine the enduring wisdom of Earth's amazing First Peoples with the best of contemporary understanding. It will take prophetic vision and great courage to establish new pathways in research and teaching. In this age of PR-spin and fashionability, sincere and persevering intentionality is hard to find. Yet, the time is right: many intellectuals have been drawing our attention to the vexing question of where 21ˢᵗ century humankind is heading. See for example: *The Politics of Virtue: Post-Liberalism and the Human Future* by John Milbank and Adrian Pabst; and, Yuval Harari's *Homo Deus: a Brief History of Tomorrow*. Guru physicist, Stephen Hawking has been reported as saying that 'Artificial Intelligence' may prove to be the greatest advance of all in the whole of human history. This brings to mind the 'Futurama' scenarios mentioned in section **c.** above. How do the rest of us like the idea of replacing ourselves with highly intelligent, planet-colonising humanoid robots that are self-

reprogramming, virtually indestructible, and intended to be immortal? Such a vision for humanity's future clashes with the tenets of just about every religion; especially Christian religion, where God was enfleshed in our history; was crucified in the flesh; and, resurrected as eternally glorified flesh.

The most pressing need is for inter-disciplinary research and teaching that specifically focuses on sustainable and just ways of living. Universities are unique. There are no other organisations that have such a huge range of expertises on the same campus. We are very special in having the potential (currently greatly under-utilized) to harness together: expert managers, administrators and lawyers; historians, social scientists and theologians; artists, linguists and musicians; writers and poets; mathematicians, physicists and different types of engineers; chemists, biochemists and industrial chemists; architects and town-planners; economists and experts in local and national and international politics; geologists, agriculturalists and foresters; botanical, zoological and genetical specialists; surgical, medical and pharmaceutical leaders; plus psychologists and educationalists; etc. Getting these diverse specialists to converse productively requires the skills of expert sociological mediators and visionaries, capable of inspiring others with a common vision and motivating them to put their brains together and cooperate for the survival and common good of humanity. Universities are ideal places for interconnecting specialised departments and schools through a vigorous and rigorous world-futures interaction.

Is it possible to get diverse specialists to put their heads together to address serious global problems? The tendency of the modern university has been to fractionate disciplines, erect new specialties, and compete like crazy. Boundary lines are usually energetically defended. *How can this process be reversed to open new ways of re-integrating all specialties and disciplines?* It's easy to ask but will not be easy to achieve since, along with most of the world, most of academia is running as fast as it can in the opposite direction. Are there some generous and inspired academics ready co-operate and to put in the long hours of hard work needed to swim against the current?

The ancient concept of the human soul may still be helpful. The soul is the central, unified part of a person where everything important about their human life is

distilled. This is the locus of our connection to absolute reality. This is the spirit of who a person really is and the seed of their hope of immortality. The personal soul concept then gives us a model to apply to the whole cosmos, illuminating the idea of completeness, cosmic unity, and purpose; together, with the human hope of having a part in it and our ideal of making identifiably positive contributions to the totality of all things. Who would not want to participate in the dance and feast of ultimate cosmology, where we never tire of helping one another weave the multicoloured threads of the never-ending riches of aesthetic and ethical truths into seamless garments of thanks and delight and praise.

The question for today's disconnected generation is: *What price do we put on our soul?*

Appreciation

I pay respects to all distinguished guests here today; and, to all my academic colleagues and their students. My appreciation is due to: Professor Paul Chepkwony, The Governor of Kericho County; to Professor Richard Musangi, Chancellor of The University of Kabianga; Professor Wilson Kipgeno, Vice-Chancellor of The University of Kabianga; and last but not least, Professor Adam Chepkwony & his team of conference organizers.

RESEARCH PAPERS

Work Environment and the Performance of Forest Rangers in South West Mau Forest, Kenya

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Abstract

The objective of this research was to evaluate and understand how the working environment of Kenya Forest Service (KFS) forest rangers affects their performance. The rangers, under the Enforcement and Compliance Division (ENCOM) of KFS are mandated to implement the enforcement of laws and policies pertaining to forests and its allied resources as prescribed in the Kenya Forest Act of 2005. Qualitative research approach was employed in the data collection using structured questionnaires in four forest stations. From a population of 46 rangers, 32 rangers, 8 serving in each of the three forest stations (Londiani, Masaita, and Sorget) of Kericho Zone, Mau complex and the Kericho Ecosystem Conservetor's Office were sampled randomly. A pre-tested questionnaire on demographic trends, duration of service, work environment variables constituting of remuneration, living conditions, motivation, appraisals, rewards, empowerment, communication, work tools, mobility, uniforms, challenges and personal life were administered in January 2016. The performance indicators gave dissatisfaction rates of 59% and 63% in most of the parameters tested. Comparison of the finding of this study with the findings of the surveys of 2010 and 2013 in different conservancies in Kenya gave an index of 51.4% and 56.74% satisfaction respectively. The results therefore denote a progressive correlation between the working conditions drivers and the performance of forest rangers. Kenya Forest Service under ENCOM Division has a responsibility and large task to improve the working conditions and environment of the rangers. No matter how efficient conservation and regeneration programs may be undertaken while enforcement lags the cumulative performance of the entire process shall ever record dismal performance. More radical measures must be undertaken to enhance the performance and productivity of rangers through motivation, improve both their intrinsic and extrinsic working environment. KFS must as well acknowledge that low employee satisfaction rates shall ever incapacitate the forest rangers' performance.

Keywords: *ENCOM Division, Forest Rangers, Working Conditions, Working Performance.*

1. Introduction

Enforcement, compliance and implementation of natural resource policies and laws in the last two decades have attracted significant interests more so due to the escalated climate change and degradation of natural resources. Warchol and Kapla (2012) notes that natural resources with emphasis on forests are incredible and imperative sources of revenue and climate change mitigatory agent across the globe. Kenya prides in its richness in flora and fauna within its forests stretching from the mangroves in the coastal regions to tropical and dry forests (Gichora & Bargerei, 2015). Forests offers a myriad of services and products such as eco-tourism, water catchment towers, habitat for wildlife, provision to timber, firewood, and other non-forest products which significantly contributes to the improvement of the livelihood of the forest adjacent communities and a key contributor to the national GDP (Onyango, 2013). The potency of forest calls for a coherent need to protect the forests and its allied resources from unsustainable utilization and illegal exploitation (Kimani, 2012). Establishment of forest enforcement and compliance division was an inevitable option so as the forest resources in Kenya can be protected from ubiquitous degradation (Kimani, 2012). Under the Forest Department, the mandate of forest protection, compliance and enforcement was bestowed to the forest guards currently referred as the Forest rangers under the Forest Act 2005 (Forest Act, 2007).

In Kenya, the forest rangers fall under the Enforcement and Compliance Division established under the Forest Act 2005 in February 2007, which reformed the Forest Department to Kenya Forest Service (Kimani, 2012). Under Part V of the Act, the commissioned officers (forest rangers) are mandated to implement and enforce policies and laws pertaining forests and its allied resources with reference to the prescriptions in the Forest Act (Forest Act, 2007) which was amended to Forest Conservation and Management Act 2016 on September 2016. In addition to the compliance and enforcement, the officers also provide guidance and supervision of the forest operations such as forest harvesting, planting and firefighting; intelligence, inspection, and prosecution of forest offenders as well as provision of skills and manpower where need be (Forest Act, 2007; Kenya Forest Service, 2012). These responsibilities match those of forest rangers and conservation officers in many regions of the world such as South Africa and United States of America where the

officers take an active role in the law enforcement through crime investigation, arrest of offenders, preparation of cases for court and testifying at trial among others (Koontz, 2007; Warchol & Kapla, 2012). The EnCom division has more than 2500 officers posted in the 210 forest stations and other administrative posts (Envag Associates, 2013). They work together with the professional and technical cadre of the Service, forest adjacent communities and other environmental agencies and organizations in their areas of jurisdiction (Envag Associates, 2013).

Forest rangers in Kenya and globally play an imperative role in the protection, management, and conservation of forest resources and biodiversity (Eliason, 2006; Kimani, 2012; New York State Department of Environmental Conservation, 2012; Warchol & Kapla, 2012). The status of forests greatly depends of the ability of the protection agencies to implement their duties amiably and effectively. Mathu (2007) argues, no matter how good a policy or law may be; the policy is prone to failure if the enforcement, compliance and implementation measures of the policy are substandard and equivocal. Mathu (2007) and Koontz (2007) further posit that enforcement and compliance division experiences considerable challenges that potentially inhibit the policy and law enforcement. Some of the noted challenges constantly being encountered comprise of poor working conditions, feeble and inadequate structural capacities, inadequate working facilities, equipment's, low morale, and motivation among the officers (Kimani, 2012; Koontz, 2007; Onyango, 2013). These drivers are greatly manifested with the dire calls for promotion of protection, management, and conservation of forests and allied resources (Onyango, 2013).

Working environment is imperative to the production efficacy of the any workforce (Anderson, 2013; Harter, Asplund, & Fleming, 2004; Oswald, 2012). In order to improve the performance of the workforce, it is essential to understand and acknowledge the factors influencing its productivity and efficacy (Harter et al., 2004; Oswald, 2012). This study aimed at evaluating the magnitude at which the working condition implicates the performance of forest rangers. The achievement of the KFS objectives and vision rests on the collective ability of all the divisions of the Service and other stakeholders to undertake efficiently their duties (Kimani, 2012; Koontz, 2007). Efficient management of forests demands for a balance among conservation,

regeneration, management, governance, enforcement, and implementation programs (Koontz, 2007).

Kenya as other parts of the world faces a grave rate of forest destruction and degradation; over 12,000 hectares of forests are lost yearly through agents of deforestations more so in conversation of forestland to agriculture and other development projects (KFS, 2010). Subsequently, considerable volumes of forests have continually degraded due to illegal logging, unsustainable utilization, uncontrolled grazing, pole making, and charcoal making (Envag Associates, 2013; Onyango, 2013). Demand for energy is a critical proponent for the exacerbated destruction of forest as more than 70% of national energy is derived from fuel wood and charcoal that if often illegally extracted form forests (KFS, 2010). As per the July-September 2014 Kenya Forest Service report, Kenya's forest cover was estimated 6.99% (indigenous forests, plantations, woodlands, and mangroves) which dropped from the initial 12% cover as a result of unsustainable and illegal exploitation of the resource (KFS, 2014). However, under the Kenya Vision 2030 goals, KFS aims to attain a minimum of 10% forest cover (KFS, 2014). The projection is a clear ground for the EnCom division to upscale its performance; a deliberation that KFS itself must ensure the rangers is capacitated with an ambient and amiable environment from which they can laconically partake their enforcement and compliance duties.

To curb the exacerbating rates of destruction of forest resources more radical measures need to be adopted (Kimani, 2012; Onyango, 2013). The degradation of the forest and lapses in the protection potential can be sustained by improving the working condition of the rangers (Drizin, 2003; Harter et al., 2004). Kehoe and Wright (2010) notes that the working conditions directly affect the morale of the employees therefore, poor working conditions significantly impede the productivity of any workforce. It is of no exception that the rate of dissatisfaction index recorded in this study inhibits the rangers' performance. Using the data derived from the questionnaires, the study therefore validated the magnitude at which remuneration rates and motivation; living conditions, transport facilities, and working equipment; work discrimination and work-personal life balance of the rangers implicates on their work productivity.

2. Materials and Methods

2.1. Study Area

This study was carried out in Londiani, Sorget, and Masaita forest stations and the Kericho Ecosystem Conservators base in Kericho Zone in Mau complex, Kenya. The four forest stations are under the protection of 46 forest rangers and 2 inspectors, 1 located at the Kericho Ecosystem Conservators office in located Masaita Forest Station and the other at Londiani Forest College based in Masaita Forest Station. Kericho Zone is of strategic importance to Kenya Forest Service since it houses the only Forest rangers paramilitary training College and Forest College situated at Londiani Forest College, in the Masaita Forest station. This was critical for the study being the base from which all the forest rangers in the country are trained hence it was anticipated the concerns and needs of the rangers within the location would be much less.
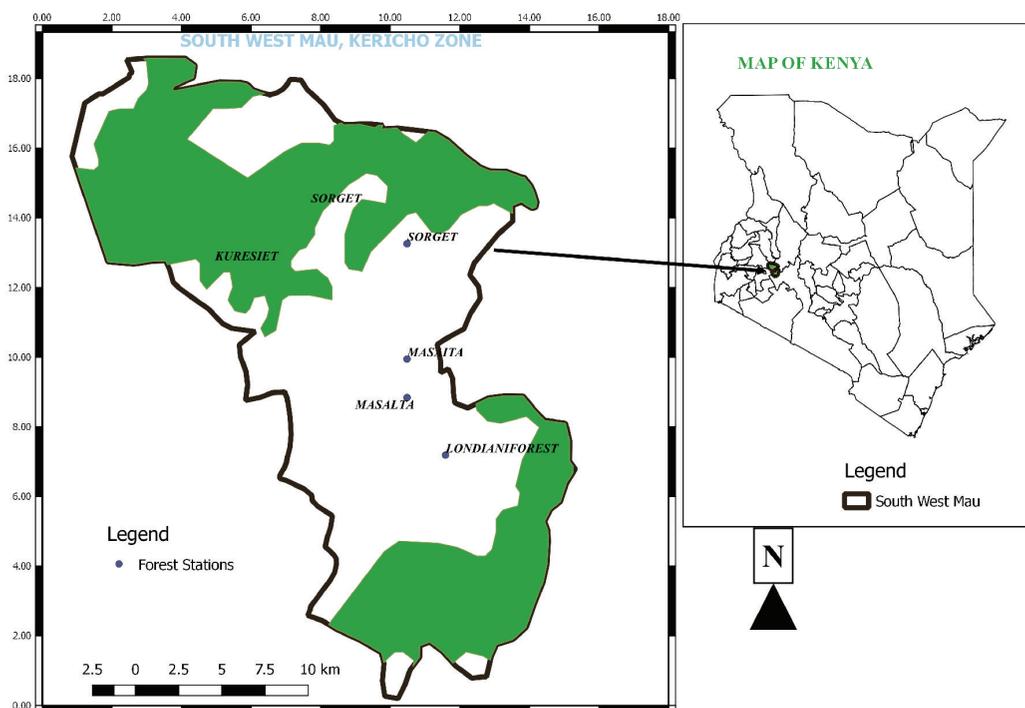
Figure 1: A map of the sampled station in South West Mau, Kericho Zone

2.2. Methodology

The methodology used was based on the qualitative research approach using questionnaires and analysed using descriptive statistics. Pre-tested questionnaires were administered to 32 out of the 46 forest rangers serving in Sorget, Londiani, Masaita forest stations, and Kericho Ecosystem Conservator station. According to Krejcie and Morgan (1970) as designed in the Morgan's table of determining sample size, out of the 40 target forest rangers, only 32 accepted to take part in the research hence a deviation of 8 as per the Morgan's table sample size.

2.3. Questionnaire Administration

The pretested self-administering questionnaires were administered to the 32 forest rangers who took part in the study. The questionnaires were designed to assess (1) the demographic characteristics {gender, age range, marital status, and work experience} b of the work force and (2) the drivers of work productivity. The parameters of work producitivy examined comprised of the (i) remuneration rates {salaries , job appraisal and promotion}; (ii) workplace motivation {work motination, communication and work performnace, stress freeness of the working environment and supervisor motivation}; (iii) sensitivity of KFS to rangers needs and wants {wants, needs and treammwork}; (iv) quality of working facilities and equity {transport, working equipments, uniforms, living conditions and discrimination} and (v) work-personal life balance {balance anf freeness with supervisors}. The questinnaires were collected on the third day after being issued to the respodents.

2.4. Data Analysis

The questionnaires were cross-examined to ascertain their accuracy, uniformity, and completeness. It was necessary to ascertain the responses before organization and coding to remove incomplete questionnaires for increased accuracy. On assertions, the questionnaires were organized, numbered, and coded using the Statistical Package for Social Scientists (SPSS) version 22. The data was then analysed using descriptive statistics and represented in frequencies and percentages using charts and tables to validate the relationships between the different variables. The results were analysed and interpreted in frequency distribution tables.

3. Results and discussions

3.1. Demographic Trends of Forest Rangers

The demographic data of the forest rangers was assessed to vindicate the work diversity of the officers as the diversity in any work force is attributed to sustainable and improved performance through sharing of experiences and skills. Gender is one of the prime indicator of work diversity of which the Kenya Constitution (2010) under Article 27 (8) categorically states, "*The State shall take legislative and other measures to implement the principle that not more than two-thirds of the members of elective or appointive bodies shall be of the same gender*". The law demands that a gender balance of workers within its parastatals as well. Out of the 32 respondents who took part in the study, forest rangers were 75% male and 25% female. It is important to verify the balance in the distribution of gender and age in the workforce; this affirms the relationship in the workforce and adheres to the gender-balance call as per the Kenya Constitution

Age range	Percent
18-24	12
25-30	12
31-44	72
50 and above	4

Table 1: Distribution of respondent's age range

Ageism is one of the imperative outliner of work diversity; Thomas, Hardy, Cutcher & Ainsworth (2014) posit that age is organizing principle and an embodied identity as well as signifier of the richness and stability of a workforce in the contemporary society. They note that age distribution significantly influences the material effect of the organization affecting both the individuals and organizations productivity. Thomas, Hardy, Cutcher & Ainsworth (2014) study recommended for an age balance in any workforce to ensure flexible, energized, dependable, and sustainable transition in the workforce. The age diversity results for this study presented skewed and formidable distribution index. Majority of the ranger (over two-thirds) fall under the age bracket of (31) thirty-one to (44) forty-four years (See *Table 1)*.

The distribution imbalance postulates a danger to the Division in terms of transition of responsibilities and experiences. Envag Associates (2013) attributes the skewness to the long and inconsistent recruitment of forest rangers; it is a challenge and raises alarms for the sustainability of the workforce in the next 15 years if more rangers are recruited not. The EnCom division is dominated with progressive old age lacking youthfulness in that only 12% of the rangers are aged of 18-24 and 25-30. The age bracket of 31-44 is the principal age of performance the FR, a balance of the workforce is crucial for sustainable performance of the forest rangers.

Consequently, the experience of the workplace viably denotes its diversity and stability (Anderson, 2013). Just like age, the experience of the employees promotes organizational sustainability, re-energizing the workforce through the integration of skills and experiences of the young and older employees. The research asked the respondents to state the duration they have worked with ENCOM division, their experiences have more weight in the analysis of the factors affecting their performance having been in the field for different time spans. It is noted that majority, about half of the rangers have worked with the division for at least 10 and 20 years. The experience is relatively balanced unlike the age.

Forest ranger's duration of service (years)	Percent
1-5	22
6-10	26
11-15	37
16-20	8
21-25	4
26-30	3

Table 2: Distribution of working experience of the respondents.

3.2.   Impacts of Remuneration Rates on the Working Performance

3.2.1.   Remuneration Rates and Job Appraisals

According to the World Bank (2006) report on strengthening of the forest law enforcement and governance, it of critical importance for the initiation of institutional reforms of forest law enforcement agencies. The report conjectures the vitality of the

forest management agencies to acknowledge and understand the role of incentives such as the salary structures and job appraisal among others on the productivity of its officers. Many studies have been conducted to evaluate the magnitude at which remunerations affects the performance of employees, many have note diverse findings (Kimani, 2012; Onyango, 2013; Oswald, 2012; Van Herpen, Van Praag, & Cools, 2005; Warchol & Kapla, 2012).

The findings of the study unequivocally vindicated that the forest rangers were equally dissatisfied with the current remuneration rates, job appraisal and promotion measures deployed by the Service. On both the remuneration and job appraisal study questions, the rangers were 59% dissatisfied with the salaries and promotion structures (See *Table 3)*. This postulates that at a great magnitude does the performance of the ranger incapacitated by these factors. Van Herpen et al. (2005) argues that even though salaries and job promotions do not directly depict the working environment, salaries are a crucial element of extrinsic motivation while the job appraisal favours intrinsic motivation. Motivation levels are noted to significantly implicate the work productivity, as Warchol and Kapla (2012) argues in their study that low salaries often contribute to escalated dissatisfaction rates and low motivation among South African law enforcement and conservation officers. The low motivation is likened to induce them to the vices of corruption and bribery, low patrol potential, feeding offenders with critical information about the richness of the forests and where to find high quality fauna and flora (Warchol & Kapla, 2012). Consequently, Kimani (2012) explained that even though it is a common parlance and belief meagre salaries promote the low motivation manifested by corruption; salaries and job appraisal alone are not sufficient to spur the performance of the rangers, rather the integrated improvement of both the motivation factors and the working conditions. Onyango (2013) equally notes that high and long-term performance of employers is promoted by stable remunerations, promotion measures and work environment; these facts are dependent for better productivity.

Rangers Response	Salaries (%)	Job appraisals and promotion %
Strongly Disagree	4	0
Disagree	55	59
Strongly Agree	11	18
Agree	26	19
Don't know	4	4

Table 3: Satisfaction and sustainability of rangers and remuneration rates, Job appraisal and promotions incentives.

Job appraisal is projected towards promoting the intrinsic needs of the workforce, motivating them to upgrade and transcend their duties (Van Herpen et al., 2005). An employer that recognizes the efforts of employees motivates them to upscale their efforts, which manifests in the cumulative productivity. In the 2010/2011 KFS annual report, 41 vehicles were impounded by rangers; 262 forest offenders were prosecuted; 197 structures illegal erected in forest land were demolished; over 48 tons of timber of various species, 9817 frames of cedar posts, doors and door frames, 12 power saws, and 12 drawn carts of donkeys were impounded wile 498 bags of charcoal were recorded (Kenya Forest Service, 2012). Basing on these statistics in relation to the recorded rates of displeasures, if more measures to promote the motivation of the rangers are undertaken, immense and improved performance shall be attested.

3.2.2. Work Motivation and Work Performance

Moldogaziev & Fernandez (2011) perceives a view that the performance of employees is strongly attributed to the magnitude at which the workforce is empowered and motivated. Besides salaries and job appraisals, KFS through the ENCOM division structures and programs can undertake various incentives that would promote the motivation of the rangers. Drawing insights from this view, the study assessed the levels at which the rangers were satisfied with the motivation measures deployed by KFS, their supervisors, the communication abilities of the unit and the stress freeness of their working environment. The table below outlines the feedback of the respondents.

Rangers response	Work motivation %	Supervisor motivation %	Communication and work performance %	Stress free %
Strongly Disagree	4	3	0	8
Disagree	55	44	26	55
Strongly Agree	11	15	63	14
Agree	26	32	11	22
Don't know	4	6	0	0

Table 4: Extent at which FR supervisors motivate them to improve their performance by providing timely and constructive communication.

Out of the 32 respondents, 47% each equally recorded to be demotivated and satisfied with the work motivation measures undertaken by KFS such as outdoor activities and competitions. This is an indication the service is averagely motivating the rangers through their activities. The respondents also noted 59% disregard rate of the motivation programs undertaken their supervisors. This implies no matter the efforts the general ENCOM units undertake if it is not applied equivalently to all forest stations and equally to all the rangers, the Division to prone to ever record ubiquitous performance. The motivation should be equitable stemming from both the professional cadre (forest managers) and the EnCom commander, inspectors, and corporals. KFS being a based on a vertical organizational structure, the equity in the motivation status is likely to enhance the performance of the rangers across all forest stations across the country (Envag Associates, 2013). If the supervisors of forest station and the rangers fail in implementing their duties, it is inevitable for the forest stations to experience ever-high rates of destruction of forest resources.

In addition to poor work and supervisor motivation, the working environment of the rangers is overwhelming ascribed as unconducive. 63% of the respondents registered their discontent of their working environment noting it to be stressful due to lack of proper working gear among others. Oswald (2012) study on the implication of the working environment on the performance of health care workers in Tanzania noted that poor and stressful working conditions as perceived by the employees is a coherent ingredient of poor performance. Oswald (2012, p. 26) argues that creation of a supportive environment has the potency of enhancing the efficacy of the workers. It is of paramount importance for the Service to determine and mitigate

the stressful elements perceived by the rangers in order to enable them to improve their forest enforcement and compliance responsibility scorecard. It is argued by Moldogaziev & Fernandez (2011) that the amiability of the working condition amicably correlates with job satisfaction and productivity. Thuis study elucidated a very high rate of stress factors in the environment hence calls for radical measures to improve the working conditions of the rangers. On the other hand, the rangers acknowledged the communication capacities of the rangers to be efficient. 74% of the respondents approved the communication channels and programs provided. If the service can provide efficient communication, it has the potential extending the same to other sectors. Kimani (2012) and Mathus (2007) points out due to technological advancements, it is also prudent for the Forest Services and departments to adopt new communication technologies that can further improve the working efficacy of the rangers.

3.2.3. Sensitiveness to Rangers' Needs and Concerns

In every working environment, there are specific needs anticipated by the workforce that they value and greatly perceived to motivate their performance when met. For instance, Warchol and Kapla (2012) notes that it is a need for the conservation and forest rangers to be in a group of at least three and with sufficient gear when taking patrol duties. The needs and concerns vary extensively from forest station to station which many stems from decency of housing to prosecution of offenders. With this view, the research looked assessed the degree at which KFS is promotes teamwork and its sensitivity to the needs and concerns of the forest rangers

Rangers response	Needs and wants %	Team work %
Disagree	63	26
Strongly Disagree	0	4
Strongly Agree	7	26
Agree	30	37
Don't know	0	7

Table 5: KFS Sensitivity to Forest Rangers' concerns and needs and promotion of Teamwork

Sixty three percent of the respondents indicated that Kenya Forest Service is not sufficiently sensitive to the needs and wants of the rangers. Only 37% approved the efforts undertaken by the Service in meeting their requirements and concerns. In a study conducted in 2013, one of the respondents was noted to look forward to a time when all the KFS employees shall be treated equally (KFS, 2013). Three years down the line, sadly, the rangers are still expressing skewness in the way the Service responds to their needs (KFS, 2013). Harter et al. (2004) argues that when the needs of employees are met, they become more involved and enthusiastic hence promoting work productivity. They as well note the aggravated enthusiasm among employees who consider their employers to be assertive to their concerns, it creates and promotes a sense of belonging, value and growth. Employee satisfaction is an antecedent of employee engagement. It worth noting that employees with a higher job gratification are susceptiable to sustainable performance in the long run (Eliason, 2006; Koontz, 2007).

The ENCOM division fairly supports and promotes teamwork among its officers, 63% of the respondents indicated there are motivated and encouraged to embrace teamwork while 30% held a contrary view. Collaboration among forest rangers is critical for their success. The rangers patrol and protect large tracks of forests, which require very extensive and coordinated collaboration amongst themselves and other stakeholders hence fundamental to the protection programs. Eliason (2006);Kimani (2012);Kozlowski and Bell (2003);Onyango (2013);Oswald (2012) noted that the encouraging teamwork stimulates the involvement of employees due to paradigm shift from individuality to collectively hence mutual commitment and accountability.

3.2.4. Adequacy and Quality of Transport Facilities and Work Equipment

The study aimed at vindicating the magnitude at which the transport facilities and working equipment influenced the performance of the rangers. It was undeniable that about two-thirds of the rangers perceived the transport and work equipment as inefficient and unsustainable.

Rangers response	Transport %	Working equipment %
Strongly Disagree	9	11
Disagree	56	55
Strongly Agree	13	8
Agree	22	26

Table 6: Adequacy and quality of the transport facilities and Working equipment

The above findings are startling as the duties of the rangers revolve around patrol, an activity that require coherent and efficient means of mobility and equipment's such as sufficient firearms and ammunitions to counter forest offenders who may have more sophisticated weapons. Sixty-five and sixty-six percent of the respondents discredited the sufficiency and quality of the means of transport and working equipment's respectively. Insufficiency of vehicles precisely designed for patrol in the forest terrains makes it impossible for the rangers to transport even the apprehended culprits and impounded property to police station for booking.

The findings affirm the results in the 2010 and 2013 reports on impacts on working environment on KFS employees (Envag Associates, 2013). Poor means of mobility and work equipment's increases the workload in the division, in that they can patrol small areas within their reach leaving other areas vulnerable to exploitation (Onyango, 2013; Warchol & Kapla, 2012). Transport means are also critical as an emergency response strategy as the rangers as expected to be stand by at any time due emergencies such as fire and intelligence on imminent and ongoing illegal activities (Onyango, 2013). The 2013 study results also indicated that ENCOM staff has a satisfaction index of 48.89% and 41.67% on the adequacy of working tools (firearms, tents, GPS, and other surveillance equipment's) and communication equipment's (walkie-talkies) respectively (Envag Associates, 2013). Lack of these facilities and equipment's is a dire impediment to the operations assumed by the staff.

The activities of forest rangers majorly include forest patrols, which predominantly pertain moving through the forests. The primary pillars of their work efficiency

are bestowed on their mobility potential as well as the work equipment such as firearms and camouflaging uniforms (Onyango, 2013). Kimani (2012) points out that the operational efficacy of the forest rangers is rooted on the aptness of transport and work equipment facilities that directly implicate of the rangers' actions as they undertake the prevention, detection and suppression duties. Through activities such as patrols, prevention of forest crimes are combated as they aim at minimizing the opportunities of engaging in illegal acts, however, the rangers need to be able to swiftly move into the forests without detection by adjacent communities who may warn the offenders. The impounded products also need to be transported to the forest stations/beats and police stations, therefore the inefficient means of transport makes their duties futile and predetermined by offenders (Onyango, 2013). The rangers also need to be moved to certain limits in the forest before they set on foot patrols, this enhance the area covered in each patrol as opposed to walking from their bases into the forests. Onyango (2013) study vindicated sadly that most of the forest stations in the Embu ecosystem in Kenya lacked vehicles in good conditions hence impeding even the transportation of the arrested offenders to the police stations. The same was noted in this study, only the Masaita forest station and the Kericho Ecosystem base owned vehicles the other two depended on the Ecosystem's Conservators office to avail them with vehicles when need be. Consequently, poor working equipment such as raincoats, gumboots, and tents among others renders the work of the ranger's absolute cumbersome at night and during raining days. These implications are advantageous to the offenders.

3.2.5. Adequacy and quality of uniforms, living conditions, and equity issues

Uniforms, living conditions and cases of job discrimination in disciplined forces in Kenya attracts allot of attention (Onyango, 2013). In this viewed, it was imperative to understand and evaluate the forest rangers' satisfaction on the adequacy and quality of their living conditions, uniforms and equity issues.

Rangers response	Uniforms %	Living %	Discrimination %
Disagree	40	63	11
Strongly Disagree	0	15	4
Strongly Agree	4	7	30
Agree	56	15	55

Table 7: Responses on the appropriateness and quality of uniforms.

The results show that the camouflage/jungle and official uniforms issued to the rangers are appropriate and of high quality. Sixty percent of respondents approved the uniforms while 40% viewed them to be inappropriate. Nevertheless, most registered substantial trepidations on the frequency at which uniforms are issues. 25.9% of the respondents prefer the uninforms to be issued whenever they are worn out, 22.2% after every two years, 14.8% after every five years while the majority (37%) desired the uniforms to be issued yearly.

The living condition of the forest rangers recorded the highest rate displeasure; majority of the rangers (78%) termed the living condition to be archaic, inhabitable and deplorable. Most of the houses are made of timber during the colonial era and lack electricity and water neither are they regularly maintained. Kimani (2012) registered displeasure of the archaic status of the houses of the rangers, he argues that provision of better living condition is an essential work motivation factor that the KFS has overlooked for so long hence beheading the rangers' morale. KFS should prioritize improving the housing conditions of the rangers by constructing better and decent housing units as well as renovating the existing permanent structures. The working environment proved equitable and non-discriminating, 85% of the respondents appreciate the efforts of KFS in ensuring they are treated equally and fairly

Rangers response	Balance%	Freeness%
Strongly Disagree	0	4
Disagree	3	37
Strongly Agree	20	15
Agree	77	44

Table 8: Personal life - Work environment balance

The study noted that 97% of the respondents are able to keep a reasonable balance between their work and their personal life thus the balance does not limit their performance. In addition to personal life-work balance, 59% responses showed the ranger are free to discuss their personal life and professional problems with their supervisors without fear of victimization.

4.   Conclusion and Recommendations

From the data analysis and the discussion above, it is evident that the performance of forest rangers in respect to the findings of this study is deteriorating at an alarming rate. The dissatisfaction rates of 59% and 63% in most of the parameters of the study indicate that their performance is compromised by many factors. Comparison of the finding of this study with the findings of the surveys of 2010 and 2013 depicts a large disparity, the dissatisfaction index of this study ranges between 59%-63% compared to 51.4% and 56.74% satisfaction index of 2010 and 2013 surveys respectively (Envag Associates, 2013). The ENCOM division has a huge responsibility to protect forests in Kenya hence a record of such low rates of satisfaction should worry every forest manager, conservationists, and policy makers they the rangers play an imperative role in the enhancing sustainability of future forests. Forest illegal activities in natural forests such as charcoal making, and illegal logging have been on the rise, an indication of the poor performance of forest rangers because of the impoverished working conditions as noted in this study.

ENCOM Division has a dire responsibility and large task to do so as improve the working conditions and environment of the rangers. No matter how efficient conservation and regeneration programs may be undertaken while enforcement lags behind, the cumulative performance of the entire process shall ever record poor performance. Measures that are more radical must be undertaken to enhance the performance and productivity of rangers by motivating them as well as acknowledging impediment of low employee satisfaction on workforce performance.

Some of the measures KFS can partake to promote the functionality and performance of the ENCOM cadre comprise of provision of modern patrol facilities such as air patrol facilities (choppers), vehicle, and motorbikes specifically designed for forest

terrain. These will enable rangers to access remote and impermeable areas as well as covering large areas over a short time. Better and adequate communications and surveillance amenities (such as walkie-talkies, hotlines, GPSs and GIS training) must also be facilitated, as they will improve communication and collaboration abilities among the officers and community forest policing activities hence boasting their abilities to curb ongoing illegal operations. In addition, it is crucial for the division to be liquidated with sufficient and appropriate working tools. The ranger should be provided with a rifle, sufficient ammunitions, gumboots due to the terrain and weather of Mau Complex, well-conditioned tents, and camping facilities as well as frequent issuance of uniforms among other facilities and equipment's deemed necessary.

KFS should also consider revising salaries and the remunerations rates offered in accordance to the national and international stipulated pay grades. If in agreement, it should device other mechanisms and incentives that would escalate the rangers' motivation such as job appraisal and promotions. The promotions should be conducted on an equal and fair basis with profound emphasis to the cumulative performance of each ranger, work experience, and the levels of education.

The housing conditions having recorded the highest distressing rate of dissatisfaction, KFS should make it a priority. It should therefore, construct permanent and decent housing units opposed to timber ones, frequently renovating the existing ones, and at least supply them with electricity and tap water. The rangers should be regularly taken to seminars and refresher courses on which they can be trained on customer care and polish of their performance as a token of motivation.

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Population Status and Extinction Risk of Medicinal Plants in a Moist Closed Canopy Afromontane Forest: A Case of *Prunus africana* (Hook. f.) Kalkman in South West Mau Forest, Kenya

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Abstract

The exploitation of the medicinal *Prunus africana* trees from forests in Kenya has raised concerns. The effects of such exploitation on the regeneration trend or population structure in disturbed and undisturbed sites have not been documented for prescription of its sustainable management and conservation strategies. This study assessed exploitation level, regeneration trend and population structure of *P. africana* in South West Mau forest in Kenya. It was hypothesized that population of the species was unstable due to high exploitation. Diameters at Breast Height (DBH) of large trees were measured and regeneration counted in four sites with varying anthropogenic influence: undisturbed, low, moderate and high disturbance areas. Three transects of 100 m apart and running from forest edge up to 1 km inside the forest were established in each site. Four sample plots measuring 20 m x 50 m were laid at 250 m intervals along each transect. Each plot was divided into 10 equal square subplots of 100 m² and 25 m² sub-subplots nested in each and a quadrat of 1 m² at its centre. Trees >10 cm in DBH were measured in subplots while saplings and seedlings were counted in sub-subplots and quadrats respectively. The density of debarked *P. africana* stems was significant different between the sites ($p < 0.012$) and the least disturbed site had the highest debarking rate (90 %). Regenerations and adult trees densities was also significantly different ($p = 0.043$ and $p = 0.005$ respectively). The relatively undisturbed site provided the highest regeneration density and a balanced population structure for *P. africana* population (almost reverse-J curve) as compared to other sites where the species population was relatively unstable. The findings revealed need for strategic restoration measures for the species.

Keywords: *Population structure, Prunus africana, Regeneration, South West Mau forest.*

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1. Introduction

Globally, trees in natural forests are selectively harvested for benefits such as timber and medicine (Bahamondez, Álvarez, & Itzelcoaut, 2010; Bleher, Uster, & Bergsdorf, 2006; Njunge & Mugo, 2011). As a result, target species tend to be overexploited threatening their survival Aldrich and Hamrick (1998) and the very source of the needed products (Oldfield & Newton, 2012). Trees are exposed to prolonged human disturbance due to their nature of long lifespan, and variation in productive behaviour. The species has been listed as an endangered species and included as Appendix II by Convention on International Trade on Endangered Species (CITES) since 1995 Kireger and Koech (2010); M. Cunningham, Cunningham, and Schippmann (1997) and by FAO panel of experts on Forest Genetic Resources as a tree species with maximum action priority in Africa (Navarro-Cerrillo et al., 2008). The species has also been included in the IUCN Red List of Threatened Species as globally vulnerable species since 1998 (International Union for the Conservation of Nature, 2016; Oldfield & Newton, 2012). Oldfield and Newton (2012); Jimu, Ngoroyemoto, and Mujuru (2013) reported a decline in population of mature size *P. africana* in Sub-Sahara Africa due to exploitation for subsistence and large-scale bark harvest for trade.

Harvesting of *P. africana* from natural forests in Kenya has raised concern by forest managers and researchers that the population of the species may be negatively affected in future (Mbinga, Okeyo, Njuguna, & Kamondo, 2013). The negative effect of logging on population status of logged species including *P. africana* was reported by Hitimana, Kiyiapi, Njunge, and Bargerei (2010) in parts of Mt. Elgon forest. Documentation on the effects of such exploitation on the population structure of the species is lacking, making it difficult to design their management guidelines. The species is neither shade tolerant nor pioneer (Fashing, 2004; Mbatudde, Nyakaana, Ploß, & Dalitz, 2013). Thus, their regeneration performance in disturbed and undisturbed sites is not known for prediction and management purposes in relation to anthropogenic activities.

The purpose of this study was to evaluate the exploitation level, regeneration trend and population structure of *P. africana* harvested for medicinal products. It was

hypothesized that *P. africana* population in this forest was unstable; therefore, it may disappear in this site. It was anticipated that knowledge obtained from this study would provide an insight into its availability and survival in its natural habitat. Forest managers will use the findings from this study in their efforts to promote rehabilitation, restoration application of sustainable management strategies and future monitoring of population dynamics of the species.

2. Materials and method
2.1 Study area and selection of study sites

This study was conducted in western part of South West Mau forest which lies between latitudes 00° 22' 46.77'' S - 00° 38' 51.25'' S and longitudes 035° 17' 28.22'' E - 035° 35' 06.75'' E (Google Maps, 2016). The rainfall in this region is bimodal with peaks in April and August and ranges from 2000-3000 mm per annum (Kinjanjui, Karachi, & Ondimu, 2013; Tea Research Foundation of Kenya, 2005). Mean annual temperature ranges from 12-16°C (Kinjanjui et al., 2013; Mullah, Klanderud, Totland, & Kigomo, 2014; Obati, 2007). The forest is relatively a closed canopy forest with high biodiversity and hosts indigenous tree species such as *P. africana* among others (Mullah et al., 2014). The study was done in four sites of South West Mau forest. Each site represented different level of forest-human interaction. In each study site debarking level, regeneration and population structure of *P. africana* was determined.

2.2 Research design

Disturbance gradient was identified and stratified into the four study sites according to the degree of anthropogenic disturbance in the forest and availability of *P. africana*. The disturbance gradient was described as; low undisturbed (LD) site bordered by multinational tea company, moderately disturbed (MD) site bordered by a stretch of 100 m width tea belt between farmlands and the forest boundary, highly disturbed (HD) site bordered by farmlands directly and a relative undisturbed site near Forest Station office. Each stratum was sampled along three transects running from the forest edge into the forest. The starting point of the first transect in each stratum was randomized. Others were established to the right-hand side of first one. Global

Positioning System (GPS) receiver was used to provide coordinates at the beginning of each transect to aid in future monitoring of population dynamics of the species.

2.3   Study species

Prunus africana, commonly known as Red Stinkwood is a secondary forest canopy tree species that has been declining over much of its geographical range in Sub-Saharan Africa due to unsustainable harvesting of its bark for the international medicinal plant trade (Fashing, 2004). It thrives well in Kenya around the slopes of Mt Kenya, Mt Elgon, the Aberdares Range, Cherangani Hills, Tugen Hills, Mau Range, Timboroa, Nandi and Kakamega forests (Orwa, Mutua, Kindt, Jamnadass, & Simons, 2009). The extract from its bark is highly valued locally and internationally for treatment of benign prostatic hyperplasia and prostate gland hypertrophy, a common condition in elderly men (Cunningham & Mbenkum, 1993; Dawson & Powell, 1999; Mbatudde et al., 2013).

2.4   Sampling procedure

Three parallel transects of 100 m apart were established from the forest edge up to 1 kilometre into the forest. A compass bearing was used to ensure parallelism of transects. Sample plots measuring 20 m x 50 m were laid along each transect at 250 m intervals starting from forest edge. Each plot was sub-divided into 10 square subplots of 100 m^2 and 25 m^2 sub-subplot nested in each while 1 m^2 quadrat was laid at the centre. In each subplot the DBH of all poles sizes and adult trees were measured while saplings and seedlings were counted in every sub subplot and quadrat respectively.

2.5   Data collection procedures
2.5.1   Data on regeneration trend and debarking

The DBH over-bark of all standing *P. africana* (> 10 cm) was measured at 1.3 m above the ground using diameter tape. Diameters of trees with buttresses were assessed at points just above the buttresses. The diameters were then segregated into size classes: seedlings (< 5 cm), saplings (5-9.9 cm), poles (10-19.9 cm) and adult trees (> 20 cm) to obtain the number of stems in every life form.

2.5.2 Data on population structure

The number of the seedlings, saplings, poles and adult trees in every site was recorded and were then used to determine the population structure of the species.

2.6 Data analysis
2.6.1 Regeneration and exploitation

Standardized values (per hectare) of the number of regenerations, poles, adult trees and debarked *P. africana* stems in every site were calculated and their means subjected to one-way ANOVA at 0.05 significance level to test for statistical significant differences and Tukey HSD Post Hoc test used in mean separation. Both tests were run from SPSS statistical program version 19. Regeneration density (stems ha^{-1}) of *P. africana* in each site was calculated as follows:

$$\text{Density (Stems ha}^{-1}) = \frac{\text{Number of stems of individual species or with measured variable}}{\text{Area in ha}}$$

2.6.2 Population structure

Bar graph of density of every life form in each site was produced to depict the population structure. The structures obtained were compared to a reverse-J shape curve which reflects population structure of a tree species in typical undisturbed forests. The structures were interpreted according to the system by Owiny and Malinga (2014); Tripathi, Upadhaya, Tripathi, and Pandey (2010) as good, if seedlings > saplings > poles > adults; fair, if seedlings > saplings > poles ≤ adults; and poor, if sapling stage is present but no seedlings or any other imbalance in the structure.

2.7 Results and discussion
2.7.1 Exploitation of *P. africana*

Table 1 presents the results of the exploitation levels *P. africana*. The density of the debarked stems; thus, debarking rate of *P. africana* was higher in the low disturbed site (90 %) and lower at the moderately disturbed site (11 %).

Table 1 Exploitation levels of *P. africana*

Site stratification	Densities of *P. africana* (stems ha^{-1})			Debarking percentage (%)
	Debarked	Undebarked	Total stems	
Low disturbed (LD)	7.50a	0.83	8.33	90
Moderately disturbed (MD)	0.83a	6.67	7.50	11
Highly disturbed (HD)	0.00ab	20.83	20.83	0
Relatively undisturbed (RU)	0.00b	29.17	29.17	0
Total	8.33	57.50	65.83	

Values followed by same letter in a column are not statistically different at $\alpha = 0.05$.

The density of its stems debarked were significantly different, F (3, 44) = 4.06, $p = 0.012$, $\eta^2 = 0.217$ among the study sites. Post hoc test indicated that the low disturbed site differed significantly from the moderately disturbed site ($p = 0.026$) and the relatively undisturbed site ($p = 0.026$). It did not however differ significantly from the other sites ($p > 0.05$).

The high percentage of debarking (90 %) may substantially deteriorate the health of the species and put it under potential risk of disappearance from this forest in near future. The effect size (η^2) indicates that of approximately 22 % of sites disturbance is attributed to the debarking could requirement for ecological intervention. The debarking trends of this species may be a slow continuation of the past authorized trade of its barks in this forest block by the then Forest Department. According to Kjaer, Graudal, and Nathan (2001), *P. africana* can easily be cultivated on-farm and their barks harvested sustainably to reduce disturbance and exploitation of those in the wild. However, farmers have sold farmed *P. africana* bark for decades in Kenya Muriuki, Franzel, Mowo, Kariuki, and Jamnadass (2012) without formal recognition of provenance and mechanisms of differentiating cultivated and wild sourced barks (Ingram, 2014). This calls for appropriate ways of distinguishing the two classes of barks.

The significant difference in debarking between the four study sites of South West Mau forest confirms that the barks of the species were still being exploited. Despite the protection by CITES and IUCN, *P. africana* remains Africa's most intensively exported medicinal plant species by volume (Cunningham *et al.,* 2002). Several studies and surveys have provided evidence of the adverse effects of large-scale bark harvesting on *P. africana* populations (Sunderland, 2000). For example, at Pico Basile, Equatorial Guinea, Sunderland (2000) found that 68 % of exploited *P. africana* was either dead or experiencing canopy dieback. The harvesting *P. africana* bark for export to European pharmaceutical companies from Mount Cameroon has caused particularly severe impacts on the population status of this species in Cameroon (Hall, O'Brien, & Sinclair, 2000). As a consequence of the uncontrolled bark harvest, *P. africana* populations are reported to have diminished in the mountainous humid forests of Mt. Cameroon (Schröder, 2000). Geldenhuys (2004) reported population of *P. africana* in South African forests as severely impacted, as only the smaller trees were not harvested. This concurred with the findings of this study in South West Mau forest as only adult trees were found to have been debarked. According to Hall et al. (2000), quality concoction is obtained from adult trees of *P. africana*. This could explain why only adult trees are exploited for the barks. In South West Mau forest, most bark originates from wild trees raising concerns that the local medicinal trade is unsustainable; thus, population of *P africana.*

The low disturbed site was the least disturbed and presumed to be the most protected site. However, the rate of debarking of *P. africana* in this site was higher than in other sites presumed to have experienced higher disturbance. Presence of high rate of debarking in a low disturbed site may suggest that *P. africana* barks was still valued for its medicinal property and therefore making its ways to the local markets. The debarking could also suggest reduction of other medicinal tree species in South West Mau forest.

2.7.2 Development stages densities of *P. africana*

Table 2 indicates that the regenerations density of *P. africana* was highest in t
relatively undisturbed site and lowest in the low disturbed site. The other sites h
intermediate but highly varied densities. The poles and adult trees were highest
highly disturbed site where no adult trees were found, while adult trees were high
in low disturbed site with lowest densities of other development stages.

Table 2. Development stages densities of *P. africana*

Site stratification	Densities of *P. africana* development stages (Stems ha^{-1})		
	Regenerations (Seedlings + Saplings)	Pole sizes	Adults
Low disturbed (LD)	1.67a	0.00a	6.67a
Moderately disturbed (MD)	3.33a	0.00a	0.83ab
Highly disturbed (HD)	20.00a	8.33a	0.00ab
Relatively undisturbed (RU)	25.83ab	2.50a	5.83a
Total	50.83	10.83	13.83

Values followed by same letter in a column are not statistically different at $\alpha = 0.0$

The regenerations density of the species showed statistical significant differen
$F(3, 44) = 2.95$, $p = 0.043$, $\eta^2 = 0.168$ between the sites. Post hoc test reveal
that the regeneration density at the relatively undisturbed site differed significan
($p = 0.040$) from that at the low disturbed site. However, it did not differ from t
densities at the other sites ($p > 0.05$).

The density adult trees showed statistical significant difference $F(3, 44) = 4.8$
$p = 0.005$, $\eta^2 = 0.333$ between the sites. Post hoc test revealed low disturbed s
differed significantly from moderately disturbed ($p = 0.049$) and highly disturb
($p = 0.019$) sites while highly disturbed site differed significantly ($p = 0.049$) fr
relatively disturbed site. The density of poles did not differ significantly ($p > 0.0$
among the study sites.

According to Kimaro and Lulandala (2013), disturbance results in impairment in t
overall regeneration potential in forest ecosystem and negatively affect fast degradi
tree species. The statistical significant difference on regenerations and adult tre

has had an impact on regeneration trend of this species. Such disturbances implied that approximately 17 % and 33 % of the variation in seedlings and adult trees respectively could be explained by sites differences in anthropogenic disturbance of the species.

Stewart (2009) reported that anthropogenic activities, particularly tree exploitation and grazing influence trees and seedlings growth, mortality and reproduction. The low and moderately disturbed sites were characterized by multi-storey pioneer tree species such as *Tabernaemontana stapfiana, Neoboutonia macrocalyx, S. mauritianum, Strombosia schefflerri* and *Psychotria mahonii* and very thick undergrowth of herbs such as *Acanthas eminens, Mimulopsis solmsii and Piper capense. Prunus africana* regenerations and poles sizes in these sites could have suffered competition for resources from such stiff competitors.

This finding concurred with a study in Kakamega forest by Kiama and Kiyiapi (2001) that grouped *P. africana* among non-pioneer light demanders whose seedlings are nursed by shade but requires light for survival at later stages of its life. High density of regenerations in relatively undisturbed site might suggest better conditions for regenerations of the species in the site. A study by Cheboiwo, Mugabe, and Langat (2014); Mutiso, Mugo, Cheboiwo, Sang, and Tarus (2015) in Mt. Blackett forest of Western Mau forest in Kenya, associated anthropogenic disturbances to light gaps which promoted successful regeneration and recruitment of pioneer species including invasives *S. mauritianum*.

In South West Mau forest, disturbance due to debarking of *P. africana* lead to deaths; coupled with stiff competition from pioneer, invasive species and herbaceous plants could have impeded its regeneration trend and lead to low densities in the study sites. Fashing (2004) revealed that *P. africana* was experiencing localized decline in the Kakamega forest with mortality rate of 3.9 % as compared with typical tree mortality rates of 1–2 % reported for most other tropical forests. He also reported no recruitment occurring into the tree stem size diameter classes of between 10 cm and 39 cm.

2.7.3 Population structure of *P. africana*

Figure 1 presents the population structure of *P. africana* in all the study sites based on the densities of all development stages of the species.
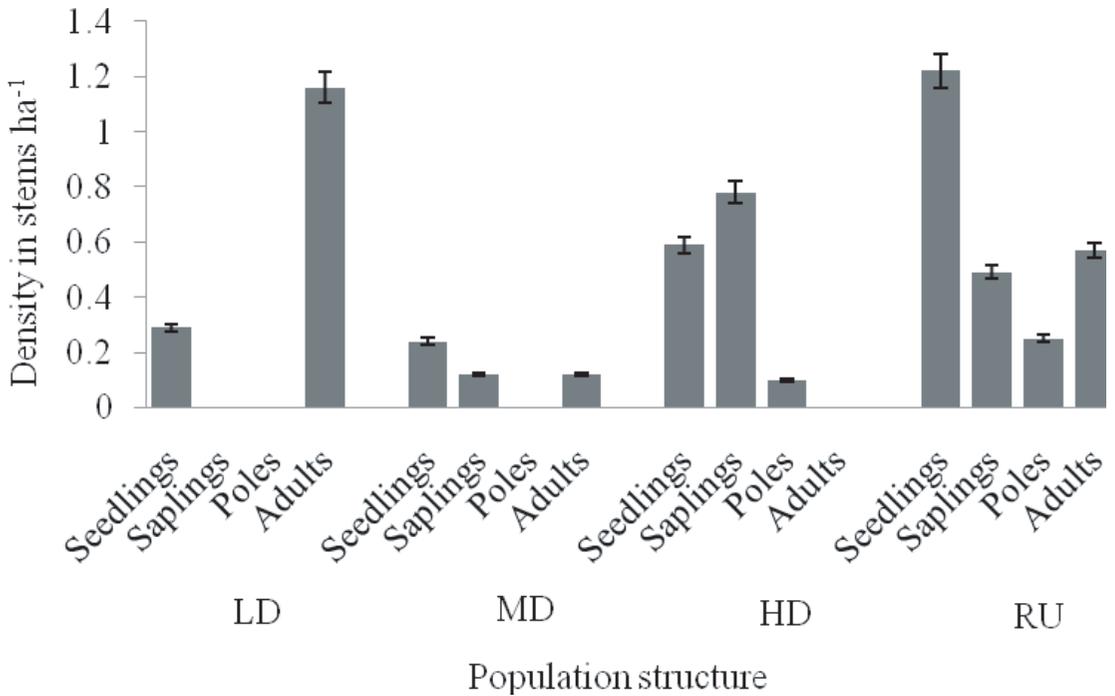
Figure 1. Population structure of *P. africana*.

The relatively undisturbed site was the only site with all the development stages of *P. africana* represented. Though there were more adult trees than saplings and poles, the structure fairly displayed a reverse-J shape. However, despite absence of poles in the moderately disturbed site, the low densities of seedlings, saplings and adult trees almost displayed reverse J-curve. The other sites failed to show specific shape in relation to J-curve.

Lack of saplings, poles and adult trees of *P. africana* in most of the sites in addition to very low densities in other sites indicates that the population of this species may disappear from these sites in future. Most of the seedlings found in the sites were few and too young to survive competition, therefore could not advance to the next stage

the plots adjacent to the farmlands and this could have been brought by birds which came to feed on crops in the farmlands. A fair population structure in the relatively disturbed site could be attributed to a high regeneration of the species in the site.

Prunus africana was expected to have a balanced population structure in every site because it seeds every year (Orwa *et al*., 2009). However, based on the system by Owiny and Malinga (2014); Tripathi *et al*. (2010) the population structure in the relatively disturbed was fair and generally poor in the rest of the sites because of the imbalance in the structure. The success of non-pioneer life history entirely relies on survival of the juveniles and their subsequent recruitment to upper age classes. The resultant shapes other than reverse-J curve reveals erratic recruitments of the species in all other sites. Despite no harvesting of *P. africana* in all the study sites in form of timber, the poor regeneration of the species may suggest that other factors other than harvesting could be responsible. The structures particularly in the low and moderately disturbed sites and may be attributed to authorized bark harvesting in the past which could have led to overexploitation; thus, death of the barks affected stems. This may explain why adult trees of *P. africana* few are and scattered in all sites and may not provide adequate seeds to subdue its competitors. Excessive debarking including ring barking of the stems may lead to death of the trees in two years (Delvaux, Sinsin, & Van Damme, 2010). This was confirmed by one very big *P. africana* stem that was found ring barked and dead in the low disturbed site indicating that the bark harvest was not sustainable. These results agreed with the findings of a study by Cheboiwo *et al*. (2014) who reviewed conservation of adult trees of *P. africana* and trade on its barks in Kenya and reported that there were few scattered trees of this species in Mau forest.

Anthropogenic land use history was reported by Brown and Gurevitch (2004) to have long-persistent effects (40–60 years) in tropical forests. Their results suggested that both natural and anthropogenic disturbances reduced species richness and diversity. The observed poor population structures of *P. africana* in South West Mau forest may be due to both natural and anthropogenic factors implying the need to highly prioritize areas for conservation the species.

3. Conclusion

This study established that *P. africana* in South West Mau forest has experienced significant anthropogenic disturbance due to debarking at a rate of 90 %. The debarking differed between the study sites ($p = 0.012$). Approximately 22 % of the disturbance in the ecosystem is attributed to the debarking. The regeneration density of *P. africana* was highest (25.83 stems ha^{-1}) in a lesser disturbed site indicating positive effect of slight disturbance for successful regeneration of the species. Its density differed between the sites ($p = 0.043$). The population structure of *P. africana* was found to be poor due to effect of anthropogenic disturbances. The structure in a lesser disturbed site was fair (seedlings > saplings > poles < adults); it was characterized by reverse-J curve though adults were more than poles. The structures were poor in the rest of the sites indicating the species is at potential risk of disappearance from South West Mau forest in future.

4. Recommendations

Studies into alternative medicinal species with similar medicinal properties as *P. africana* are recommended to reduce the impact of bark harvesting of the species. These may include in-situ and ex-situ conservation strategies. There is need for protection of seedlings in the wild through minimization of anthropogenic disturbances particularly in areas where the species is abundant. Nurse trees for the species should be identified and protected to increase the survival rates of the juveniles. Clearing around some of *P. africana* to get rid of all weeds and create receptive seed beds and little light on forest floor prior to seeding period may be done. Enrichment planting using appropriate germplasm obtained from this forest ecosystem (well adapted to the sites) is recommended. To promote regeneration trends thus healthy population structure, policies of domesticating *P. africana* may be introduced to reduce disturbance and exploitation of those in the wild. Specifically, application of CITES regulations for protection and conservation of *P. africana* in the wild are recommended.

5. Suggestions for further research

There is need for continuous study of forest ecological processes and; development of strategies aimed at stimulating natural regeneration of *P. africana*. Further

research on natural disturbance indicators of *P. africana* in South West Mau Forest is also required. The ability of the existing *P. africana* in South West Mau forest to provide potential quality germplasm for the enrichment planting exercise should be studied. Conditions and the history of the site with high regeneration density should be studied deeply and be used to manipulate the regeneration level in other sites with low regenerations.

Acknowledgement

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The Essence of Quality Education as a Tool of Human Development

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Abstract

Education has become so central in life that; no sensible development can take place in its absence. The study seeks to enlighten the reader on the meaning of the word tool. Secondly, I will try to show the different definitions of education and touch on quality education from an African traditional point of view; an education that inculcates good values to the people e.g. Honesty, obedience, fear of God, kindness, loyalty and moral uprightness among others. Lastly, I will try to show that development is the real change for men and women, that clarity of terms will enable us to venture easily into our theme and see clearly how quality education becomes a necessary tool for human Development. Little knowledge is dangerous, so they say. This adage shows the impact made by striving for education. Literate people are not ignorant. They know that they do not know. They do not fear criticism, have a heart of change and are flexible. The researcher also wants to show that mere intelligence or academic excellence is not necessarily equated with wisdom. The latter is preferable in our study. My objective will therefore be meant to show dangers that accompany ignorance, and a call for an urgent need to love and cherish education. Dangers posed by lack of quality education are like; Consciousness Stint (I am sorry I am made that way) yet truth is paramount, Fundamentalism/Extremism of perceived doctrinal ideas (man was not made for doctrines, but doctrines for man.), Conformists against transformists, a heart of stone, fears of the unknown, and judges of the unknown. Others are ignorance of a person's human rights, lack of detachment and lack of free will to choose one's destiny. This study fits well in the theme category of the conference (Science and humanities- *Education and human development).* The study will collect data using purposive sampling procedure from a population of 600 comprising of lecturers, students and business entrepreneurs. The scope will be Tetu Constituency in Nyeri County.

Key words*: Development, Fundamentalism, Quality Education, Reformation and Governance, Tool.*

1. Introduction

1.1 Education as a tool of development

A tool is any instrument or apparatus such as a spanner, axe, hammer held in the hands for doing special jobs. Take for example a few spanners which are used for engine overhaul. Human development is a complex phenomenon whose secret behind success can only be found in education. Education is the major agency for both personal and national socio-economic development. Investments in human capital development play a critical role in long-term productivity growth. The implication of the declining education quality at all levels has far-reaching implications on our moral, civic, cultural, and economic sustainability. It is important to realize that the discussion on education and its reform should gradually and systematically move away from a reactionary approach to more of a systems approach that appreciates workable solutions for reforming our education system.

1.2 Quality education

Quality on the other hand is the degree to which a set of inherent characteristics of an entity fulfils requirements. Different people perceive these attributes differently and so we have to define it in our own perspective. To describe quality, we use attributes like goodness, redness, tallness, shortness, freshness, sweetness etc. If we qualify education, we can therefore talk of good education, fulfilling education, education that meets the standards or even efficient education. Education is a process of teaching, training, and learning, especially in schools or colleges in order to acquire knowledge and develop skills and attitudes (Oluoch, 1992). Though in education the teacher also learns, I will focus more on students who are in the formation process. Even before colonization Kenyans practiced indigenous education which maintained the fabric of ethnic advancement where children were conditioned to take a predestined place in the society. Learning was informal, and the adults oversaw educating the youth to be responsible people until puberty when initiation rites were carried out for both boys and girls. At the onset of political independence, the founding fathers clearly outlined the enemies of the progress as *poverty, ignorance and diseases.* During the colonial era, communities in Kenya received poor social services from the colonial government because of the racial

segregation policies. African education was provided for mainly by Christian missions with little subsidies from the government.

2. The blue print of Kenya's post-colonial development

The blue print of Kenya's post-colonial development, the sessional paper No.10 of 1965, formulated by the minister for economic planning, Tom Mboya, stated how these enemies were to be tackled through quality education. One of the strategies proposed was to use education to stem ignorance. A list of the recommendations and objectives of education were outlined in this session paper;

1) Education must foster a sense of nation hood and promote national unity.

2) Must serve the people of Kenya and needs of Kenyans without discrimination.

3) Must be regarded and used, as an instrument for the conscious change of attitudes and relationships, preparing children for those changes of outlook required by modern methods of productive systems of organization

4) A must urgently conserves the needs of individual and national development.

5) Must promote social equality and remove divisions on race, tribe and religion.

6) Must pay special attention to training in social obligation and responsibility.

7) The outcome of our educational provision at all levels must be adaptability to change.

8) The transformative power of education and its contribution to national development.

These were and still are the philosophical tenets of our education goals since independence. It is therefore important to develop critical thinkers as a national priority, a people who can critically look at issues regarding a kind of standard education focused on human development. There is a relationship between university education, or tertiary education and solving national problems. "The immediate problem that confronts Kenya today is that of relating her educational system to her own environment. In an environment of massive corruption, insecurity, failed

justice system, economic gap between the rich and the poor, etc, we need focused approach to rout out these evils in our environment. We need our esteemed education to urgently attend to the changing of attitudes about honesty, integrity, respect, self-discipline, sharing and cooperation among others. Many respondents agreed that to bring back the savour of quality education like the one witnessed in our traditional circles, the following challenges must be addressed.

2.1   Shortage of manpower

Shortage of manpower is one of the challenges facing education in Kenyan schools today. Past education reports recognized that Kenya cannot be a good achiever in education unless the country has a sufficient reservoir of trained indigenous manpower at all levels. Recently, the education ministry through The Teachers service commission (TSC) advertised for seven thousand new posts for employment, which are far below expectation compared to the 30,000 required teachers today. A normal learning class should accommodate 50 students. The teacher overload wears him/her off and consequently he /she cannot deliver. Eighteen (18) teaching hours per week could be recommended. The implementation of the recommendation by the Mackay report of 1981 to some extent helped to accelerate production of skilled manpower. It also recommended continuous upgrading of skills and knowledge at the pace and ability of its trainees and education and training for direct employment. Teachers for children with special needs are a case in point. They are trained at Kenya Institute of Special Education (KISE) an institution which was opened in 1986 when various Courses were moved from Kamwenja and Highridge teachers training colleges and consolidated at KISE. Presently there are hundreds of training centers that have started across the country to train more personnel on special needs of children with learning difficulties.

The Mackay report (1981) also recommended substantial expansion of middle level institutions but this was never to be. Regrettably, several middle level colleges were instead converted to universities thus creating shortage of training manpower at this level. Middle level institutions play an important role in most sectors of the economy. These institutions are the hope and fulcrum of the industrial take off where trained manpower is essential for ensuring economic development is achieved by the year

2030. There should be substantial expansion of middle level institutions with a new curriculum re-designed to promote entrepreneurship and self-employment. In technical/medical training institutes, more active collaborative mechanism between industry and training institutions should be put in place to endure relevance of technical training. Private investors can also be encouraged to start technical training institutes to increase manpower. Terrorism, insecurity and war related activities affect manpower. The Garissa attack on university students ended up paralyzing studies and some lecturers and students vowing never to go back. The post-election war of 2007/2008 left many wandering in refugee camps, children and parents alike. Such unintended scenario makes rehabilitation and reconstruction difficult thus affecting the flow of one`s education and ultimately affecting quality of his/her education.

2.2 Lack of research and industrialization

Education system is lacking research which is important for products to sustain a competitive edge in a liberalized economy. Linkages between universities` research departments and industry are almost non-existence. In view of the vital role research plays in facilitating socio-economic, and industrial development, the Mackay commission (1981) recommended that government and industries give research funding top priority and that collaboration between industries, universities and research institutions be established and strengthened. Research priorities should be identified by university institutions with a requirement to prioritize their research activities in areas that will enhance technological development. Expansion of specialized universities that address environmental needs of Kenyans, like agriculture, medicine, ethics, architecture, journalism, music, survey, nursing, physical/health, estate management is imperative. Research finding should then be availed to those institutions and industries that are able to translate them into industrial productions.

2.3 Anti-social behaviour

Quality education is compounded by the lack of serious attention to the purpose of education. Moral formation should be at the forefront of education. Unfortunately, our schools today are full of anti-social behaviours that appear to increase every day, yet they seem not to be dealt with firmly. There are reported incidents of

cannibalism, rape, homosexuality, sexual orgies, drug abuse, devil worship, blue, white and red dances. Recently in the month of July and August 2016, about 120 secondary schools from the whole republic were affected by riots, characterized by burning of dormitories, classes and administration blocks. A taskforce charged with finding the cause of all these disturbances faulted the head teachers for being zealous in exam administration, but on the other hand forgetting aspects of child development and welfare. These activities pose a major threat to both quality of education and our education institutions. It is noted that students who have been involved in such activities seem not to regard these activities as anti-social, claiming that they had witnessed riots elsewhere in the wider society and no stern measures seemed to have been taken against the offenders. Peer influence here cannot be ignored.

To deal with such anti-social activities the government should set a commission charged with re-defining the national values and ethics. It should have representatives from civil society, religious organizations, opposition and the government. The information from the findings of such commissions should be used to formulation a new syllabus on social education and Ethics. Institutional management also should work out concrete ways and means of assisting parents, teaches, education administrators and counsellors on how to assist students in dealing with he challenges posed by cannibalism, devil worship and other similar cults. Measure should be taken against teachers who collude with students in hooliganism. The Gachathi Report of 1976 and Kamunge report of 1988 recommended the teaching of religious education and social education and Ethics in formal Education institutions to curb these social problems. Religious education should be taught by committed and qualified persons practicing the faith in which they offer instruction and it should be taught in a manner respecting the freedom of conscience, worship and association.

2.4 Lack of guidance and counselling services

One of the major problems facing education in Kenya today is lack of guidance and counselling services. The commission noted with concern that this once vibrant service is no longer as effective as it used to be, most of the professionally trained personnel in this unit have since retired or have been deployed to other sectors.

The institutional and field staff has nowhere to seek necessary advice to help them in carrying out their guidance and counselling duties effectively. Most of the staff members in educational and training institutions who offer these services are not professionally trained and they themselves need the same service. However, the Mackay commission recommended that a national programme be instituted for professional training of teachers to handle guidance and counselling in education and training. Alternatively, every training institution should include guidance and counselling courses to enable teachers to handle this important service, professionally. That calls, not only for professionalism but also for maturity and dedication to duty on the part of the teacher counsellor who should guide, and counsel students based on gender parity unless otherwise stated.

2.5 Sexually transmitted diseases

Sexually transmitted diseases are quite common among students and ends in one acquiring the deadly virus of HIV/AIDS. At first the local people thought that this was a foreign disease. There was general denial of the existence of the epidemic since 1984 when the first case was diagnosed in Kenya. The citizens have not been taking the threat of HIV/AIDS seriously and this has resulted in many learners being affected or infected. This has not only affected parents and learners but a very large number of teachers dying of the same epidemic thus increasing the shortage of teachers in schools. The deaths associated with HIV/AIDS have adversely affected quality education and training. All the same, the commission has made suggestions of macro and micro-level programs and activities which can help in prevention and control of HIV/AIDS especially in education and training institutions. Such programs must be multi-sectoral and would require collaboration of various sectors including, county, national, and international agencies. The commission recommended that the National AIDS Council be established as a matter of urgency, but nothing much has taken place since the HIV/AIDS scourge has continued to take away many despite the many workshops and seminars held.

2.6 Child Labour

The Millennium Development Goal (MDG) no. 4 talks about education for all. Education should be all inclusive. Keeping or deploying children at home is a

common practice that continues to bedevil the pastoral communities which nomad around in search of pasture and drinking places for their flock. Other children fail to go to school in the pretext that they come from poor families who cannot sustain them in school. Consequently, they are deployed in Miraa, tea and coffee farms while others busy themselves in fishing, crime, street peddling and other petty trading activities. Instead of helping the country to advance forward, these children will become a burden and a liability to the state. Girls are employed as house girls or child maids both in rural and urban areas while some enter prostitution or early marriages. Organized work systems prevent many children from gaining or benefiting from the compulsory free education while at the same time education systems fail to act on the chronic absentees from school. Such problems should critically be dealt with by severely punishing those engaging children in child labour. The government should make sure that all children are in school, introduce feeding programmes and other basic facilities in order to keep children at school.

In Arid and Semi-Arid Lands (ASAL), there are notable challenges as earlier observed. These factors include poor communication and infrastructure, lack of water, children having to go for long distance to school, insecurity and conservative social-cultural practices which all interfere with progress of education in Kenya. Although mobile schools had succeeded in accessing education to children and are particularly suited for young children in nomadic population such schools were only managed by non-governmental organizations (NGOs)' without government involvement or support. The county governments of the areas concerned should pay special attention to sustained incentives like: school feeding programmes, security, managing mobile schools, improved communication infrastructure, and ceaseless sensitization on the value of girl education. The Teachers Service Commission should ensure that female teachers are deployed evenly throughout the country to ensure that girls in schools have appropriate role models. All in all, to provide quality education to all children as per MDG NO. 4, the national government should increase funding in schools, offer bursaries equitably, initiate scholarship programs, provide affordable loans in higher education, offer textbooks and other educational materials.

2.7 Lack of facilities and personnel for learners with special education needs

Learners with special education needs are disadvantaged by nature and degree of their disabilities. Parents of such children are prepared to send all their disabled children to school irrespective of their disabilities, but fees and other requirements often make this impossible. The fact that most of the graduates of the special school do not find any employment has also been a source of discouragement. The integration of disabled learners in normal schools has been viewed with misgiving since such schools do not have facilities necessary for accommodating disabilities. Most of these schools have no specialized teachers to handle specific disabilities; their construction does not take into consideration the needs of disabled learners and may not have the special learning equipment needed by learners. Quality education in this sector can be solved by first establishing and equipping schools for children with special needs and making sure they are enrolled in them. The teachers who train in this area should be deployed to such schools so that the special needs of these learners can be catered for by professionals. Attractive salaries should be given to such teachers to encourage more in the field of the children with special needs.

2.8 Lack of equity in education

Among the factors that contribute to lack of equity in education are inequitable distribution of resources, grants and equipment to schools; Poor distribution of qualified teachers national wide with some schools being over staffed while others have virtually no teachers for some subjects. The best qualified teachers are sometimes spotted and transferred to schools of national importance. Uneven distribution of or lack of stationery, ICT structures, computers libraries, laboratories, lecture halls, and qualified lecturers often disable quality of education.

However, ensuring equity in education demands sustained monitoring using qualitative indicators of achievement to determine levels of enrolment, persistence and achievement of all levels of the education cycle. Specific requirement of physical facilities in schools are necessary and should be adhered to uniformly throughout the country before schools or universities are permitted to function. Commission for university Education (CUE) must be serious with accreditation of new campuses and

schools. Quality Management System (QMS) - ISO 9001 that oversee discipline, order, management, effectiveness and efficiency (time and completeness of killing a mosquito) should readily come in to restore sanity in quality education. Professional registration boards and supervisory departments/ministries should be promoted and safeguarded. Ethnic balance I all institutions of higher learning should respect the 34% rule of representation. Institutions of higher learning which largely employ ethnicity in recruitment of staff do a lot of disservice to quality education. Recently a governor in one of the counties demanded a vice- chancellor from his tribe to run a national institution; Politicizing education is imprudent since it ends up interfering with the constitutional independence of other established institutions. Nepotism and corruption in the promotion of teachers/lecturers has affected morale and performance by allowing non-performers to be promoted and consequently affecting quality education.

2.9 Lack of creativity and innovativeness

One of the major objectives of education is the development of creative and innovative minds. The current curriculum is overloaded and does not encourage creativity. The examinations tend to test recall, as opposed to analytical thinking. The commission was informed that over-emphasis of certificates and lack of talent development activities coupled with continuous assessment leads to rote learning at the expense of practical subjects. There should be encouragement of creativity in all areas of life. The government should encourage and provide through Kenya National Examination Council, exams that are analytical rather than rote.

The current curriculum appears to be irrelevant since it has not fully achieved the objectives of education. It has failed to provide sufficient knowledge and skills for the learners to be self-reliant and employable at certain levels. The curriculum has also failed to inculcate values and ethics and the capacity for critical thinking and innovation. It has also not succeeded in fully addressing the developmental needs of the country. Pastoralist communities were particularly dissatisfied with the lack of inclusion of pastoralism as an economic activity of ASAL areas in the national curriculum; instead students in ASAL areas were forced to learn about coffee, tea, maize farming crops that are alien to them. Fishing as an economic activity of some

communities was not largely included in the curriculum.

Lack of specialization is one of the reasons why learners are unable to meet market demands. The subjects are so numerous that the learning process becomes superficial with students unable to apply what they have learnt. Subjects such as religious education and social ethics education are offered as academic subjects for examinations purpose and not for influencing the behaviour and future lives of learners. Critically the curriculum should be matched with human resource needs through regular reviews and consultation with industry to ensure that it keeps abreast of new development. The process of curriculum development and syllabus design must be taken in broad consultation with communities, potential employers, and other stake holders in education to ensure that is addresses the specific needs of children with special education, needs and regional interests such as pastoralism and fishing.

2.10 Lack of a motivated teaching force

Teachers/lecturers are the lowliest paid civil servants in Kenya and they are often agitated and demotivated. Many head teachers have not been trained in management and administration skills and this leads to inefficiency and lack accountability. Current admission criteria which allows candidates with a minimum qualification of D+ and even poorer grades in mathematics and English to be admitted into primary teacher training programs has resulted in a weak teaching force. At this level some teachers are said to be teaching subjects which they themselves failed in. Therefore, there is a high turnover of teachers as they are constantly seeking transfers to better and greener environment. Although the commission recommended that the admission of teacher training be reviewed to ensure that only well qualified candidates with subject specialization be provided for admission, it has not succeeded because of the high level of mushrooming private colleges that admit even failures. To boost the morals and commitment to teachers/lecturers, we should offer them suitable services and salaries.

3. Conclusion

The United Nations Development program (UNDP) defines human development,

" as the process of enlarging people`s choices, to lead a long and healthy life, to be educated, to enjoy a decent standard of living, enjoy political freedom, other guaranteed human rights and various ingredients of self-respect" In line with this view it is only fair to conclude that without concerted attention and effort to address the issues raised above on quality education, we will continue to fall far below the expectation of full human development credentials. It must train the individual for a better appreciation of his own cultural traditions. The learner should be equipped with the ability to absorb new ideas, new information and new data for resolving the constantly changing problems of his environment; education must train the individual to relate and interact meaningfully with other individuals in the society and to appreciate the importance of effective organization for human progress; Education must develop the creative ability of individuals especially in the cultural and technological realms; it must foster in the individual those values which make up for good citizenship such as honesty, selflessness, tolerance, dedication, hard work and personal integrity. The main challenges therefore that have been facing quality education in Kenya should be looked at urgently. In a nut shell they include lack of funds and resources, lack of adequate qualified teachers, child labour, terrorism, HIV/AIDS, lack of equality, shortage of learning facilities, poor assessment in curriculum implementation, and irrelevance of curriculum to the needs of Kenyans. Although the education curriculum has been undergoing transformation since independence, it is important for the government through the ministry to keep on reviewing it from time to time to meet the current needs of Kenyans. Guidance and counselling should be prioritized to meet the current anti-social behaviours in institutions of learning. The government should put more emphasis on the right for child education without fear or favour.

Education is a life – long process, however, the delivery of education, the current structure and over-emphasis on passing examinations does not promote this concept of life-long learning. Therefore, many school learners abandon their books because learning is viewed as a process that ends after one has completed a given cycle. The Ominde report (1964) recommended that adult and continuing education be established and developed under the ministry. This recommendation led to the establishment of the board of adult education by an act of parliament in 1966 whose role is mainly advisory and policy making. The Kamunge report of 1988

recommended that the board of adult education intensifies efforts in the promotion and coordination of adult education. The report also recommended that the BAE strengthen its co-ordination and regularly role to synchronize adult education and literally activities among providing agencies. The best education is one that opens our minds to think critically, our hearts to embrace all even when we disagree, and our hands to be practical in all endeavours. The ongoing challenges of security and national unity can only be solved through a purpose-laden education that is desired by all.

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The Ethical Dilemma of School Curriculum Implementation and Implications on Teacher Preparation in Kenya

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Abstract

Education in Kenya focuses on the holistic development of the individual learner based on the cognitive, psychomotor and affective domains of learning. Such learning should provide more opportunities for student participation in the learning process and less examination-oriented teaching and learning. It should be guided by a curriculum that considers issues of scope, sequence, continuity, integration and balance both during its design and implementation. This paper focuses on the ethical dilemmas in the process of curriculum implementation in schools in Kenya which negatively affect the role of education as an agent of development. It highlights ethical issues that arise in the teaching and learning process regarding the principles of learning derived from the psychological foundation of the curriculum. It explores the implications on teacher preparation in Kenya with a view to alleviating the current stresses experienced in the schools affecting both the students and teachers and the society at large.

Keywords: *Curriculum implementation, Ethical dilemma, Principles of learning, Teacher preparation.*

1. Introduction

Education has been noted as an agent of human development. Education in Kenya is aligned to and guided by among others the Education Act 2013, Sessional Paper No. 14 of 2012, the Constitution of Kenya 2010, the Kenya Vision 2030, Teachers Service Commission (TSC) Act 2012, Kenya National Examinations (KNEC) Act 2012, and Kenya Institute of Curriculum Development (KICD) Act 2013 all of which consider education as the key to the country's national development. It is these Government policy documents that guide the provision of formal education. For formal education to spar development it must lead to the acquisition of desirable

knowledge, skills, attitudes and values that would enable one to play his/her role and be a useful member of the society. Such an education is aimed at not only the acquisition but the development of the ability to put the acquired knowledge into use and subsequently generate new knowledge hence the emphasis on lifelong learning. Education in Kenya focuses on the holistic development of the individual learner in line with Bloom's domains of learning; that is, the cognitive, psychomotor and affective; what is cited by Florian, Young and Rouse (2010) education of the head, hand and heart.

Education that aims at the holistic development of the learner must be propelled by an efficient and effective curriculum. The learners must be provided with relevant learning experiences Tyler, (1949), or learning opportunities Shiundu and Omulando (1992) under the guidance of the school (Bishop, 1985). This can be achieved through an effective system of curriculum implementation or instruction; the process of putting the planned curriculum into use. Curriculum implementation is the process of experiencing the learning opportunities in the classroom; the experiential contact between the learner and the conditions in the learning environment to which the learner can react. It refers to the interaction between the learner and the teacher, fellow learners, content, methods of teaching, learning activities, resource persons, and learning resources among others and how these have been organized Tyler, (1949) to facilitate learning. Therefore, successful curriculum implementation that would lead to effective and efficient education for development requires not only prudent selection of the learning experiences but effective organization.

In Kenya, selection and organization of the learning experiences is done at the level of curriculum design by the Kenya Institute of Curriculum Development (KICD). In doing so, issues of scope, sequence, continuity, integration and balance should be addressed otherwise it would result in problems of curriculum organization which will hamper the implementation of the curriculum and consequently effective learning. Matters of scope allows for consideration of the depth and breadth of subject matter in terms of subjects and content to avoid curriculum overloads that would be strenuous to the learners and stressful to the teachers. Sequencing ensures ordering of content and learning experiences for systematic learning. It is through continuity

that recurrence of content and learning experiences from one level to another is reiterated to promote learning. Integration brings out the interrelationship among the different learning areas to reduce fragmentation of knowledge hence holistic development of the learner through emphasis on curriculum balance where all the aspects of the curriculum, all aspects of the learner and all aspects of the learning process are ensured. This should be seen not only in the designed curriculum but more so during the implementation process. However, it has been noted that the planned curriculum is not implemented as planned which raises ethical concerns on the part of the teacher and the school. This is because the teacher education curriculum prepares the teacher in all professional aspects that are required for practice. The society also has expectations on teacher performance which sometimes may conflict with professional requirements hence the dilemma in the ethical concerns raised in this paper.

Gichure (1997, p. 16) as "the systematic study of human actions from the point of view of their rightness or wrongness as a means for achievement of man's ultimate happiness". Ethics therefore in her view direct human actions and gives rules for and serves as a guide to human conduct. It is concerned with moral obligation whether deontological with regard to duty or teleontological as regards results or consequences of one's actions (Fisher & Lovell, 2009 cited by Githui (2013). Since ethics refers to what one ought to do according to Gichure, the capacity to choose in her view is based on a person's knowledge on the nature of the action and the rules that regulate such actions; conducive to the good of others, his private good and the good he shares with others of his kind. This brings in view professional ethics in education which is based on the premise that the teacher is knowledgeable in what is expected of her in the classroom and the school as a whole. However, the teacher's actions are teleontologically determined not only by the good of the action to the learners but also her own good and the good of fellow teachers and the school management, which exasperates the ethical dilemma in curriculum implementation further. Ethics therefore involves making choices between and among competing values (Githui, 2013).

Teacher education is charged with the responsibility of preparing teachers who can meet the needs of learners and guide them in the acquisition of competences that would enable them to be useful members of the society and take up their roles well. It is in this sense that teacher education not only emphasizes on the academic subject content, that the teacher requires but more so the professional knowledge that ground the teacher as a professional. Curricula offered in various teacher education institutions focus on key areas of learning which include and not limited to the study of human nature, principles of human learning, sociological bases of education and curriculum, philosophical foundations, historical aspects of education and curriculum, communication skills, administration and management skills and pedagogical skills in addition to academic content in various subject areas. This includes the in-built teaching practice that provides opportunities to student teachers to translate theory into practice Shiundu and Omulando (1992) in different school contexts (Tabot, 2000). This presumably furnishes the teachers with not only what to teach, when to teach, why to teach, where to teach and how to teach as well as how to ascertain that learning has taken place. It is based on this that the rightness or wrongness of the actions of the teacher in the teaching-learning process can be judged.

2. Curriculum Implementation as an Instructional Process

Learning is facilitated by interactions in the learning environment and this is what curriculum as a programme of instruction is all about. The interactions can be formal, non-formal or informal, referred to as the dimensions of the curriculum (Oluoch, 2002). These dimensions are taken into consideration by KICD in the design of the curriculum which is eventually presented to schools in form of syllabuses, teachers' handbooks and guides. It is the responsibility of the teacher to interpret and translate this curriculum plan into an instructional programme based on the knowledge, skills, attitudes and values attained through teacher education and experience. Hence the classroom teacher decisions actualise the curriculum and give it meaning Otunga, Odero, and Barasa (2011) and that is why; "How the teacher interprets and translates the curriculum document determines the impact of the written plan on the learners" p. 79. The concern of educationists the world over is therefore not just what is taught but how it is taught hence the importance of ethical issues in instruction which is the

whole process of curriculum implementation in the classroom and the school.

The progressivist philosophical orientation views the teacher as a guide and facilitator and the learner as an active participant in the teaching-learning process. "For education to be effective it is essential that there be more opportunities for student participation in the learning process as well as more peer evaluation and less examination-oriented teaching and learning" (Rao, 2010, p. 50). This is based on the principles of learning derived from the psychological foundation of the curriculum that learning is most effective when the student is actively involved in the learning situation and that an effective learning situation should recognize and provide for the purposes of the learner (clear objectives). Hence some of the criteria applied in the selection and organization of the learning experiences include, conformity with objectives, motivation to the learners, appropriate to the ability of the learners (learnability), relates to life outside school, gives satisfaction to the learners, reinforces other learning experiences, consistency with developments in the subject, and significance - contributes to the process of learning (Shiundu & Omulando, 1992). It is only when these aspects are taken into consideration that the learner can actively participate in the learning process and learning can take place because "the single valid measure of a curriculum is the learning that takes place" (Otunga *et al*., 2011, p. 73).

Moreover, the psychological foundation of the curriculum contributes to the development and implementation of instructional programmes. It is an understanding of the nature of the learners and the principles of learning that guide the formulation of instructional objectives, selection of content, organization of learning experiences, decision regarding the scope of the curriculum, selection of appropriate methods for instruction and individualised instructional procedures, selection of learning materials/resources, adaptation of curriculum and learning experiences and methods and forms of evaluation. It is on these important aspects of learning derived from Tyler's four fundamental questions Tyler (1949) that ethical issues are raised. It is fundamental to consider "What educational purposes should the school seek to attain?" "What educational experiences can be provided that are likely to attain these purposes?" "How can these educational experiences be effectively organized?"

and "How can we determine whether these purposes are being attained?" This is essentially the work of the teacher in the school and the classroom in putting the curriculum plan into action. Are the actions off the teacher in line with expectation based on their professional training? Society should be confident that we as teachers are using our professional autonomy properly and ethically. However, the dilemma is that the same society makes demands that sometimes conflict with professional requirements putting the teacher in a professional quagmire.

Instructional theory encompasses instructional processes all of which are a reflection of the anatomy of the curriculum Otunga et al. (2011) as espoused in Tyler's fundamental questions. Though instruction may be influenced by availability of time, learning materials, the nature of the learners, and the learning environment, the quality of the teacher is a constant variable. It is the teacher who plans for the available time, improvises where resources are not available or inadequate, understands the nature of the learners and the learning process and applies the most appropriate approaches and strategies. The teacher has the greatest influence on the learning environment. It is in this regard that there is ethical concern on the rightness or wrongness of the actions of the teacher. The approaches selected by the teacher should be consistent with sound educational practice and relate to the goals of education (ibid) and objectives of the programme of instruction. This paper therefore raises ethical issues on three critical areas of planning to teach, teaching/ learning process and assessment of learning.

3. Ethical Issues in Planning to Teach

Planning is a very important aspect of teaching. It is through planning that a teacher identifies the subtle and intricate processes that will spar learning. It is during planning that the teacher determines her intentions for teaching and whether she even wants to teach. Teaching is a complex activity that involves thinking and reflection so that the teacher thinks about the lesson long before, during and way after teaching (Otunga et al., 2011). These authors go further to outline specific instructional decisions which the teacher must make when planning a unit or lesson: identify the content and processes to be addressed, the strengths, needs and interests of the students, and the most effective instructional approaches. During instruction,

the teacher makes decisions on the depth and breadth at which content should be presented, the balance to be accorded each component, the best way in which the content should be presented, what is to be assessed, and how it should be assessed. Therefore, student assessment should be linked to the objectives and the learning experiences.

The specific objectives, as contained in the syllabuses, cover the domains of learning and range from low to high level. Specific objectives also referred to as instructional or lesson objectives describe in specific terms the behavioural changes in students because of experiencing the curriculum. They therefore refer to the most immediate outcomes of classroom interaction. Instructional objectives serve the purpose of providing guidelines in the selection of content, lesson activities and evaluation (Shiundu & Omulando, 1992). It is the objectives that clarify the capacities of the learners to be developed based on Bloom's taxonomy of objectives; that is the cognitive, psychomotor, and affective. It is therefore the responsibility of the teacher to ensure that her planning considers all these aspects of the learner.

4. Ethical Issues in the Teaching-learning Process

The current view of learning is that of an interactive process as opposed to the traditional view of transmission by the teacher while the learners passively receive the knowledge (Otunga *et al*., 2011). The latter seems to be the status quo in most schools even though the teacher is aware of the benefits of the former through training in educational psychology. An ethical dilemma then arises when the learner is on the receiving end. Is it for the benefit of the learner or the teacher?

Since the main purpose of education is to prepare individuals for their roles in society, it should teach them 'how' to think rather than 'what' to think so that the role of the teacher is to lead the learners to self-directed learning (Otunga *et al*., 2011). They posit that successful teaching involves training learners to acquire the skill of learning so that they can learn on their own and become less and less dependent on the teacher. Claxton (2002) cited by Burton and Bartlett (2006), argues that "learners need above all to learn to learn and that the teachers' main focus should be teaching them how" p. 48; that pupils need to exercise their 'learning muscles' and to become

resourceful, resilient, reflective learners. They cite a study in Jordan and another in London in which teachers who used structured questioning and encouraged pupils to discuss their understanding of concepts, led to pupils of all abilities scoring higher in their national assessment tests. This, they attribute to the thinking, derived from neuroscientist research, that meaningful learning creates longer term connections that can be refreshed even after long periods of disuse whereas rote learning (pseudo learning) leads to weak temporary connections. Hence transfer of learning which is witnessed in problem solving approaches is attained. A concept learned in Form one, for example will only require a little reactivation for the memory to be rekindled much later in Form four; a child who has learned a concept can be able to apply it in solving other problems. This is the essence of constructivist theory of learning which focuses on individual learners' construction of meaning from structured learning activities and assessment tasks. "It is what the learners are able to do after being taught that provides a valid measure of the quality of teaching" (Otunga et al., 2011, p. 91).

Based on individual differences that exist among the learners in terms of abilities, interests and needs, teachers should focus on developing particular individual capabilities based on Gardner's multiple intelligence theory (Burton & Bartlett, 2006). The key determinant, they note, is the extent to which a teacher has a detailed knowledge of each learner's progress, strengths and challenges in a learning context. The teacher should therefore relate and respond appropriately to each learner through appropriate manipulation of instructional processes for effective learning. Research in educational psychological has facilitated new understandings amongst educators about how people learn, from which pedagogical implications have been derived (Burton & Bartlett, 2006, p. 53). Teachers are equipped with knowledge and skills on the selection and use of instructional materials which enhance the teaching-learning process and make it more effective. Research has indicated that teachers rarely use teaching-learning aids though they understand its benefits in enhancing understanding among the learners (Kurumei, 2012).

Though teachers are noted to be few and are said to have a heavy work load which makes it difficult for them to perform to their optimum levels and realize quality education (UNESCO, 2004) the ethical dilemma is that the same teachers have extended the school day and the classroom hours beyond the stipulated schedules. Such arrangements make learning cumbersome and stressful to the learners which has been noted as one of the factors that has contributed to agitation among secondary school students witnessed in the recent wave of arson (Sunday Nation; July 3, 2016). In one institution outrageous demands of starting the school day at 4.00am and ending at 9.00pm, and reduction of lunch break to 20 minutes was cited as one of the factors in the report. This raises ethical concerns based on the knowledge of the teacher on the developmental stages of the learner and the principles of learning.

5. Ethical Issues in evaluation of learning

Evaluation is an important component in the teaching-learning process. It is used to determine the extent to which the objectives are being or have been achieved (Tyler, 1949). The terms 'are being' and 'have been' imply that it is a continuous process throughout the instructional process. Evaluation therefore can take place before teaching-learning begins to diagnose and identify specific learning needs of the learners and their entry behaviour in order to determine appropriate instruction (Otunga *et al*., 2011). Is what the schools currently refer as 'the opener' serving this purpose? The content of the items in the test would indicate this. During the teaching-learning process, teachers constantly check the progress of the learners thus formative evaluation through tests commonly referred to as CATs (Continuous Assessment Tests), quizzes, observation, and assignments among others. Summative evaluation comes at the end of the course to determine the effectiveness of the teaching learning process and the programme of instruction. In Kenya, this is in form of national examinations such as KCPE and KCSE. The ethical dilemma comes in when the examinations are over-emphasized at the expense of learning. Research has indicated that in Kenya what is taught is determined by what is examined Boit (2010) so that teachers tend to ignore aspects of learning that are stipulated in the curriculum if they are not examined (Boit, Njoki, & Chang'ach, 2012).

Moreover, according to Otunga *et al.* (2011), there is a lot of controversy surrounding such standardised testing because much of the time it involves comparing one student and another notwithstanding individual differences among the learners in terms of their individual potential and attitude. They cite Scriven (1991) who, questioning the credibility of evaluation when a year's work is summarised into a grade, considers it a kind of crime. This they note has a debilitating effect on the curriculum because as explained by Madaus (1998) whom they cite, it influences teachers' actions who tend to teach to the test at the expense of the educational experience and society tends to treat test results as a major goal of schooling. This therefore leads to an examination-oriented curriculum which has been witnessed in our Kenyan society (ROK, 2012).

When examination results are over-emphasised in the society, failure is abhorred by all those who are involved. According to Peterson (2005), the classroom becomes a breeding ground for misperceptions, fears, real or imagined, and inequities where high-stakes tests do just what the label implies: raise the stakes. Thus, they contribute to the distrust, anxiety, and psychological stresses of students. Teachers however understand the emotional state of the learner can impact on educational performance. If a learner is frightened perhaps of failure or reprisals, transfer of information to the long-term memory stops and long-term learning is prevented (Burton & Bartlett, 2006). Yet the teacher on the other hand according to Peterson (2005) may feel torn between the expectations of students and the expectations of the organizers who institute curriculum and testing procedures, not to mention the fact that he or she will also be tested and evaluated by both. It becomes a question of ethics. If we charge the teacher with the responsibility of being a "moral leader" and truly educating students, we are holding teachers to a double standard unless we clearly define for the teacher the morality of the institution. The double standard exists, however, regardless of whether the teacher is indeed charged as a "moral leader" hence the ethical dilemma. Nevertheless Otunga *et al*. (2011, p. 134) note that:

> *Because of this morbid fear of failure in examinations, students and even teachers often go to extremes, some blatantly unethical,*

immorality, and the general impact is travesty of the entire purpose of education.

This however does not negate the importance of evaluation if properly administered. Thus, the above authors cite Scriven (1991) that in ethical terms, considers evaluation a key tool in the service of justice and Skilbeck (1990) that essential knowledge, and skills must not only be taught but must be learned.

6. Conclusions and Recommendations

However well a curriculum is designed, its implementation is paramount. It is the actual teaching and learning process which will portray the quality and effectiveness of the planned curriculum in meeting the national goals of education. The complexity of the teachers' tasks and the demands and expectations by the society leads to moral and ethical issues which have implications for the teacher education institutions. Teacher training has been a single event which may not be adequate in grounding the teacher in the expectations of the profession. In this regard therefore, it is high time that teacher education institutions should consider developing follow-up activities to ensure that the novice lives up to the expectations of the profession. In this sense teachers will act as what Rao (2010) refers to as trailblazers in the lives of learners and in the process of education for development.

Teacher education curriculum should be enhanced to include more experiential learning and contact with the classroom and the whole school environment during training, with the view of identifying the ethical dilemmas in the schools. These can form a source of content for deliberations on possible solutions. If the planned, the experienced and the evaluated curriculum are to be in line with professional expectations of the teacher, then there should be more involvement of teacher education institutions in curriculum development and evaluation through collaboration with KICD and KNEC. Moreover, teacher education institutions should consider developing more contact with schools through programmes that will give opportunities to practicing teachers to update their knowledge and skills and maintain a positive attitude and commitment to the profession.

There should be more emphasis on professional ethics in the teacher education curriculum to curb the ethical dilemmas in the field. In fact there should be a stand-alone course in all teacher education institutions whereby the teacher trainees are taken through what Githui (2013) refers to as 'progressive phases of ethical thinking and orientation'. The teacher education institutions should reach out to the society through various forums to raise awareness on what education is so us to reduce unethical pressures on the teacher. Untrained teachers should be completely done away with in both public and private schools considering that there are many trained teachers who are unemployed. Moreover, managing of institutions of learning should be entrusted to people who have made a study of education in their careers. If these suggestions are put in place, the current stresses experienced in the schools affecting both the students and teachers and the society at large will be alleviated hence promoting human development through education.

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The Impact of Plantation Farming on the Biodiversity and Ecosystem Sustainability in Kenya

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Abstract

Contemporarily, agricultural suitability is measured by the level of profitability a land use system has with an unintended or intended disregard to the system's sustainability or the direct and indirect impacts a land use effects on the land resource. The global land resource is a habitat of a rich biodiversity of organisms coexisting in an ecosystem. Among and within these ecosystems exists rich (both complex and non-complex) interactions that at a global view results in a balance that ensure environmental sustainability and resource replication. However, the contemporary evaluation of agricultural sustainability cited above has been an emerging issue in the global environmental sustainability. In the recursive quest of land users to improve their land productivity and profitability, both the land biodiversity and its ecosystem sustainability and balance is destabilized and consequently destroyed. This paper focuses specifically on plantation farming in Kenya. It discusses both the positive and negative effects the land use practice has on land with special emphasis on land's biodiversity and sustainability. The short-run and long-run hazards of plantation farming to the environmental and the socio-economic livelihood of practicing households are also contained herein. Finally, a sustainable recommendation on a paradigm that can be both ecologically and economically sustainable has been proposed and recommended to offset the negative intended and unintended consequences that the practice result in for the betterment of livelihood.

Keywords: *Agriculture, Biodiversity, Ecosystem, Farming, Livelihood, Plantation, Sustainability.*

1. Introduction

The first and the second sustainable development goals respectively are ending poverty and ending hunger (UNDP, 2015). Both goals can be efficiently attained through increasing and promoting agricultural activities globally. However, in the individual and collective quest to achieve these two goals, negative initially

unintended consequences arise that become a detriment to the fulfilment of some of the remaining fifteen goals.

As an explanation, improved agricultural activities means improved output production. Improved output production can translate to sustainable availability of food to end hunger regionally and globally. The action of ending hunger can have positive consequences of reducing poverty or eradicating it in its entirety through the commercial trading and exchange of food produced in surplus. However, while achieving food security and eradicating poverty, most human activities impact negatively on the environment. For example, increased agricultural activities means increased strain on soil leading to poor and underproductive soils. This also means that there is rampant excision of natural and fragile environments' land and conversion of it into agricultural land that has its specific consequences captured by several organizations, including the United Nation (UNESCO, 1996, pp. 23-35).

Increased riparian agricultural activities pollute the water quality destroying riparian and maritime ecosystems and initiate landscape changes altering the flow of rivers and consequently destroying conventional water resources especially downstream. When all these unintended consequences of attempting to achieve the first two of the sustainable development goals occur, a hindrance to the achievement of at least five other UNDP sustainable development goals is developed. Some of the affected goals include good health and well-being (goal 3); clean water and sanitation (goal 6); climate action (goal 13) and Life below water and land (goals 15&16). This situation can be inferred from a report UN (2016) on the SDGs where the global population suffering from hunger decreased by 4% whereas the water sources and forest resources destruction increased.

There is a subtle disconnect between the intention of the sustainable development goals and the means of their ultimate achievement. This disconnect, and dilemma can be well captured by a paper on sustainable resource management Popp and Hoag (1998) as follows:

> *When attempting to sustain natural resources, we find ourselves in a predicament: we want to attain it but cannot agree on what*

"sustainability" is or how to achieve it. This dilemma is not trivial, for society has fixed endowment of natural resources and the consequences of miscalculations to current and future generation could be severe.

There are several agricultural activities and their unintended consequences, this paper however focuses on plantation farming and scopes it to the Kenyan status quo of the practice. Plantation farming is the general large-scale and widespread growing of a particular crop. As opposed to small scale agriculture, plantation crops most of the time have readily and complexly extensive available marketing and incentives to the network participants. Stakeholders can access a wide support base, centralized management and systemized marketing.

This availability of sure and established market makes plantation agriculture transcend the contemporary small-scale agriculture. In this respect therefore, if a new factory is established for example that creates demand for tea, most or almost all land owners would do away with most other land-uses they initially had to pave way for tea growing. One landowner would emulate the neighbour and the snowball effect of this emulation would lead to an entire community adopting and converting their total attention towards the plantation crop or prioritizing the crop over other crops. In the long run, a community or a locality that initially depended on an assortment of crops, animals and trees finds itself at the complete mercy and dependence of one crop. The impact of this dependence in Kenya is the main discussion of this paper. The different plantations that are dominant and their subsequent effect on the environmental biodiversity and ecosystem are discussed also discussed herein.

2. Plantation Farming in Kenya

Before discussing the effect that plantation farming has on the biodiversity and ecosystem in Kenya, it is important to first discuss the various major plantation farming activities in Kenya. Plantation farming can be generally divided into two main categories of interest that are tree plantations, and other crops plantation. In Kenya, both the categories exist. There are large-scale plantations of both trees and crops. The dominance that a given plantation tree or crop exhibit can be based on several factors that include (i) the agro-ecological zone, (ii) the climate, (iii) the socio-

cultural beliefs and practices (iv) government policy and (v) market availability. Different tree and crop species are grown in different regions of Kenya. For example, maize and sugarcane in the Western and Nyanza regions, tea in the South Rift and Central Kenya regions, palms and cashew nuts in the coastal regions and rice some parts of Nyanza and Central region. According to a survey on the Kenyan demography KNBS (2014, p. 1), only 20% of the total 582,646 square kilometres land area of the country is arable. The remaining 80% is dry and incapable of supporting sustainable agriculture. The total forest cover by 1995 was estimated by the IUCN to be at 0.0304 square kilometres Wass (1995) and has rapidly diminished since then. This phenomena that can be attributed to population pressure on natural resources, natural disasters and unfavourable climatic conditions.

In 2004, a response to the Economic Recovery Strategy (ERS) gave rise to the Strategy for Revitalizing. Agriculture (SRA) that had a vision of transforming Kenya's agriculture into "a profitable, commercially oriented and internationally and regionally competitive economic activity that provides high quality, gainful employment to Kenyans". This can be inferred to mean that there was going to be increased promotion of agriculture at plantation farming level. In Kenya, plantation farming is largely influenced by the regional climate and industry formation. The key plantation crops according to a government report Government of Kenya (2010) are tea, coffee, sugar cane, cotton, sunflower, pyrethrum, barley, tobacco, sisal, coconut and bixa. It has been estimated that they contribute to up to 55% of the agricultural export. Cut flowers, vegetables, fruits, nuts, herbs and spices are also grown in large-scale.

3. Biodiversity and Ecosystem Sustainability

To understand why it is important to determine the effect of plantation farming on the biodiversity and ecosystem sustainability, the terms themselves must be discussed first. Biodiversity can be loosely defined as the total richness in terms of ecosystem variability, species composition and the genetic variation within the species themselves or the variety and array of life on earth. Biodiversity can be studied or discussed from three different levels that are the genetic, the species and the ecosystem level. In this respect, biodiversity is normally measured by getting the

total number of species with specific genetic and environmental characteristics in a given ecosystem.

An ecosystem can then be loosely termed as a system that incorporates the biodiversity and the interaction between the species in the biodiversity and their environment. In his paper on stability of ecological systems, Holling (1973) introduces his argument of the different views of life on earth. One being that living things live die and become extinct and the other being ecosystem balance view of things. The global environment is made up of a variety of fungi, bacteria, plants and animals of different sizes, forms and habits in different habitats. In these varying habitats, chemical, physical and biological interactions take place resulting to closed or open interaction systems called ecosystems. In this regard therefore, there can be a variety of ecosystems that include tundra, marine, desert, grassland and forest ecosystem. Theoretically, every place around the globe can be analysed into an ecosystem with the interacting species connected in terms of the negative or positive effects from their mutual contact. Ecosystem sustainability is when the interacting organisms and their chemical, physical and biological interaction do not cause a system imbalance. For a balanced ecosystem, imbalances can be caused by a number of factors that include habitat change, invasion of alien species, overexploitation and nutrient loading or pollution (GreenFacts, 2016). An assessment groups the causes under five main categories that are demographic, economic, socio-political, cultural and religious, and scientific and technological (Millenium Ecosystem Assessment, 2005).

4. Importance of Biodiversity and Ecosystem Sustainability

So why is the biodiversity and ecosystem sustainability important? Scientifically, the world and its resources has been around for millions of years. Human beings in their current form have hardly existed 300,000 years. Some of these resources and features are of absolute importance for the survival of living organisms with human beings included. Some of these resources are in abundance and others have limited availability. The ones in abundance raise no alarm for conservation need. However, the limited availability resources require time to time conservation activities.

Because almost all human activities depend on the global naturally available resources, both their present and future availability must be ensured. This need to ensure the availability of global resources for future utility while exploiting their capability for present utility leads to the need for sustainable management of these global resources. The eminent future extinction of these resources negates specific environmental aspects that were primal dependencies on the availability of the resource. For example, when a waterbody dries off, all the marine organisms that existed in the waterbody cease to exist. If an entire forest is destroyed, all the wild animals get destroyed along with the forest. Keeping both the waterbodies and forests in their best possible state in this case for instance would have ensured that both the maritime and forest ecosystem is conserved. This is a glimpse of sustainability in its skeletal view.

At a 'creators view of things', all living things should have an equal claim to the global resources and their benefits. This in turn means that all living things whether plants, fungi or animals have a share or niche in the global balance of life and hence the biodiversity. The richer the biodiversity of a given environment, the more the resilience the environment has against both local and foreign factors changes (referred to as stresses). Biodiversity therefore enhances ecosystem sustainability and at the same time, a sustained ecosystem ensures that there is sustained biodiversity. It is the biodiversity that creates an ecosystem and it is the sustainability and balance of this ecosystem that ensures the future existence of both the ecosystem and its biodiversity.

5. The Impact on Biodiversity

Every naturally occurring environment is a habitat for several lifeforms. There are insects, birds, mammals, plants and other organisms. As explained above, some of the factors that can cause an imbalance in an ecosystem and destroy biodiversity include habitat change, invasion of alien species, overexploitation and nutrient loading or pollution (GreenFacts, 2016). Plantation farming can facilitate the occurrence of all these factors. This section shall explain this facilitation with examples from the practice in Kenya.

First, plantation farming causes an abrupt change on the naturally occurring habitat. Unlike small scale farming whose habitat change effect is sometimes gradual and unnoticeable, plantation farming reforms and restructures the entire habitat in terms of nutrients availability, sunlight access, food resources availability, water resources availability, soil characteristics, plants species composition and animal species composition. For instance, in Western Kenya, the sudden introduction of sugar companies led to the widespread growing of sugarcane in vast acreages. In a locality like Mumias, Butali, Lugari and their environs, landowners rapidly shifted from other forms of agriculture into sugarcane plantation farming or incorporated sugarcane sections in their farms. Even though the economic benefits can be in the short run regarded as superior and justifiable, let us also give regards to the habitat change effects induced.

Sugarcane in Western Kenya normally takes 24 months to be factory ready. During land preparation, all other plants are ploughed away. Theoretically, in an acre of land under mixed farming, one can expect to find at least ten different species of plants. If it is an acre of a naturally occurring ecosystem like a forest, an acre might consist hundreds of different species of plants. Ploughing around 10 acres therefore in preparation for sugarcane growing already destroys a very large diversity of plants. Sometimes chemicals are used to kill the grasses and other vegetation on the land to save time. What these chemicals do apart from serving their purpose is that they kill insects and other small animals along with the weeds. That is already a large diversity of insects, reptiles and other small animals lost.

It is not likely that farmers can intercrop sugarcane with any other crops or trees. The only common intercropping witnessed is either the growing maize between sugarcane rows in the first few months of the plantation establishment or beans in the place of maize or both beans and maize. The rest of the months is continuous weeding and some nutrients addition through fertilization. It is also likely that trees and other shrubs that had naturally established within the sugarcane plantation end up getting cut down. This in the long run might lead to desertification or other forms of habitat change and a destruction of the biodiversity.

An established plantation of sugarcane can be harvested at least thrice before there is need to replace the old plantation with a new one. This means that the sugarcane species will dominantly exist and be selected over all other crops for at least five years before replacement with other crops or a fresh stand of the same. This will slowly lead to the extinction of these other forms of vegetation in such a locality. Eventually, a locality that had a thousand-different species of plants, animals and other organisms ends up having barely a 10% of the original species composition.

Plantation farming is a human activity that facilitates and catalyses the invasion of specie or species of plants in places the species would naturally not have been invasive. This catalysed invasion further kills biodiversity. For example, the large-scale growing of pyrethrum in Elgeyo Marakwet and parts of Nandi County in Kenya leads to the killing of insects like bees and butterflies and other animals like fish in water bodies. Pyrethrum produces poisonous pyrethrin that when poorly handled can lead to a serious destruction of biodiversity.

The large-scale growing of tea in Kericho and Limuru despite having many economic and environmental benefits has also caused a catalysed invasion of the species in the two counties. Tea takes about five years to be established and might be picked thereafter for even up to 100 years. During this period, tea forms a thick closed canopy that blocks sunlight from reaching plants and other organisms below the canopy. The tea bushes' leaves also contain toxins that when dropped inhibit the growth of plants below the canopy. This enables tea bushes to outcompete and eventually eliminate other plants in their established plantation destroying a large diversity of these competing plants.

The practiced cloning of tea seedlings by major companies like James Finlay's and Unilever in Kericho paves way to genetic erosion by multiplying one variety of the tea species and supplying it to the entire county. The greatest risk in this practice can be witnessed when the resistance to pests, diseases and other environmental stresses comes into play. The vegetation cover of the entire county might be wiped out in an instant due to the monogenetic composition that cloning in plantation farming brings about.

Moreover, plantation farming encourages the overexploitation of natural resources. In the process of overexploitation, the naturally occurring vegetation rich in biodiversity is replaced with large-scale monogenetic single crop plantations. For example, plantation forestry done by most companies like Tim sales in Elburgon (Nakuru County) that rely on timber as part of their raw material tends to replace naturally occurring forest sections with fast growing timber trees like *Eucalyptus sp., Mellia volkensii, Pinus sp.* and *Grevillea robusta*. When closely analysed, apart from altering the habitat this practice poses a future threat of causing extinction to other plants and animal species in the habitat. Eucalypts for example have toxins in their leaves that inhibits other plants from growing below their canopy. Their negative effect on waterbodies can cause drying out of rivers and the loss of the fish, reptile and insect species that rely on the rivers for their survival.

The swampy conditions under which rice plantation thrive in are a hindrance to the thriving of several other organisms in a given habitat. In Ahero, Nyanza County, the land must be prepared with paddocks. Rice growers should condition their farms into artificial flooding through the creation of water channels throughout the farmland. All the plants, animals and other organisms that cannot thrive in these conditions die. This leads to a loss in biodiversity.

Plantation farming also cause direct and indirect pollution to the environment. For example, the large-scale growing of maize in Kitale and other parts of Western Kenya require a substantial amount of nutrients addition to increase productivity. This is done through the addition of DAP and CN to the soil. Most maize farmers do not carry out a soil nutrients analysis before deciding the exact deficiency a given soil suffers from. This leads to year in and out addition of the same nutrients to the soil. Beans growing in the same region require the use of pesticides that are harmful to an unintended diversity of insects and even birds. Sometimes these nutrients and pesticides finds their way into waterbodies like rivers and cause eutrophication and the destruction of marine life. The real impact of plantation farming on water bodies can be best inferred from a report on Latrobe catchment, Mossop *et al*. (2013) that analyses not only the stream flow but also the sediment chemistry and toxicology.

It is common in Kenya to find wild animals leaving the forests and destroying crops and plantations of farmlands. For example, Monkeys leave the Kakamega forest in Western Kenya and wanders into maize plantations causing destruction and eventual losses. This can be theoretically attributed to quite several reasons. One of the reasons include the fact that human activities have gradually encroached the wildlife habitats and reduced or destroyed the wildlife's naturally occurring food sources. Plantation farming is one of the key contributor of encroachment. The Mau Forest Complex in Kericho for example has faced serious encroachment through tea plantation farming. There are quite several other direct and indirect effect that plantation farming, but this paper only sorts out to narrow down and tackle the.

6. The Impact on Ecosystem Sustainability

There have already been several scholarly works that have related ecosystem sustainability with biodiversity. For example, Loreau and De Mazancourt (2013) have used models to show the dependency between biodiversity and ecosystem sustainability. Experiments by scientists like Tilman, Reich, and Knops (2006) have also already been done on the same. For a sustainable ecosystem, most of the ecosystem's components like its topography and biodiversity should be in a relative balance. This means therefore that all the effect that plantation farming has on the biodiversity discussed in the previous section also results into a disturbed ecosystem functionality, balance and sustainability.

However, there are scenarios when the biodiversity of an ecosystem is impacted upon without necessarily affecting the sustainability of the ecosystem. This is especially true when the overall effect on the biodiversity is small or when the ecological niche or functions of the affected species can be easily replaced by other species in the ecosystem. What this means is that you can wipe away a given tree species, for *Prunus africana*, from a naturally occurring forest without affection the overall function, balance and sustainability of the forest. A disease that targets the tree species therefore cannot end up destroying the entire forest. But what if the forest is only composed of *Prunus africana*? A disease that target the tree would wipe out the entire forest together with its functionality, balance and sustainability. This is theoretically the risk that plantation farming cause at any given time.

Sustainability as already discussed implies the usefulness of the present while guaranteeing future usefulness. A forest ecosystem for example should be able to provide enough wood and non-wood products and services for the present utility without impacting the future availability in quantity and quality of the same products and services. There have been several historical perspective on sustainability especially of the biodiversity, some of which have been discussed by an article entitled 'The diversity–stability debate'(McCann, 2000, p. 228).

Plantation farming alters the ecosystem's functionality that causes a change in the system's balance that eventually renders the system unsustainable. Large-scale irrigation farming for example in parts of Marigat, Baringo County has caused high salinization of the soil and rendered land incapable of supporting plant life. Diverting rivers into farmlands for easier irrigation in the county has also caused the rivers to change their path impacting on the sustainability of the rivers. This large-scale irrigation has also caused the drying out of these rivers.

Sugarcane growing in Muhoroni and other parts of Nyanza and Western region has triggered the replacement of other vegetation like trees with sugarcane. Because sugarcane belongs to the grass family (genus Saccharum), the ecosystem functions that the replaced vegetation played are lost. For example, the shading functionality of trees is lost. The flowers that supported insects like bees and butterflies are destroyed. The timber and firewood sources are reduced. The water catchment areas protection through buffer zones and water purification functionality of the ecosystem are lost.

If one analyses the unintended effects carefully, it can be realized that plantation farming adjacent to forest resources or reserves leads to the destruction of forests. This can be explained by the fact that landowners prefer to occupy all their land with a plantation crop (e.g. tea or coffee) to ensure maximum profit. In so doing, they fail to set aside land for animal grazing and trees for timber and firewood. This causes the plantation farmers to wander into forest reserves in search for pastureland, firewood and timber. This with time causes the destruction of the forests.

Plantation farming activities in fragile ecosystems like slopes have caused landscape changes that have destroyed the ecosystems' sustainability. The big gulley's that erosion has created in Marigat can be cited as evidence for this. All the fertility of the soil is deposited down the slope. This renders the land above the slope poor in nutrients with a sandy texture or bare and rocky. Once this occurs, the land above the slope can hardly support any form of vegetation while the vegetation below the slope is covered to death by the soil deposit from above the slope. These deposits can block streams or change the path a given river follows causing a destruction of the ecosystems down the stream's initial path and the stream's new path.

7. A Sustainable Approach

One of the challenges that environmental conservationist face in Kenya is the inability for most people to develop the system thinking where one views the connection between human practices, the environment in which the practices are being carried out and the impact of the practices on their direct environment and the global environment. Someone cuts just one tree from a privately-owned farm and even though both the farm and the tree are privately owned, the environment is not. Both the privately-owned land and the tree are part of a big global system. A simple individual and isolated action of cutting just one tree in Kenya affect the population of trees globally. If a factory released its effluent into the ocean and assumes that the ocean is too big to notice the poison, it is only a matter of time until the whole ocean is poisoned.

Human activities and their wider environmental impact are most of the times viewed as disconnected and unrelated. That is why a farmer who owns one acre of sugarcane for example cannot see the general contribution that the one acre has on the entire locality or County. A thousand unrelated farmers each owning one acre of sugarcane pool into a thousand acres of land under sugarcane. If each farmer out of the one thousand innocently cut down one tree to make way for sugarcane plantation, one thousand trees cease to exist. This translates into destroying over one acre of trees had such cutting down been done on the same piece of land or a forest.

A sustainable approach therefore can best be arrived at when landowners develop the system kind of thinking. There should be proper sensitization of the fragile but interconnected nature of the environment. A proper assessment of both short run and long run impacts must be done and the report of these assessments be taken seriously. As commonly observed, a new factory becomes established at a given locality that requires certain raw materials (for example pyrethrum). The attractiveness of the readily available market created by the established factory heavily outweigh the environmental risks and negative impacts that large-scale growing of the pyrethrum leads to. Eventually, the environment together with its ecosystem functions and biodiversity is destroyed and it is too late to reclaim it to its primal quantity and quality.

Relevant government departments should lay down proper policies that anticipate the impact of plantation farming on different ecosystems. There is already environmental impact assessment to help in policing such a strategy. However, it is very difficult to ensure that all the land use practices on privately owned lands follow the principles of sustainability and environmentally friendly approaches. This thus calls to more environmental extensions to outline the negative impacts of plantation farming on the biodiversity and ecosystem sustainability.

Alternative modifications of conventional plantation farming should be adapted to various plantation and their adoptability promoted. For instance, there should be more trees introduced in tea plantation. The trees should compose of different species, unlike the common Grevilea sp. commonly incorporated in Kericho County. Plantation crop combination should be encouraged to break the monogenetic characteristics of plantation farms. Hedgerow planting should be incorporated in plantation farms where a rich diversity of plants can be zoned within hedges on plantation farms. There should be a rich diversity of plants on farm boundaries. These boundaries can be used as a kind of ex-situ plants conservation where unique plant species can be transplanted from the plantation farms to farm boundaries to prevent their extinction.

The most important rule of plantation farming should be careful zonation. It is wrong to think that plantation farms can be more sustainable when zoned in the most environmentally friendly areas like the forests. This is a poor definition of sustainability that only incorporates financial sustainability. The long run of this kind of thinking is desertification and irreversible climate change. Plantation farms should specifically be zoned away from fragile ecosystems like rivers, slopes, swamps and even forests.

8. Conclusion

Human activity is one of the major destruction catalyst for biodiversity and ecosystem sustainability. The human problem-solving technique rely upon getting solution to already developed problems. It is most of the time quite unlikely to see mitigations for anticipatable problems. That is why forest conservation only becomes a cause for alarm and policy making when the forest in question has already been destroyed beyond reclamation. That is also why white rhinoceros only become a global topic when their global population diminishes to a few hundreds. Although plantation farming has many socio-economic and environmental benefits, when overexploited or poorly practiced can pose a serious extinction threat to local and global biodiversity. It can also cause irreversible habitat changes and ecosystem imbalances through changing of ecosystem functions in a given environment. This paper has listed some of these effects and suggested a sustainable approach to the practice.

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Cultural Uses of Chepalungu Forest, Kenya: Case of Priority Tree Species for Traditional Medicine

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Abstract

Forest resources are part and parcel of human life. The wood, bark, leaves, fruits, seeds and roots of trees yield food, fodder, shelter, medicine, fibre, resin, oils and other numerous products used for subsistence of people living adjacent to the forest. Natural forests in Kenya are facing immense pressure from a growing human population. In recent past, there has been rapid depletion of Chepalungu forest cover. A study was conducted to identify highly valued trees for traditional medicine by the communities living adjacent to Chepalungu forest, Bomet County in Kenya, based on sustainable development strategy of forest resources. The study was carried out among communities living adjacent to Chepalungu forest. Study sites were four locations (Bing'wa, Siongiroi, Ndanai, and Abosi) in the two forest blocks. Thirteen elderly members were identified and interviewed; seven around Kapchumbe and six around Siongiroi blocks. Six tree species (*Prunus africana, Olea Africana*, *Podocarpus latifolius*, *Warbugia ugandensis*, *Ekebergia capensis*, and *Syzgium guineese)* were identified for being highly valued for their medicinal uses. The mostly used tree parts for medicinal purposes include bark, leaf, fruits and roots. *Warbugia ugandensis* is the widely used medicinal tree in the area and on average each herbalist extracts 17.0 Kg of bark of the tree species identified per month. These tree species are used to treat various ailments including cancer, prostrate hypertrophy, stomach-ache, diarrhoea, fever, high blood pressure and STIs. The study revealed high cultural dependence of people on the Chepalungu forest ecosystem. This calls for multidisciplinary approach to enhance participatory forest conservation.

Keywords: *Chepalungu forest, Cultural dependence, Multiple uses, Non-wood forest produce.*

1. Introduction

Globally, over 1.6 billion people depend on forests to varying degrees for food, fuel, livestock grazing and medicine among other livelihood improvement products and services (Chao, 2012). Over 200 million indigenous people living either in the forest or less than 5 km from the forest edge depends entirely on forest resources (Chao, 2012). Due to increasing human population and high dependence on existing forest resources, forests are being depleted and the supply of future forest products including Non-Timber Forest Products (NTFP) is becoming uncertain (Lynser & Tiwari, 2015). NTFPs constitute a critical component of forest resources and play critical role in enhancing food security and family income among poor households especially in developing countries (Khanal, 2006; Vinceti et al., 2013). In Kenya, tropical forests like Kakamega Rain Forest provide various types of NTFPs that sustains people's livelihoods (Kiplagat, Mugendi, & Mburu, 2007).

Among NTFPs harvested in forests, many medicinal tree and shrub species are used in treating various diseases and symptoms (Furukawa, Kiboi, Mutiso, & Fujiwara, 2016). Over 70,000 medicinal tree and shrub species have been documented worldwide (Langford, 2013). In addition, there are about 120 plant derived drugs on the Kenyan Market; three quarters of such drugs are derived from traditional medicinal plants (Furukawa *et al.*, 2016). In Mwingi District, Njoroge, Kaibui, Njenga, and Odhiambo (2010) identified 28 tree species that were highly recognized as medicinal plants for human health. In Kakamega forest, Otieno and Analo (2012) identified 40 medicinal plant species that were highly prioritized in Kakamega area.

The use of traditional herbal medicine in Kenya is on the increase with over 90% of the Kenyan population using medicinal plants at least once to treat various health conditions (Njoroge *et al.*, 2010; Otieno & Analo, 2012). This number is much higher as compared to the average of 80% to 84% of the population in developing countries and local people in Peru who have at least used traditional medicinal plants (Bussmann, Sharon, & Lopez, 2007). In early 1990s, traditional medicine was mainly used in rural areas to support the healthcare needs of most vulnerable and poor people. However, the trend has been changing as the product is gaining market in urban areas (Furukawa *et al.*, 2016). The trend indicates that the market base

Traditional plant medicine is most preferred especially in rural areas because of its low prices, availability, natural origin without risk or harms when used and cultural preferences as compared to modern medicine (Bussmann *et al*., 2007; Furukawa *et al*., 2016; Otieno & Analo, 2012).

Unfortunately, Kumar, Sheikh, and Bussmann (2011); Bussmann et al. (2007) and Njoroge *et al*. (2010) indicated that at the current unsuitable harvesting rates, about 33.3% of medicinal plant species could be extinct especially in India, China, Nepal, Uganda, Tanzania and Kenya. Such extinction will greatly affect the biodiversity of most forests because harvesting of medicinal plant materials is selective in nature, as some species and tree parts are more preferred than others (Furukawa *et al*., 2016; Kokwaro, 1993). For instance, in Kenya, *Prunus africana* is the most preferred tree species Njoroge *et al*. (2010), and bark is the most preferred tree part (Furukawa *et al*., 2016). In addition, harvesting tend to concentrate on certain bark qualities or sizes.

In Bomet County, the biodiversity of various forests including Chepalungu Forest Reserve are under threat as most indigenous trees have been cut down for medicinal purposes (County Government of Bomet, 2013). Therefore, without proper interventions, medicinal tree and shrub species may be extinct or rendered endangered, which may not only affect the forest biodiversity, but also the wellbeing of the entire local community that depends on traditional forest for medication. Bomet County is willing to implement the promotion, propagation and planting of medicinal tree and shrub species in private farm lands, protected areas such as schools and other public institutions as well as on public lands (County Government of Bomet, 2013). For successful implementation of such intervention, there is need to document medicinal plants that are highly prioritized by the local people (Njoroge *et al.*, 2010). This will ensure that appropriate plant species are promoted, propagated and planted. This paper reports finding of a study designed to determine tree species that are highly prioritized for medicinal use by the local community living around Chepalungu Forest, Bomet County. The study also sought to determine the plant parts that are highly concentrated on during harvesting; determine the average quantities harvested per month and potential ailments that are treated by the identified species.

2. Materials and Methods

2.1 Study area

Chepalungu Forest lies on latitude 00° 53' 00'' S and longitude 35° 10' 00'' E. it is administratively divided into two management blocks, Kapchumbe (in the South-West) and Siongiroi (in the North-East) (Figure 1). The area has medium to long cropping season followed by a medium to short one and intermediate rains. The mean annual rainfall is 1200 mm – 1350 mm, and evenly distributed except in January and February which receives short dry seasons (County Government of Bomet, 2013). April and May are considered as the wettest month in the region. Altitude in the area ranges from 1550 m to 2000 m above the sea level. The higher altitudes especially in the North Eastern parts of the area are suitable for tea and dairy farming. In the middle parts between the two sections of Chepalungu forest, the lands are suitable for coffee, pyrethrum, and maize farming though tea farming is also present (County Government of Bomet, 2013). Maize and marginal coffee crops are the main crops in the lower area which occupies almost 18.72 Km² of the agricultural land (Jaetzold, Hornetz, & Shisanya, 2010). The mean annual temperature ranges from 17.9°C – 20.5°C, with between February and April considered as the coldest months, while December and January considered as the hottest months. According to County Government of Bomet (2013), a large part of the area is characterised by undulating topography that that gives way to flatter terrain in the south.
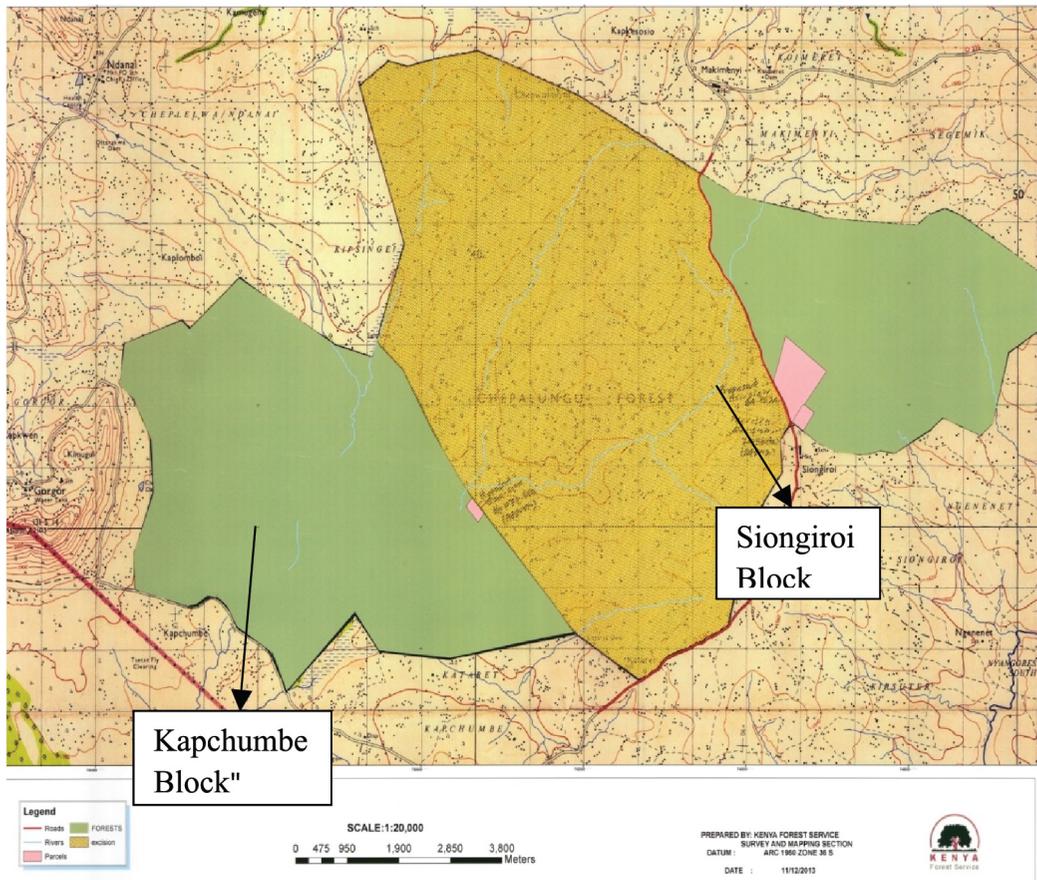
Figure 1: Study sites (The Two Blocks) of Chepalungu Forest

(Source: KFS, 2003)

The soils are predominantly loamy black cotton soils. However, there are presences of volcanic, igneous and metamorphic rocks. Kapchumbe and Siongiroi blocks of Chepalungu forest are adjoined by six settlement Locations. These locations are Abosi, Bingwa, Siongiroi, Makimenyi, Ndanai and Kongasis. The region is mainly occupied by the Kaleinjin community, which is one of the prominently known communities for its knowledge in medicinal plants (Kipkore, Wanjohi, Rono, & Kigen, 2014). These locations have a total of 80,673 persons occupying approximately 15,849 households (Langat, Sigu, Wanyondu, and Bii 2002; Ministry of Agriculture, 2010). The rapid population growth has been exerting pressure on the existing resources including natural resource and limiting provision of services. According to County Government of Bomet (2013), a large proportion of the population in the area is not

in gainful employment as most of them are in the *Jua Kali* sector.

2.2 Sampling Strategy

Stratified random sampling technique was used to divide the study area into two blocks; Kapchumbe Block and Siongiroi Block. This was important to ensure that respondents from the two sections of the forest (in the South-West and in the North-East) were included in the study to enhance population representation. In each block, snow ball sampling technique was used in selecting the research participants. According to Goodman (1961), snow ball sampling is where the existing participants help the researcher to identify other participants or refer the researcher to other participants that he/she is aware of. This is very important in selecting a hidden population that is difficult to be accessed by the researcher. In this case, finding renowned and old aged traditional medicine men and women was not easy. Therefore, the researchers consulted the area Chief and requested to be led to a prominent herbalist or people knowledgeable in traditional medicinal plants. After identifying the first respondents, the researchers then asked him/her to direct them to the prominent herbalist that he/she is aware of in the area. The process continued until the all prominent herbalist in the area were exhausted. However, for one to be included in the study, he or she must have been 50 years and above at the time of research and must have stayed in the area for more than 20 years. This was important because according to Badshah and Hussain (2011), most indigenous knowledge about traditional medicine in most third world countries is possessed by elderly members of the society. Based on this criterion, a total of 13 respondents were identified, seven around Kapchumbe block, and six around Siongiroi block.

2.3 Data collection

Structured questionnaire (Appendix I) was administered to key informants through field excursion face-to-face interviews. The questionnaire contained both closed ended and open-ended questions. In administering the questionnaire, the researchers selected an interpreter by the help of the area chief. The interpreter's role was to translate the information from English to Kaleinjin, and then from Kaleinjin to English. As a specialist in Forestry (Monica), part of the research team provided the scientific and common names for each species identified. Before commencing data collection, the respondents were informed on the topic of the study, the purpose

of the study, and the possible uses of data collected. The respondents were also requested to participate in the study voluntarily without any coercion.

2.4 Data analysis

The collected data as recommended by Corder and Foreman (2014) was subjected to Non-parametric analysis tests because the collected data was not drawn from a given probability distribution. Therefore, Chi-square goodness of fit test was used to test whether there were significant differences in the number or frequencies that the highly prioritized medicinal plant species were cited by the respondents. Kruskal-Wallis test was used to test whether the quantities of medicinal products obtained from different species, and from different plant parts were significantly different. In case of significant differences, pair-wise analysis using Mann-Whitney U test was conducted to differentiate the exact plant species and plant parts that were experiencing significant differences.

3. Results and Discussions

### 3.1 Highly prioritized plant species for traditional medicine

The study identified 6 species that were recognized as highly prioritized traditional medicinal plants for treating human ailments. The six species were *Prunus africana, Olea Africana*, *Podocarpus latifolius*, *Warbugia ugandensis*, *Ekebergia capensis*, and *Syzygium guineese,* with their local, common and scientific names in Table 1.

Local Name	Common Names	Scientific name
Tendwet	Red stinkwood/Iron wood/Bitter almond	*Prunus africana*
Emidit	Brown olive/wild olive/Indian olive/African wild olive/ Olive	*Olea africana*
Saptet	Podo/Smooth-barked/yellow-wood/Oteninqua yellow wood/ East African yellow wood	*Podocarpus latifolius*
Soget	E.A greenheart/Pepper-bark tree/Kenya greenheart/ E.A greenwood	*Warbugia ugandensis*
Araruet	Dog plum/Ekebergia/Cape ash	*Ekebergia capensis*
Lemeiywet	Waterpea/Waterboom/Snake bean tree/Woodland water berry Mountain water berry	*Syzygium guineese*

Among the six plant species, four species namely: *Prunus africana*, *Olea africana*, *Podocarpus latifolius*, *Warbugia ugandensis* were mentioned by all (100%) respondents (Figure 2). This implies that the four species were highly recognized and very important in treating different human ailments. The remaining two species; *Ekebergia capensis,* and *Syzygium guineese* were mentioned by 91.7% and 83.3% of respondents respectively. However, Chi-square goodness of fit test indicated that there is no significant difference in the number that the six medicinal plant species were cited by the respondents ($\chi2_{(5,95)}$=18.440, *N*= 12, *p* = 0.231). Therefore, the six species are of great concern and needs to be prioritized in conservation, propagation and plantation in private farms and public lands by the community neighbouring Chepalungu Forest. This is because Njoroge *et al.* (2010), Barnett (2000), and Bisht, Bhatt, Rawal, and Dhar (2006) advises that prioritizing species is the best index that can be used to identify plants of potentiality for conservation.

Figure 2: Highly Prioritized Medicinal Plant Species around Chepalungu Forest
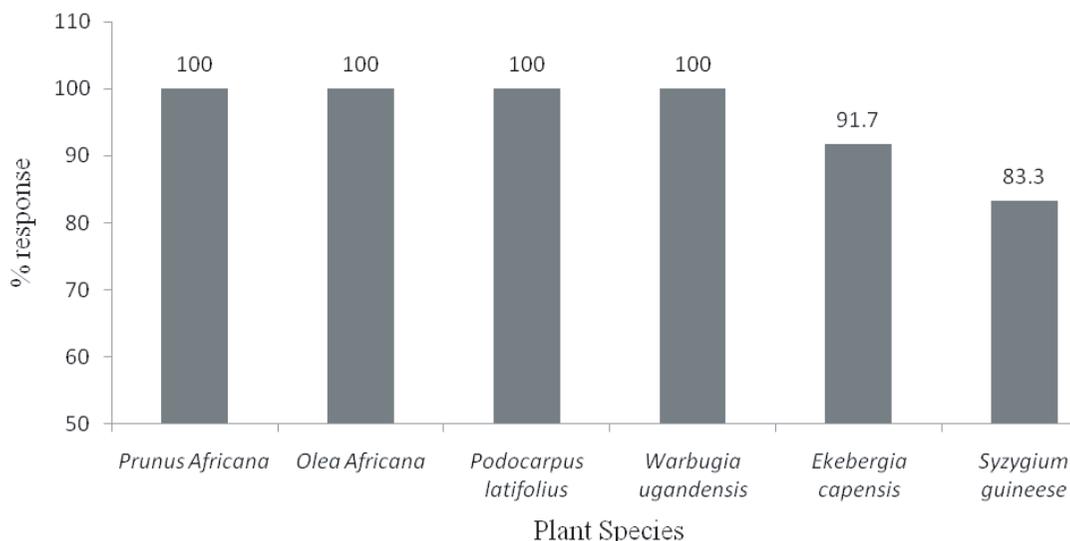
Comparing the species prioritized by herbalists neighbouring Chepalungu forest and the plant species found in other studies, the prioritization of medicinal plant species in Chepalungu is unique. This is because out of 18 species listed by Njoroge *et al*. (2010), only one species (*Warbugia ugandensis*) was listed in Chepalungu. In addition, out of 40 species listed by Otieno and Analo (2012) in Kakamega, only *Prunus africana* was mentioned by herbalist neighbouring Chepalungu Forest Reserve. Out of 9 species listed by Furukawa *et al*. (2016), only two species (*Olea africana* and *Warbugia ugandensis*) were mentioned in Chepalungu. However, though Kipkore *et al*. (2014) carried out the same research under the same Kalenjin community living Marakwet County (Kenya), none of the listed by Kipkore was mentioned by herbalists involved in this study at Chepalungu Forest. The difference may be as a result of differences in ecosystems in both Chepalungu and Marakwet, just as mentioned by (Kipkore *et al*., 2014).

3.2 Parts of the Tree Used and Quantity Harvested

The mostly used parts of the plant for medicinal purposes include bark, leaves, fruits and roots (Table 2). On average, each herbalist extracts about 17.0 kg of bark from the six highly prioritized tree species per month. About 11.0 kg of bark, fruits and roots are extracted by each herbalist per month from *Warbugia ugandensis*. Kruskal-

Wallis test indicated significant differences between the quantities of medicinal products obtained from different species ($\chi2_{(5,95)}$ = 37.709, p < .001), and between different plant parts ($\chi2_{(3,95)}$ = 64.126, p < .001). The extraction from *Warbugia ugandensis* was comparatively higher than extracts from other species because of its ability treat most commonly occurring ailments like back pains, Common cold, clear sinuses, stomach-ache and toothache among others. However, the study concurs with Njoroge *et al*. (2010) that *Prunus africana* is among the most preferred tree species in Kenya for medicinal purposes. The study also concurs with Furukawa *et al*. (2016) that bark is the most preferred tree part. This may be due to the findings by the United States Department of Agriculture (n.d) that most active ingredients are often found in higher concentrations in the bark.

Table 2: Parts of the Tree Used and Quantity Harvested (in Kg)

Species	Part of the plant				Mean quantity per species, per herbalist per month
	Bark	**Leaves**	**Fruits**	**Roots**	
Prunus africana	5.0	4.0	0.0	0.0	**9.0**
Olea africana	3.0	3.0	1.0	2.0	**9.0**
Podocarpus latifolius	0.0	5.0	3.0	0.0	**8.0**
Warbugia ugandensis	6.0	0.0	2.0	3.0	**11.0**
Ekebergia capensis	2.0	2.0	0.0	1.0	**5.0**
Syzygium guineese	1.0	0.0	0.5	0.0	**1.5**
Mean Quantity/ tree part/herbalist/month	**17.0**	**14.0**	**5.5**	**6.0**	

Table 3: Pair-Wise Analysis between Medicinal Plant Species within Chepalungu

Species	*Olea africana*	*Podocarpus latifolius*	*Warbugia ugandensis*	*Ekebergia capensis*	*Syzygium guineese*
Prunus africana	n.s	n.s	n.s	*	*
Olea africana		n.s	n.s	*	*
Podocarpus latifolius			n.s	*	*
Warbugia ugandensis				*	*
Ekebergia capensis					n.s

* Significant difference (p < 0.05); n.s. : not significant at p = 0.05.

Table 4: Pair-Wise Analysis between Plant Parts used for Traditional Medicine

Plant Parts	Leaves	Fruits	Roots
Bark	n.s	*	*
Leaves		*	*
Fruits			*

* Significant difference (p < 0.05); n.s. : not significant at p = 0.05.

However, the study differs with Kipkore et al. (2014) that plant leaves are the most widely used plant part for traditional medicinal purposes. This may be attributed to totally different plant species highly prioritized in the areas presented in this study and that presented by (Kipkore et al., 2014). The study also differs with findings by Ngarivhume, van't Klooster, de Jong, and Van der Westhuizen (2015) that roots are the most widely used tree parts for medicinal purposes. Importantly, respondents cautioned that plant species and plant parts having fewer extractions per month per herbalist are not necessarily less important but may be having higher concentrations of required ingredients. Therefore, with higher concentration, they are used in fewer quantities, translating to fewer amounts extracted per month.

3.3 Ailments Treated by Different Parts of Highly Prioritized Medicinal Plant Species

Table 5 indicates different plant parts from different plant species and their correspondent ailments that they treat. In some cases, either tree parts from same species, different plant species, or different tree parts are used to treat similar ailments. In other cases, different tree parts from the same plant species are grounded and mixed with water to form a concoction that treats certain ailments.

Table 5: Correspondent Uses of Different Plant Parts

Species	Part of plant	Correspondent uses
Prunus africana	Bark	1). Treatment of cancer, 2). Treatment of prostrates hypertrophy that majorly occur among elderly men, 3). When pondered and mixed with water, it is used to relief stomach-ache
	Leaves	1). Inhalant for fever, 2). An appetizer: enhance appetite among individuals having low appetite.
Olea africana	Bark	Bark, leaves and roots are mixed, grounded and then boiled to
	Leaves	1). Treat cancer, 2). Lower high blood pressure, 3). Treat nervous related
	Roots	problems, 4). Treat backaches and headaches, 5). Treat eye problems, 6). Improve kidney functioning
	Fruits	Treat Diarrhoea
Podocarpus latifolius	Fruits	Fruits/Leaf extract – 1). Used in treatment of sexually transmitted infection
	Leaves	related problems especially the gonorrhoea, 2). Chest related problems
Warbugia ugandensis	Bark	1). stomach-ache, 2). Constipation, toothache, 3). Cough, 4). Fever, 5). Back pains, 6). Muscle pains and week joint among other general body pains
	Roots	Boiled in water and taken as a relief to diarrhoea Inner bark – Common cold, dried and ground to a snuff used to clear sinuses and chest complaints
	Leaves	Leaf decoction baths for the cure of skin diseases
	Bark, roots and leaves	boiled in water and the decoction drunk to treat malaria
Ekebergia capensis	Bark	Cure for dysentery and typhoid
	Leaves	Intestinal worms
	Roots	Headache and Chronic cough (Chest related problems)
Syzygium guineese	Bark and roots	Grounded bark and roots mixed with water used as a purgative and diarrhoea
	Fruits	Treating dysentery

Therefore, the study concurs with Kipkore *et al*. (2014) that the preparation of traditional medicinal from plants takes different forms depending on the intended medicinal use. The study also concurs with Ngarivhume *et al*. (2015); Otieno and Analo (2012); Kipkore *et al*. (2014); Kumar *et al*. (2011) and Njoroge et al. (2010) that traditional medicinal from plant species can be used to treat many ailments ranging from simple to highly complicated ones.

4. Conclusions

The study has revealed six highly prioritized traditional medicinal plants, plant parts used, average quantities extracted monthly per herbalist based on the wet weight and correspondent ailments treated. Since extraction of plant parts including bark,

leaves, roots and fruits is higher in some plant species than others, the plant species like *Warbugia ugandensis* whose parts are highly harvested may become extinct if appropriate conservation measures are not put in place. Such extinction may greatly affect the biodiversity of Chepalungu Forest Reserve negatively.

5. Recommendation

As Bomet County implement promotion, propagation and planting of medicinal plant species in private farms, protected areas, lands to conserve the biodiversity of Chepalungu Forest Reserve, this study recommends that the county government should prioritize on the six plant species stated in this study. This is because they are highly prioritized as medicinal plants by knowledgeable and experienced herbalists in the area.

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Appendices
Appendix I: Structured Questionnaire
<u>**Section 1: Preliminary Questions**</u>
1). Forest Block (*tick appropriately*) () Kapchumbe Block   () Siongiroi Block
2). Respondent's age…………….
3). Period of stay in the area……………….
<u>**Section B: plant Attributes**</u>
4). Name two plants that are highly prioritized for medicinal
Highly prioritized species
 a). Local Name …………………
b). Common name (English name) ………………….
c). Scientific name …………………………….
Origin of the plant (*tick appropriately*) () Indigenous   () exotic

Moderately prioritized species
 a). Local Name …………………
b). Common name (English name) ………………….
c). Scientific name …………………………….

Origin of the plant (*tick appropriately*) () Indigenous   () exotic

5). Part of the plant and quantity harvested
Part of the plant and quantity harvested

Species	Part of the plant	Average quantity harvested (kg)	Commonly treated Symptoms treated
Highly prioritized species	Bark		
	Leaves		
	Roots		
	Flowers		
	Fruits		
Moderately prioritized species	Bark		
	Leaves		
	Roots		
	Flowers		
	Fruits		

Culture: The Core of Psychological Tranquillity and Successful Counselling

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Abstract

Culture is a set of predominant characteristics and attitudes that identifies a society. It's the sum total of a people's ways of living transmitted down the generation line. Counselling is professional guidance, done through psychological methods, and techniques that test the individual's interests and aptitudes. Psychology is a science concerned with the human mind and deals with the person's feelings emotions and general tranquillity. Traditional African counselling founded on the people's culture, had the family unit as the societal pillar whose members foster the entire unit. Individuals were possessively supported and guided to maintain the unit. Contemporary counselling has its roots in the early church where religious philosophers based human wholesomeness on being at peace with god. Harmony between one's culture and one's religious beliefs creates psychological tranquillity. Culture violation results in social rejection and counselling techniques redressing such rejected persons must adhere to the specific cultures. Study aims at determining the dependence of successful counselling on cultural practices; it also aims at assessing whether psychology, culture and counselling are components of a single vessel that will assist the individual and better the entire society. Probability and non – probability sampling designs were employed, and data was collected through interviews and questionnaires. 150 University students and staff were sampled, and the data collected was analysed using the descriptive method. Study revealed that the individual's culture constructs psychological comfort; that successful counselling lies in aligning individuals' psychological health to his/her practices in view of a culture subscribed to. Counsellors should understand their clients' culture to journey with them appropriately; individuals must fit into a specified culture to embrace and be embraced to function satisfactorily; suitable theories must be formulated so that they can be used to guide all the required counselling processes.

Keywords: *Individual tranquillity, Suitable counselling theories, Single vessel.*

1. Introduction

Counselling is by far the most reliable means of dealing with societal problems that emanate from the individual's ways of life and cause discomfort to him, his immediate associates and the community at large. It is reliable in that unlike punitive measures it does not activate anger and retaliation; unlike contemporary medication it has neither reactive effects nor resistance and unlike exclusion or segregation, it is soul searching thus sincere and far reaching. Counselling touches the inner being of the person. It appeals to the human aspect of man and brings out the inner self of the individual (Woolfe, Strawbridge, Douglas, & Dryden, 2011). Counselling may be a walk by the therapist with the client, but it is more of a walk of the individual with his real self. It is a chance for the individual to step out of himself and objectively re-examine himself by taking a critique journey back memory lane to discover possible triggers, accelerators and loopholes for problems experienced. It is a chance for the individual to sit as judge at his own hearing where sincerity to self-counts.

Successful counselling is the counselling that is embraced by the counselee. It is that counselling which the counselee understands, accepts and values. He / She should be able to see this type of counselling to attain liberty from the negative self. To do this the individual must be both psychologically and culturally at ease with himself. Being psychologically at ease means he can scrutinize his emotions, his thoughts and his reactions without reservations. There should be no issues in his mind (conscious and sub-conscious) that cause him unrest. Having cultural ease means being able to examine one's way of life and ones fitting into the society without subjectivity. He should not be the cause of other peoples' discomfort nor should he be uncomfortable due the other's ways and behaviours. Culture being a society's way of life must perpetuate the individual's way of life. The individual should fit into the larger society and the society should take him in with comfort and ease.

This research investigates culture as an asset in the boosting of counselling and generating psychological comfort. Culture plays a pivotal role in counselling in that both the client and the therapist must identify acceptably with their own cultures and must understand and appreciate the others' culture. This calls for multicultural

awareness and diversity. A client will be stressed by his cultural alienation. He will be a misfit. On the other hand, a therapist may be a prisoner of his/her culture conditioning. Such a therapist may subject the clients to stereotypes and preconceived notions (Sue & Sue, 2007). Worse still, a therapist might be lost to culture in the sense that he does not value any culture. This will make it difficult for him or her to even understand the client's plight. Such therapy will only dampen the client's self-esteem and kill his hope.

The study was intended to establish the influence that culture has on psychological peace. Different communities have different enculturation processes for their youth. This brings about varied levels of intensity of cultural adherence. Today with the diversity of avenues of cultural transmission (media, internet, mobile phones and others) individuals must be aligned to cultures with which they identify. Cultural mix-up is stressful. It leaves the individual dissatisfied and unfulfilled because he remains on the fringe of the actual culture. It is only in the self-identification that the individual can settle and be at peace. The study is an investigation of the impact that culture has on successful counselling. Behaviour disorder is easily understood when examined in the context of the culture from which it originates (Durand & Barlow, 2006). In fact, there is no description of a disorder until the behaviour is linked to some cultural norms. Counselling is deemed successful only when it manages to place the client back into his culture with acceptance where he had suffered rejection or ill-fitting (Nelson-Jones, 2011).

When counselling is viewed with reservation and negativity it fails to serve the intended purpose of journeying with the individual to desired destinations of self-value and self-acceptance. Many times, counselling has been misunderstood and treated with lots of suspicion. This is particularly where people have placed counselling in total contrast with given cultures maintaining that counselling violates values and teachings of a given culture. They may look at counselling as a display of weakness on the client's part. In such scenarios counselling is either rejected or underutilized. This is majorly due to issues like mistrust, perceived irrelevance and cultural insensitivity (Corey, 2009). Cultural norms must be aligned to personal meaning for the individual to feel accepted. If a culture does not enfold the individuals' interests

and values, they will feel left out and will rebel or seek acceptance elsewhere. This will result in loss of self-identity and belonging. The individuals will sway from lifestyle to lifestyle and borrow from all around until they fail hold onto any values. When one seeks psychological peace through counselling, one needs to first attain cultural identity.

2. Methodology

The survey design was used to carry out this study. Descriptive data was collected from identified samples of a population through questions and interviews. The collected data was then tabulated to describe the hypothesis. This information was used to develop generalizations about the entire population. The location of the study was Kericho County and the population of the study was University of Kabianga (UoK). The study was carried out among the staff and students of University of Kabianga, with the Schools, Students' Religious groups and Staff Departments as the subgroups for stratified sampling.

2.1 Sampling Procedure

The study used the stratified random sampling design of the probability sampling method which gave equal and independent chance to all the individuals in the sampled strata. The simple random sampling was used within the subgroups for both staff and students Ogula (1998) to arrive at the required number of participants. The university has clusters in the form of years of study, courses, staff scales and divisions. These would have been much more complex to select from given the number of participants required for the study.

2.2 Sample Sizes

From the six schools at UoK and the four Students' Religious Groups one hundred (100) participants were selected at ten samples per strata. And from the six schools and eleven departments for staff fifty (50) participants were selected at three participants per strata. (Only two participants were sampled from the smallest strata of the staff). This gave a total of one hundred and fifty (150) participants sampled.

Table 1. Participants Sampled from the Main Stratum

Schools in University of Kabianga	Students sampled	Staff sampled	Total number sampled
School of Education	10	3	13
School of Natural Resources	10	3	13
School of Science	10	3	13
School of Business	10	3	13
School of Agriculture	10	3	13
School of Information	10	2	12
Total	60	17	77

Table 2. Participants Sampled from other Strata

Religious Groups & Departments	Students sampled	Staff sampled	Total
Catholic Students Association	10	_	10
Christian Union	10	_	10
Muslim Students Association	10	_	10
SDA	10	_	10
Finance Department	_	3	3
Procurement Department.	_	3	3
Catering & Hostels	_	3	3
Internal Audit	_	3	3
Student Affairs Department	_	3	3
Security	_	3	3
Library	_	3	3
Central Services	_	3	3
Health Unit	_	3	3
Examinations Department	_	3	3
Farm	_	3	3
TOTAL	40	33	73

2.3 Target Population and Variables

While Kericho County is the general population for the study, University of Kabianga formed the target population. The sub-groups from which the participants were sampled composed the clusters. The hypothesis that Psychological tranquillity can be achieved through individual counselling based on cultural norms and values has several variables. The achievement of psychological tranquillity by the individual will depend on successful counselling based on the client's cultural values and identity.

2.4 Data Collection Instruments

For this study two types of data instrumentation were used. These are: questionnaires and interviews (Ogula, 1998). These instruments were used on different groups of participants. The researcher issued the questionnaires to the sampled participants and collected them after they were filled. She however used oral interviews with other persons within the university that she interacted with, to gather general opinion-based information about how culture impacted on counselling and what effect counselling has on one's psychological state. The questionnaires were issued and collected after a given period. Though all the 150 questionnaires were collected, two were not analysed because one was illegibly filled, and another had almost 90% blanks i.e. unfilled.

2.5 Data Analysis Procedure

Data analysis involved preparation of the collected data i.e. cleaning, coding, and editing of data so that it could be processed using the Statistical Package for Social Sciences (SPSS) software. The coded data was then entered into the SPSS programs where it was developed into a database and hence analysed. The descriptive data analysis was done using both quantitative and qualitative methods. Quantitative data was analysed using frequencies and percentages. These were subsequently presented in form of tables, charts and graphs as shown in the study findings. The Qualitative data was analysed and was used to compile a summary as given in the study discussion.

3. Theoretical Framework

The study draws from Sue et al. (1996) theory of Multicultural Counselling and Therapy (MCT) that has a variety of proposition. Of interest are the three propositions that state: 1) Therapists' and clients' identities are embedded in experiences and contexts such as individual family and culture and that the totality of these experiences and contexts are the focus of treatment when it comes to counselling; 2) The therapist and client must develop a cultural identity that includes attitude and relationship. Both must know their cultural values have the right attitudes. They should also relate to others – from within and without their own cultures – with respect. 3) Therapists should define goals and use counselling modalities that are

consistent with their client's life experiences and cultural values. From this it is evident that the MCT theory stresses the pivotal role that culture plays in successful counselling which gives rise to psychological tranquillity. This studies also draws from Sigmund Freud and Eric Erikson who both state in their different theories that unresolved issues in the individual's life disorientate the individual causing him/her psychological unrest. Freud (1949) explains that past unresolved issues remain stored in the sub-conscious mind and may emerge later in life and cause behaviour maladaptation. Erikson (1968) explains that any developmental stage that is unsatisfactorily negotiated will also cause the individual behaviour maladjustment later in life. These theories indicate that for the individual to attain psychological tranquillity counselling is of necessity. Unresolved issues and unsuccessfully negotiated development stages are not just forgotten. They remain until adequately dealt with.

4. Research Findings and Discussion

This study looked at cultural influences on the individual and the general society where it was found that the main objective of most cultural practices was to instil specific teachings in the people and bind them in brotherhood. These teachings would then guide or determine their school of thought and thus dominate their attitude and self-esteem. Different communities subscribe to different cultures. And different people embrace their culture at different levels and value. However, there are some general facts that are common to all cultures. These are inclusive of the following:

1) Culture is the community's identity

2) Culture serves certain aspects of the society

3) Culture gets drilled into a people (Enculturation)

4) Culture influences the people's way of thinking

Specific cultural practices enrich the individual's self-acceptance and acceptance by the other members of the society. It enhances brotherhood within a people. Specific aspects of culture may also derail the individual and make him question the practices. These are the wrong cultural teachings that may need weeding out. Culture ought to help the society grow. The data collected showed that majority of the participants

felt that the major role of culture was identity, followed by security. Basing on the scores, 61.5 % thought that the number one role of culture is identity while 41.2 % thought security is the number one role of culture. Few participants thought culture enables individual growth first. Yet a small percentage felt it is a channel of trendy fashion. The scores indicated 26.3% thought growth was number one, while 10.1% felt it was fashion that was the core role. Most participants thought Growth was the second role of culture regardless of what they had as the leading role. These represented 45.2% of the score. And Fashion was considered the last role of culture with a score of 35.1%.
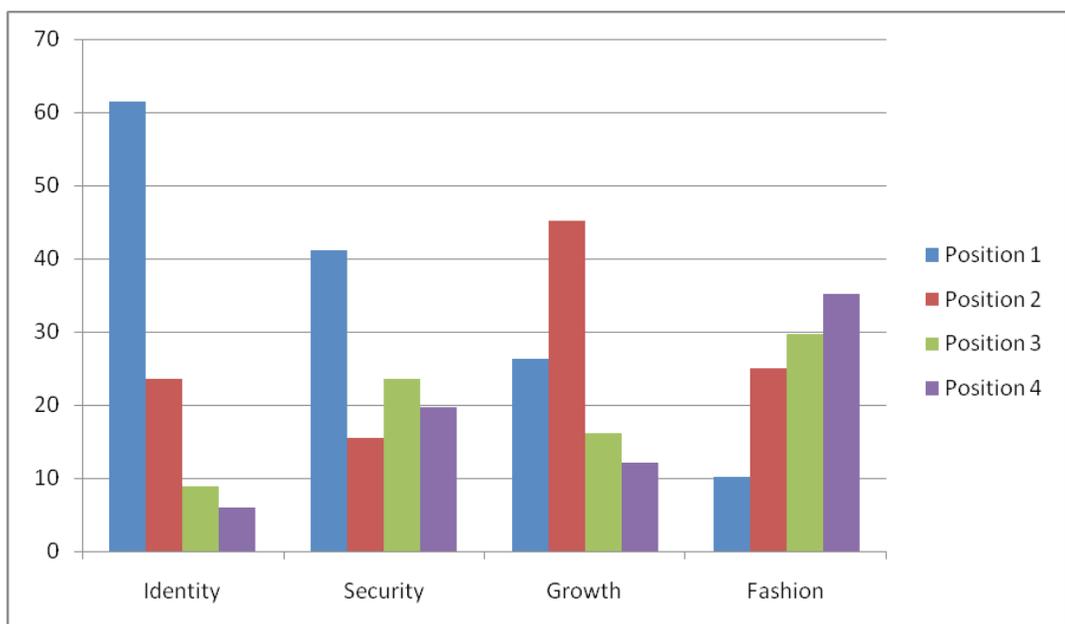
Figure 1: Score for roles of culture in %

The most important idea here is that culture has main roles to play for the individual and by extension for the entire society. These are the values to which the individual is ultimately attached and from which he/she attains self-value and identification to the extent that if he goes astray from them then he feels he is a misfit and requires counselling. Such individuals who have deviated from the norms of the society will experience psychological unrest and disturbance. The significance an individual attach to a role of culture is what will bind him or her to that culture. For instance, one who thinks the most important role of culture is providing security will attach

value depending on whether he has other sources of security or not. The priority roles of culture as revealed from the study indicate that the attitude and value the individuals associate with culture is determined by those prioritizations. Culture is respected depending on how significant it is to the individual. For instance, if one thinks culture's main role is fashion and he/she is not interested in fashions then culture is of no value or use. The diversity of choices for the best role is indicative of the different levels of attachment various persons have to their culture. It should be noted that where there are alternative means of achieving the said goals or roles, the attachment level is varied.
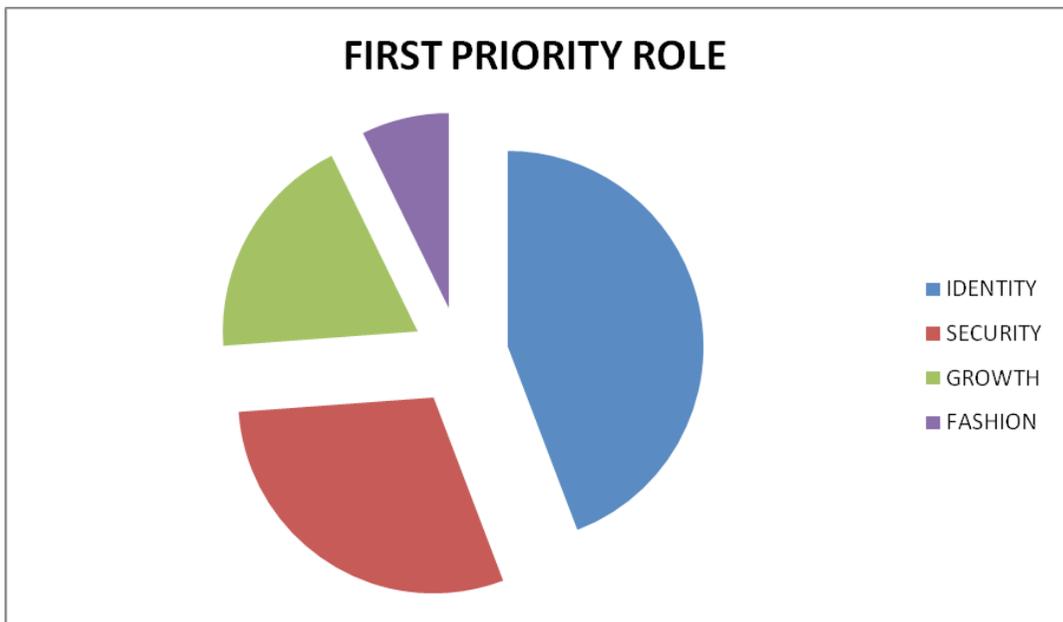
Figure 2: Percentage Score as role No 1

This study results show that culture's role number one is to provide identity for the individual and even for the entire society. A person's culture first places him where he fittingly belongs. It breeds identity in him then the identity provides security for the individual. The significances of culture are multidimensional. But the greatest is providing the individual with an identity. When one has no culture to which he/she subscribes then one belongs to no specific society. Belonging is a human need according to Maslow (1954) and where it is lacking there is inadequacy. All human beings need to belong. They require love and concern from others who know and understand them. They need to be recognized, accepted and appreciated in their life

circles. This makes them feel they belong and that is what gives them identity or definition. When an individual feel that he adequately belongs somewhere then he is sure of his security or he has a security he can rely on. He will expect to be defended; to be spoken for or to be bailed out in case things turn out bad on his part. His people should be able to stand up for him just as he should be able to do the same for them when need arises.

Culture for individual growth and culture for societal fashion are other dimensions of the roles of culture. When the individual is initiated into cultural stages through rites and teachings, he grows from one level to the other. Even when one imitates some cultural values from role models and mentors in the society and assimilates them as his own he rises a notch higher in the society and he grows. All cultural achievements be they material acquisitions or actions displayed, are recognized and appreciated by the society. These earn the individual position and respect. He grows. Culture to some degree may play the role of an instrument of fashion. Here fashion may be in view of attire, physic, life style, possessions and many more. Where any of these becomes a trend, then culture is fashionable. It becomes a display for admiration and inclusion. One strives to act and appear like the others for fashion.

The study results also show that successful counselling must be carried out along cultural lines such as values, norms and teachings. The counselling techniques; the counselling environment and the counselling language: all should conform to the given culture and cultural requirements. This means that the person being counselled ought to realize and examine his cultural values. Do the cultural norms suit his cultural values as an individual? Does he agree with what culture is trying to instil in him or her? If not is there a way to go around it without hurting one's loved ones and the significant others. Equally important is role of the therapist in view of the given culture. This is because to counsel an individual successfully the counsellor ought to know and understand his/her culture. Does he/she understand the client's ways of life? Does he/she know how much value and respect the client attaches to his culture? Can he or she lead the client towards rejecting some of the cultural teachings without wounding himself or the client psychologically? These are the factors to be considered to attain successful counselling. Such counselling provides

unconditional positive regard for the client in the sense that the client is appreciated within his culture and values. It also gives the therapist the self-confidence he or she needs to win the client over. By way of his/her being conscious of other people's values and behaviour he/she will be respectful. This knowledge and understanding of other people's cultures will also equip the therapist with the information necessary to discern what is normal and what is wayward.

Table 3: Facts about Successful counselling

Investigation	Positive Scores	Negative Scores	Total
Therapist's need to understand client's culture	93 (62.8%)	55 (37.1%)	148
Cultural peace a must for Psychological peace	86 (58.1%)	62 (41.9%)	148
Psychological peace a result of Successful counselling	139 (92.5%)	11 (7.4%)	148
Total	316 (71.1%)	128 (28.8%)	444

More results of the study reveal that Psychology is a vessel for good or successful counselling just as culture too is a vessel of the same. A counselling client often seeks psychological peace. His challenges will be directly or indirectly linked to his psychological peace. The counsellor on his part should always work to sort out his or her psychological hitches if he/she is to effectively help others. A well balanced psychological state will give authority to guide another towards a peaceful psychological state. Culture too is a vessel of good and successful counselling. A client has behaviour issues in view of a given culture. In the event of no specified culture then there cannot be need for individual adjustment. Counselling need is tied to cultural malpractice. Counselling is successful if it helps one get back on track for cultural acceptance. This is possible only if the cultural values and norms are identified and respected by both the counsellor and the counselee.

Culture, psychology and counselling are all interlinked. Culture boosts psychology while psychology enables good counselling and good counselling is key to cultural peace and individual acceptance. The three works together to better the individual and the society by extension and in general. When the individual whose ways have caused him maladaptation within his social circles is counselled successfully then he will adjust and will be accepted by the society once more. This will earn him psychological comfort and peace. Thus, successful counselling leads to cultural

acceptance that brings about psychological tranquillity as illustrated in the figure below.

CULTURE

PSYCHOLOGY
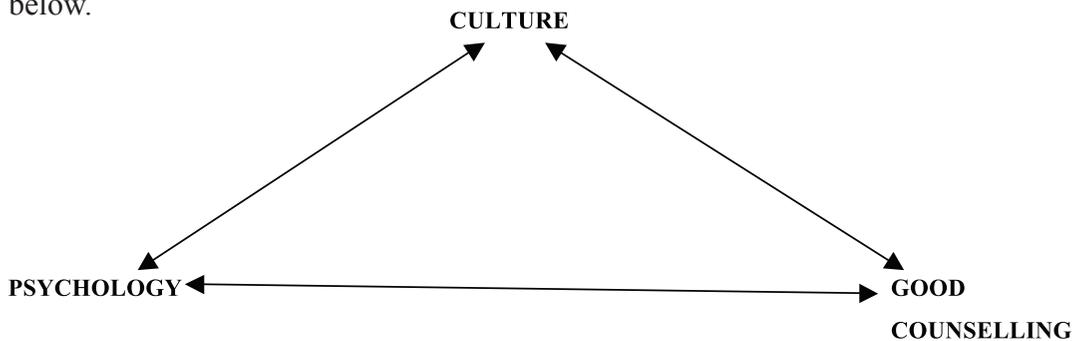
GOOD
COUNSELLING

Figure 3: *link between culture, psychology and successful counselling*

Data outcomes have shown that good counselling brings about totality to the individual. This individual totality is manifested in inner peace that comes with psychological health. A healthy psychological state conforms to the individual's feelings. It means the individual has no issues bothering his conscience or causing him worry. It means he enjoys social acceptance and appreciation and above that he must be enjoying self-acceptance and appreciation. Such one is an individual who has attained self-actualization. He has risen through Maslows stages of the hierarchy of needs and is at the top of the pyramid because he must have accomplished his basic needs to rise to the social needs and is headed to the needs that will do him proud while permeating to the society to give it satisfaction and pride. Good and successful counselling is pegged to psychology and culture. The persons concerned with culture, psychology and counselling are all of equal importance to the client who is a single but very significant component of the society.

5. Conclusion and Recommendations

Though the three aspects studied stand out as separate fields of study and implementation in the academic sphere they are a stronger force if studied as one whole with three segments. This will be enriched by the complementary characteristic within them. Each segment stands stronger if supplemented or enabled by the other. All issues concerning the well-being of humanity should be treated with the maximum importance that it deserves. The improvement of mankind in all areas must be given priority since it contributes to the care and preservation that the globe

direly requires of us. Best methods and best practices must be arrived at for the sake of man because a comfortable person is a rational person that can be relied upon. Scholars, medics, the religious, politicians and all who are responsible for humanity require to work together so as to come up with the best strategies. It is important that ideas be solicited for from all ends and utilized for the common good.

The three areas discussed here need each other for the development of the ultimate ideal society. Cooperation among the persons in the various disciplines will yield success and easy functioning as opposed to controversy, despising and discrimination. Psychologists, Counsellors and Social scientists must work hand in hand and formulate general goals to collectively contribute to the creation of the globe we all want and would love to be part of. If counselling needs information about culture, and individual psychology is at peace with conformity to culture whereas counselling gives psychological peace then it is apparent that collective contribution generates ease of business. Controversy and or antagonism is destructive to the intended positive results. Each segment should be ardent about what the other has to offer and be willing to share what they must give, for solidarity and better achievement. The idea that any group is superior to the other only hampers progress since ranking and qualifying only makes people placed at the bottom to close up and those placed at the top to be vain and unreachable. The three areas sited are just one among many. More studies should be carried out to discover areas that can possibly be merged for the achievement of greater and far reaching results. Any scholar worth his or her salt should encourage interdisciplinary research and involvement for the betterment of humanity.

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Infertility: Bioethics of Cultural, Religious and Scientific solutions: A review

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Abstract

Infertility is a problem that affects couples worldwide. Its importance is linked to the very core of heredity; perpetuation of the species. Socially, it prevents perpetuation of the family line and threatens security in old age. There are age old solutions of infertility as well as modern scientific solutions. The core issue in these solutions is related to the definition of a parent as the one who sires or begets (the genetic parent), bears (the gestational parent) and/or rears (the nurturing parent). These solutions however often pose ethical issues of right and wrong, as well as legal issues that at times require judicial determination. This paper discusses these solutions citing local examples and ethical and legal challenges.

Keywords: _Assisted Reproductive Technologies, Ethical Issues, Infertility, in-vitro Fertilization, Surrogacy._

1. Introduction

Infertility is a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (Zegers-Hochschild et al., 2009). Other definitions add on the definition of infertility the issue of bearing a live child after successful gestation and thus include women who experience miscarriages and still births as infertile (Mascarenhas, Flaxman, Boerma, Vanderpoel, & Stevens, 2012). Infertility is a fairly common occurrence affecting 186 million people which is between 12% and 28% of couples worldwide (Himmel et al., 1997; Inhorn & Patrizio, 2015). Of these cases, 20-30% are due to male infertility, 20-35% to female infertility, and 25-40% are due to combined problems in both parts (ART, 2014).

Infertility touches the very core of human existence for it curtails the perpetuation of the family line and threatens the security in old age provided for by children. It denies people of parenting which is often considered a milestone commensurate with initiation into a higher social group. Ordinarily, the three aspects of parenting are vested in a couple. Being the genetic parents, they contribute the hereditary material contained in the ova and sperm; as a gestational parent the woman bears the foetus and is delivered and as rearing parents they are required to provide the physical, economic, social and psychological nurturing.

2. Traditional remedies to infertility

There are traditional remedies of infertility in every society which often separate the three aspects of parenting. Cultural solutions mostly assume that infertility is of female origin due to the patriarchal nature of most societies. For instance, herbal remedies are popular particularly in African communities where medicine men/women claim to have portions that solve infertility. A major remedy however is polygamy which assuming infertility is of female source the man is justified to take another wife who supposedly would bear him children, and thus ensuring that the man is the genetic parent by siring. Ethical concerns regarding polygamy relate to legal position on who is considered a wife which differs in various jurisdictions.

Adoption is also a common remedy of infertility that allows an infertile couple to be parents by rearing without either siring or bearing and thus are have no genetic relatedness to the children. This practice was well documented in ancient times where the code of Hummurabi clearly set out the contractual agreement with the biological parents surrendering all claims to the adoptive parents. The adoption was permanent and irreversible with the adoptee having all rights of a biological child. In the event that the adoptee attempted to revert to his biological parents, the efforts were met with harsh penalties of tearing out his tongue or eye (King, 2005).

Another traditional remedy is a surrogacy, an arrangement where another woman mostly a servant or slave sires a child with the husband of the infertile wife again allowing the man to be genetically related to the child. This old practice as recorded in the Bible (Genesis 16:1, 2):

> *Now Sarai, Abram's wife has borne him no children. And she had*

an Egyptian maidservant whose name of Hagar. So, Sarai said to Abram, see now, the Lord has restrained me from bearing children. Please, go in to my maid; perhaps I shall obtain children by her.

The Babylonian Code of Hammurabi dating 1754 BC clearly set out conditions for surrogacy where a childless wife could give her husband a maid to bear him children who were thereafter considered hers. The maid however was not considered a wife but remained a slave of the wife (King, 2005).

In some societies however, where it is known that infertility is of male origin, there may be discrete arrangements of another, mostly a male relative, to sire a child with the man's fertile wife with the clear understanding that the sire has no rights to the offspring or the wife of his relative. The role of the sire in this case is that of a noble duty to protect the reputation of his kinsman and provide a benefit of perpetuating the name of not only the kinsman but the extended family and the entire clan. In this regard, the infertile male is the parent of the child by rearing, and the woman a parent by begetting, bearing and rearing. The kinsman though having contributed 50% of the genetic material and being a parent by siring is often unacknowledged. He however is recognized as a parent in the wider African sense where uncles and close male relatives are referred and addressed as father by children. This was the case as recorded in Genesis 38:6-9

Judah got a wife for Er, his firstborn, and her name was Tamar. But Er, Judah's firstborn, was wicked in the LORD's sight; so the LORD put him to death. Then Judah said to Onan, "Sleep with your brother's wife and fulfill your duty to her as a brother-in-law to raise up offspring for your brother." But Onan knew that the child would not be his;

Recently such an arrangement was reported by Emmanuel Muthini in The East African Standard daily of March 2nd, 2015. A 25-year-old woman married to a 27-year-old man was desperate for a child after unsuccessful attempts for almost three years. After initial objection, the man finally agreed for a medical check-up which revealed he was infertile. This led to him being withdrawn as he was ridiculed, mocked, and referred to as "baba zero" (father of zero) especially after his younger brother who married after him became a father. After exploring various options such as traditional and conventional medicine which proved unsuccessful, he suggested a

unique solution to his wife; his younger brother would sire a child for them. Despite the wife's initial shock, she agreed and a meeting of the three was convened where though initially surprised, she agreed. The husband set strict guidelines for the venture, one of which was the sexual act was to be in his presence. The brother objected to this condition and insisted that this was not a once off activity but required a whole month of trying to optimize the chances of success. The husband objected, and the negotiations stalled. One day, the desperate wife realizing that this circus would continue without an end, called her husband who was away and gave him an ultimatum; she was on her way to his brother's house to consummate the arrangement. The brother was agreeable and the two engaged in baby making. In the middle of the exercise, the husband turned up and desperately knocked the door while shouting and ordering them to open. Curious neighbours gathered to see the outcome of the drama. The angry brother opened the door and shouted back that this was unacceptable since his role was of a humanitarian nature without pay and he did not deserve this kind of embarrassment. The couple went home and did not discuss the matter further. As of the writing of the incidence, the lady reported that she awaited the outcome and vowed that, since she knew her brother-in-law was fertile, she would pursue this arrangement until she became a parent. Ethical issues of this traditional method regard the rights of a child who grows up with the mistaken belief that another is their biological father. In addition, issues of tissue or organ donation may come into play.

Another solution in some communities is for the infertile, and mostly menopausal women to "marry" other women who then bear children with selected men. Offspring from this union are recognized as being children of the infertile female who rears them and plays the social and cultural role of "husband" to the wife who begets, bears and rears the children. The man who sires the children though having contributed 50% of the genetic material and being a parent by siring is neither acknowledged nor recognized as a parent.

This was the subject of a land mark case of *Monica Jesang Katam vs Jackson Chepkwony and Another*. Cherotich Kimong'ony Kibserea an 83-year-old childless widow "married" 30-year-old Monica Jesang Katam and paid dowry to her father as per the traditional Nandi customs culminating in a traditional marriage ceremony

in 2006. Henceforth, Cherotich accepted Monica's children prior to marriage as her own as well as children subsequently born by Monica with a man identified by her "husband". Cherotich had honoured her obligation and introduced a mature married man from her tribe for a sexual partner. Monica on her part had also done her part and faithfully and diligently served Cherotich as her husband. After six years of marriage, Kibserea died in 2008 and Monica's bid to inherit her "husband's" property was contested by Kibserea's relatives. Monica told the court that she had lived happily with her husband and now after this death she considered herself as a widow. In his ruling on June 17, 2011 Justice Ojwang quoted an authority (Oboler, 1980):

> *a female husband is a woman who pays bride wealth and thus marries (but does not have sexual intercourse with) another woman. By so doing, she becomes the social and legal father of her wife's children.*

Justice Ojwang further referring to Cotran (1968) observed that, as established in Nandi customary culture and law, a menopausal childless woman could marry another woman to bear children for her and the children would thus be considered to belong to the childless woman. This was, and such traditional practices were aspects of culture that were protected under Article 11 (1) of the 2010 Constitution. In this regard, Monica's children irrespective of their biological father were legally hers and thus Monica, and her children were first in line to inherit her "husband's" (Cherotich Kimong'ony Kibserea) estate. The court agreed and allowed Monica to administer and inherit the estate of her late (female) husband.

Gideon Maundu | NATION Ms Monica Jesang Katam and her lawyer Peter Kirui after the High Court ruling.

In such arrangements, children from such marriages may never know their biological father as they grow in a female only household. An example is that of Franklin Chepkwony Soi one of the five children who are a product of a marriage of Esther Soi and Juliana who said he neither knew nor was interested to know his biological father and said Telewa (2012):

> *"I was born here at Juliana's house and Esther here is my mother. Juliana married my mother because she wanted some sons to inherit her property".*

On her part, the 67-year old female husband Juliana Soi was at pains to explain that theirs was not a sexual relationship and said that by the time a woman can marry, she must have reached menopause.

Juliana and Esther Soi married in the early 1990s

Muliro Telewa BBC News, Elburgon, Rift Valley

Another was the subject of inheritance in the case *Eliud Maina Mwangi vs Margaret Wanjiru Gachangi, Civil Appeal No. 281 (A) of 2003*. The central question in the appeal was whether the respondent, a woman-to-woman marriage under Kikuyu customary law to entitle her to a grant of letters of administration of the estate of the deceased and to inherit the deceased's property. Here the court recognized that

Margaret Wanjiru Gachangi, was married to the late Keziah Wanjiru Kahiga in a woman-to-woman marriage under the customary Kikuyu customary laws. The court stated that:

> *"Where a husband dies leaving a childless widow, who is past childbearing age, the widow may marry a wife. The widow pays ruracio (dowry) to the family of the woman selected and arranges for a man from her deceased husband's age set to have intercourse with her. Children resulting from such intercourse are regarded as the children of the widow's deceased husband."*

3. Science based remedies to infertility

There are Assisted Reproductive Technologies (ART) which provide scientific solutions to infertility depending on the cause of infertility. Artificial Insemination (AI) is one that manually introduces semen into the female vagina or uterus. In AI by husband/partner, semen from a partner with erectile or ejaculatory dysfunction can be used allowing him to be a parent by siring. AI can also be used where the female partner has hostile mucus and thus partner semen bypasses the hostile vaginal environment by direct injection into the uterus. This allows parenting of the couple by siring, bearing and rearing. At other times, donor semen could be used in artificial insemination particularly when the male partner has no sperm, low sperm count or poor sperm quality. In this regard, there are three people involved as parents; the sperm donor as a sire, the male partner as one who rears and the female partner who bears and rears.

A second ART is *in-vitro* fertilization (IVF) developed by Dr Robert Edwards and Dr Patrick Steptoe that led to the first "test tube baby" Louise Joy Brown on July 25th 1978 Short (1979) and a Nobel Prize for Edwards in 2010. In this technology which is indicated for couples with infertility related to fertilization problems, the sperm fertilizes the ova outside the female, and the resultant zygote is introduced into a uterus that has been hormonally prepared for successful implantation. The sperm and ovum can be from both parents, or from one member of the couple or from neither with varying opportunities for parenting and genetic relatedness.

A third ART is embryo donation where both the sperm and ova are of donor origin and only implanted in another female for gestation. This process is surrogacy or

commonly referred to as a hired womb. The first baby born through surrogate embryo transfer was reported in California where an embryo from the parents' gametes was transferred to a surrogate mother (Blakeslee, 1984). The third party, the surrogate mother acts as a gestational carrier carrying the foetus to maturity without having any genetic relatedness with the baby. In respect to parenting, surrogacy is a classic three parent scenario such as AI and IVF by donor with the accompanying ethical concerns. However, in this case, there are issues related to gestation where the surrogate mother may require payments for the service.

In Kenya, assisted reproductive technologies are available since 2006 when the first IVF babies were born. Surrogacy is also available in Kenya. In the Daily Nation of 6th February 2012, Okwemba (2012) reported that surrogacy was big business with Kenyan women some of who are paid between Ksh 600,000 and a million (USD 7,000 to 11,000) to carry a pregnancy on behalf of others. who lacks uteri or have medical complications that make carrying a pregnancy impossible. It is reported that between 2003 and 2006, over twenty couples had used this method to bear close to 30 babies in Nairobi IVF clinics. These arrangements of surrogacy are undertaken in secrecy with the surrogate mother negotiating with the commissioning couple of how much she will be paid, and a contract is drawn including; conditions for giving up the baby immediately is born and forfeiting any future claims to the child.

There have been legal issues relating to surrogacy one of which was reported in the Saturday Nation July 5th 2014 (Wambugu, 2014). WKN and CWW contracted JLN as a surrogate mother who delivered twins born at the MP Shah Hospital in Nairobi on Jan 25th, 2014. The hospital had in September 2013 been informed of the surrogacy arrangement between the parties which included surrender of the babies to the genetic parents on delivery. JLN however changed her mind after delivery and in the ensuing dispute, the twins were handed over to the director of the hospital who placed them in a children's home for adoption. The three parents went to court and blocked adoption of the twins while awaiting resolution of the parenting matter. Noting that there were no laws governing surrogacy in Kenya, the children's court ordered that the twins be handed over to WKN and CWW their genetic parents and birth certificates indicate as much. However, the children's court gave JLN unlimited access to the children.

4. Ethics and Bioethics

Ethics are moral principles or rules of behaviour used in deciding what is right or wrong; what is acceptable or not in a community. There are three universally accepted ethical principles which form the bases of decision making on what is ethical or not. These are; Respect for persons, Beneficence and Justice. Bioethics is a branch of ethics concerned with a philosophy that seeks to integrate biology, ecology, medicine, and human values and is concerned with ethical questions that arise in the relationships among life sciences, biotechnology, medicine, politics, law, and philosophy (Potter, 1971).

4.1. Ethical issues of traditional remedies

Infertility is a bioethical issue. Traditional solutions such as polygamy violate the ethical principle of respect for person where women in infertile marriages face social stigmatization particularly towards the woman often leading to physical violence, emotional abuse, marriage breakdown , social exclusion, community exile, ineffective and therapies, poverty, old age insecurity, increased risk of HIV/AIDS, and death (Inhorn & Patrizio, 2015). Likewise, men involved in traditional solutions of assisted siring also often have their rights violated for they are not recognized as the parents of the children they sired. The rights of children in adoption, assisted siring and surrogacy arrangements are denied their rights to know their biological parents for this would confer physical and psychological benefits. The rights of such children who may grow up without ever knowing their genetic parents may further be violated in cases where a medical issue of tissue or organ compatibility arises. There is also a risk in consanguinity when they choose to have children. This may be in contravention of the Constitution of Kenya article 54 (1) (e) which states that:

> Every child has the right ...to parental care and protection, which includes equal responsibility of the mother and father to provide for the child, whether they are married to each other or not;

Ethical issues in these arrangements relate to the principle of justice where the biological parent relinquishes rights for the sake of a kinsman or to the female "husband" in the case of a woman being married to another woman. In addition, these arrangements may violate the right to information regarding a child who grows

up without knowledge of the biological father.

4.2. Ethical issues of scientific remedies

Scientific solutions also pose bioethics concerns. Ethical issues of artificial insemination by donor are related to the health and biological characteristics of the donor, and his rights in respect to the child. For instance, sperm donors should be healthy with no apparent sexually transmitted infections or hereditary disease. In addition, the donor should relinquish claims to the child and oftentimes, his identity is withheld to both the child and the parents. Furthermore, are rights of parents to know their children and those of children to know their parents. Depending on the source of donor sperm, there are more ethical issues regarding a child knowing their biological parent with attendant challenges if there is need for tissue of organ donation or transplantation as well as consanguinity when they choose to have children with people they presume to be unrelated to them.

Ethical issues in sperm, ova and embryo donation are like those of AI. The position of the Ethics Committee of the American Society for Reproductive Medicine (2013) is that embryo donation closely approximates normal human reproduction than adoption. In this regard, like in sperm and ova donations, rights over the embryos are transferred from the donor to recipient at the time of the medical procedure of donation and implantation. Thus, ethical considerations of privacy, confidentiality, informed consent of the donor and beneficence in respect to the recipient are in operation. In addition are the ethical issues of identity of biological parents in the event of a medical need for tissue or organ compatibility.

However, surrogacy has additional ethical issues one of them being the compensation/inducement equilibrium. What is the value in terms of the monetary gains of carrying pregnancy for the entire gestational period of nine months with either a normal or surgical delivery at the end? Furthermore, there are issues involved in the surrogate mother giving up a baby soon after birth and extricating herself from emotional and psychological attachment. Should the surrogate mother be given visiting rights to the baby? There certainly are ethical issue related to ownership of the parents who sire/beget, and the one who bears the child. For instance, what if at the end of gestation, the parents decline to take the baby? In addition are the ethical issues of

this solution regarding the right of a child who grows in a female only household without the support a male figure. Issues regarding surrogacy are many; the obvious one being commercialization of the process. In addition are the legal concerns of whose name appears on the birth certificate; a concern that requires a legal definition of parent besides the issues of rights of a child to know their biological parent. Depending on the source of the donor sperm, the ethical issues are regarding a child knowing their biological parent with attendant challenges if there is need for tissue of organ compatibility.

In addition to issues of concerns with AI, there are ethical issues regarding IVF relating to the principle of beneficence vis-à-vis the children who have a possibility of increased birth malformations including psychosocial developmental defects and cancer (Davies et al., 2012; Hansen, Kurinczuk, de Klerk, Burton, & Bower, 2012; Li, Zhou, Qian, & Chen, 2013).

5. Conclusion

Infertility is and will continue to be a challenge to people. However, there are ethical issues in all traditional and scientific solutions. Some of these challenges highlight the lacunae in law in many jurisdictions -Kenya included. Despite these challenges, the ethical principle of finding a favourable balance of harm and benefit should be the guiding standard. This should not just consider the adults, but also the children who being of diminished autonomy deserve special protection as set out in the principle of respect for persons. With increased scientific advances in assisted reproductive technologies, there is need for commensurate legislature to ensure that the rights of all parties involved are protected.

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The Potential of Environmental Psychology to Alleviate Climate Change: A Review

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Abstract

Environmental degradation and climate change issues have become inevitable discussions both at national and global levels. The devastating climate change is unequivocal as the world faces heightened rates of temperatures leading to escalated rise in sea levels rendering thousands of people homeless. More than often whenever global warming is mentioned, most ecologist, environmentalist, and conservationists mind are perturbed with the exacerbated loss of biodiversity, daunting rates of deforestation,water scarcity, the loss of soil fertility, increasing soil salinity, loss of habitats, natural catastrophes, air pollution, diminishing fossil reserves, ecosystem imbalances, and disturbances not forgetting the escalated populous pressure on the limited natural resources and conflicts between man and the environment. The threats and shortages cannot be assumed. Calls for man to reconcile with the environment have been voiced extensively but not sufficient enough to restore and preserve the environment. Climate change and environmental obliteration is not an abstract issue. The problem starts and ends with humanity. The need to save and recreate our environment is imminent and requires multidisciplinary collaborative efforts stemming from natural resource management fields to social sciences and far more. Environmental degradation is due to the human activities and the coexistence with their surroundings. Psychologists have an indispensable role in evaluating and addressing the integration and interrelatedness between man and the environmental problems. They have the potential of promoting ecologically sensitive and more sustainable behaviors among people by applying the psychological principles based on the population's attitudes, values, norms, beliefs, cultural history, and heritage. This paper elucidates the potential of environmental psychologists in alleviating the environmental degradation and climate change consequences by evaluating the system thinking theory, human dimensions, and ecological resilience.

Keywords: *Environmental Degradation, Environmental Psychology, Climate Change, Prevention And Protection*

> *"… Our common home (earth) is like a sister with whom we share our life and a beautiful mother who opens her arms to embrace*

us. Praise be to you, my Lord, through our Sister, Mother Earth, who sustains and governs us, and who produces various fruit with coloured flowers and herbs," Pope Francis of Assisi.

1. Introduction

Climate change is debatable from different fronts, whether in denial or not it is unequivocal that it is no longer an abstract issue (NRDC, 2015). The tide on the global community to mitigate climate change hence restoration of the environment is increasingly being voiced across the globe. At the core of the mitigation and adaptation strategies, sustainable management of natural resources forms a primary component of the mitigation strategies (GoK, 2013; NRDC, 2015). It is of paramount importance to understand the road map for achievement of the projected objectives. This paper revisits the dynamism of the climate change and the road map of achieving the objective through implementation of principles of environment psychology.

Stoett (2016) perceives climate change mitigation and adaption strategies as a complex and wicked problem requiring dynamic ecological and socio-political approaches. The attempts and efforts endeavored at achieving sustainable environment and alleviation of climate change requires integrations and inputs from various disciplines (Cote & Nightingale, 2012; Gifford, 2007; Pope Francis of Assisi, 2015). Issues of climate changes recognizes no boundary, nor religions, no ethnicity, wealth nor economic status, they are cross cutting (NRDC, 2015). Humanity is always at the center of the consequences and the drivers for the escalated degradation of the environment. Basing on this view, this paper also explores the potential of environmental psychologists in alleviating climate change by elucidating the importance and integration of interdisciplinary research in their efforts of saving our common and dearest home.

According to UNEP (2016) it is estimated that over 795 million people across the world suffer from hunger whilst over 1.2 billion shall experience dire water scarcity. By 2030, it is postulated that demand of water will increase by 40%, food by 50%, energy by 40% whereas demand for timber and fiber will increase by 40% (UNEP, 2016). Kenya as many other countries in the world faces considerable environmental management, restoration, preservation and conservation challenges compromising

the healthy and wellbeing of her citizens. In 2010, Kenya Forest Service (KFS) released a report indicating that Kenya loses more than 12,000 hectares of forests yearly through deforestation activities, conversion of forests for development of projects with agriculture being at the forefront (KFS, 2010). Consequently, illegal logging, charcoal making, uncontrolled grazing, illegal collection of firewood, forest encroachment and illegal settlement, overexploitation of the forests for medicines and unsustainable utilization of forests have equally exacerbated the destruction of the natural resources (Bishop & Browne, 2007; KFS, 2010). Conversely, Kenya faces consistent episodes of devastating consequences of drought and floods stemming from loss of livelihoods and lives, destruction of poverty to infrastructure (GoK, 2013). These implications significantly impede the social, economic and environment wellbeing of the Kenya population (GoK, 2013; KFS, 2010). At the epicenter of the destruction and the driving forces to extreme climate variability are the human dimensions driven by the desire to access more land for settlement, practice agriculture, and issues of food insecurity and poverty.

The exacerbated degradation of natural resources more so forests in Kenya resulted into release of approximately 1.6 million tons of carbon into the atmosphere hence increasing the rates of global warming (KFS, 2010). Other than the destruction of forests, Kenya equally faces daunting threats of scarcity of clean water, soil loss and erosion, drying of wetlands and rivers, displacement of communities, habitat and biodiversity loss (GoK, 2013; KFS, 2010). Population pressures, urbanization, industrial and agricultural projects, poverty, ignorance, and unsustainable resource utilization among others aggravate these changes. The challenges are very diverse constituting drivers drawn from multilateral social and cultural backgrounds, beliefs, attitudes, literacy levels, among others; hence, no single approach can be deployed to exclusively address and mitigate the problem of environmental degradation and climate change. It requires cumulative and collaborative efforts from different fields to consolidate and harmonize their expertise to develop feasible and long lasting mitigatory and adaptation measures.

The Kenyan environmental planners, conservationists, and natural resource managers are tasked with the responsibility of addressing the ever-accelerating challenges in natural resource management (GoK, 2013). Walker and Salt (2012)

notes that the world we are living in faces a wide array of dire and growing resource issues of which most are human induced. The comprehensive and dynamic nature of the current resources quagmires we face should be at the core of all the strategies and deliberation undertaken by any society. It is because of the complexity of the issues that has led to the development of sensitive and inclusive strategies to address the changes at a national and global level (Bishop & Browne, 2007; Williams & Patterson, 1996). Drawing insights from the new paradigm of resource management, environmental planners, conservationists and managers cannot sufficiently work as independent bodies but require expertise of economists, anthropologists, sociologists and psychologists among others (Reser, 2007). It is critical to have a holistic thinking, as environment is a system consisting of different integrated components argues (Stoett, 2016). It is more than often difficult to see all the elements of the system; thus, it requires collection and combination of views from different observers at different elevation to surmise how the system functions. These can only be achieved by amalgamation of views from people from diverse professional stands, cultural backgrounds, ideologies as well as the contribution of both the external and internal agents in the proximity of the system (Stoett, 2016, p. 34; Williams & Patterson, 1996, p. 512). The relationship of human beings and the environment shall always be at the core of the holistic thinking.

2. Climate Change and Environmental Psychology

The world we live in is not indifferent from us, in fact, we are not a part of nature, but we (humanity) are part of nature. Humanity has advanced; the life we live today is exclusive as compared to that lived a decade ago (Pope Francis of Assisi, 2015). We have achieved grave technological advances and economic growth all projected at making the life of man easier and more habitable than before (Pope Francis of Assisi, 2015). We all envisage a world in which every country and person is able to enjoy a sustained economy and ecological amelioration. We anticipate for a society in which production and consumption patterns of our natural resources are sustainable and certain, a world where humanity coexists in harmony with the environment Stoett (2016) and in which the technological advancements and other technical endeavors are accompanied by authentic social and moral status (Pope Francis of Assisi, 2015). At least we owe that to our dear Mother Earth notes the

sentimental Pope Francis of Assisi.

Environmental psychology is an interdisciplinary field developed in the 19th century with an aim of examining the interplay and the interrelatedness between human and their physical environment (Gieseking, 2014, p. 587). It has a very diverse scope drawn from various social sciences, which include psychology, anthropology, economics, sociology, geography, public policies, education, architecture, among others integrating with natural sciences such as forestry, agriculture, botany, zoology, biochemistry, wildlife management among others (Gifford, 2007, p. 200; Williams & Patterson, 1996). The primary aim of environmental psychologists is projected on understanding the value human accord to the environment and the impacts of their decisions to their surroundings (Gieseking, 2014).

The current millennium is considered an era of Anthropocene in which the impacts of human activities and decisions of natural environmentalist has been recognized by many scientists and researchers from different fields (Stoett, 2016). The current state of natural resource management and climate change ethical questions require a wide range of knowledge and expertise of which ecological principles cannot sufficiently provide cordial resolutions. Because many of the questions are drawn based on the human values and concerns, integration of environmental psychologists in efforts of climate change mitigation and adaptation is critical (Cote & Nightingale, 2012; Gieseking, 2014).

Environmental psychology takes into account not only the human behaviours, cognition and perceptions but views the environmental challenges and attributes from an holistic point by integrating with varied schools of thoughts (Gifford, 2007). It helps scientists define how people relate and define their place and space as well as how the surrounding responds to the sense accorded to it. The concerns of environmental psychologists can be categorized into the environmental experiences and perception, socio-political relations, human behavior and the emotional relationship between people, place, and space (Gieseking, 2014).

The environmental perceptions evaluate how people perceive and take their surrounding for instance, the uniqueness on how various people manage a forest. On the other hand, environmental experiences address the interplay between knowledge

and cognition a person or community has (Bishop & Browne, 2007; Gieseking, 2014). The experience and magnitude of expertise people have helps them in decision-making process and the approach to the issues differs with a person's experience. The two principles have grave impacts on the notions of both personal space and that of the surrounding. As time passes by, the perceptions and the experiences of people change bringing about different behaviors that shape their decisions, hence when the different environmental approaches and ideas are integrated, they form critical elements of the ecological psychology umbrella (Bishop & Browne, 2007).

Every policy, strategy, or project deployed in pursuit of promoting environmental sanity and sustainability must recognize the relationship between the place and its identity, which gives meaning to the society's environmental sense and experience (Gifford, 2007; Moore *et al.*, 2014). The identity of a place exhibits the emotional and behavioral capacity of the people that plays a vital role in determining their environmental consciousness (Gieseking, 2014). Once the identity of the people and place has been synchronized, it will promote the system thinking, as the various elements in the system shall be factored in the final decisions made. Despite climate change being a common global problem, each country distinctly has varied approaches of implementing the mitigation and adaptation measures denoted in their national commitment strategies (NRDC, 2015). For instance, there is a huge disparity in which Kenya and Nigeria would opt to implement clean energy projects due to the distinctiveness in their social, economic, cultural economic, technological and ecological backgrounds.

Environmental psychology also takes grave acknowledgement of the socio-political concepts and attributes of the people regarding the space and place they occupy. The social and political concerns both at national and global level play an imperative role in the development and implementation of climate change incentives (Bishop & Browne, 2007; Boonstra, 2016; Moloney *et al.*, 2014). The social and political perceptions build our imagination about environment. Therefore, at the formulation stage of policies and laws or at the development stage of a project, it is prudent to consider the expertise of psychologists who understands the socio-political status of the people to capture their concerns in the project. The incorporation of environmental psychology in the fight against global warming and promotions of

sustainable development has the potential of stimulating hostile thinking (Folke *et al*., 2010; Moloney *et al*., 2014). The perception, experiences, attitudes, norms, emotions, economic, socio-political status, and the human behaviors directly implicate the healthiness and wellbeing of the general humanity and the environment. Therefore, environmental planning has an integral and indispensable role to play in addressing the relationship between humans and the wicked problems faced today while elucidating achievable and efficient remedies.

3. Human Dimensions

The nature of human being is unique due to its cognitive abilities, which help us determine the way we interact and coexists with the ecological systems in a unique and exceptional way (Reser, 2007). Different people accord different values to different aspects of their environment depending on their social, political, and cultural beliefs and values. The culture of the people defines the way the community relates with the environment, for instance the way forest habitat communities living adjacent to the forests and those people far from the forests coexists with their surrounding is different (Boonstra, 2016). Their environment greatly influences their culture and value of the forest hence is expected to behave differently. Therefore, it is essential for environmental programs, projects, policies, and laws to be sensitive to both the social and the ecological concepts of the system also known as socio-ecological system (Pope Francis of Assisi, 2015; Stoett, 2016).

The concept of socio-ecological system was coined in an effort of coupling the human and the natural systems, which have been studied separately (Boonstra, 2016; Cote & Nightingale, 2012). The systems contain elements that depend on each other hence to maintain the symbiotic relationship and interdependency it is critical to integrate the components from both the systems. It recognizes the two-way relationship, which is critical to environmental psychologists. The coupling has indispensable impacts on both the current and future possibilities in alleviation of climate as it promotes the harmonious coexistence between the social and the ecological components and promoting ecological resilience.

The subsequent topic alludes the system thinking which advocates for the collective integration of all the components in a system and approach to a system from a

holistic view rather than from individualistic perceptive (Moore *et al.*, 2014; Stoett, 2016). The socio-ecological system advances the principle of system thinking. While undertaking socio-ecological approaches, it is critical to recognize the complexity in the social system that is more dynamic than ecological. The complexity of the system is likened to the different interaction and values among individuals, which implicates on the norms and values of the entire community capable of affecting the behavior of the society (Stoett, 2016). Putting into consideration all the attributes of each individual is tricky while the norms vary extensively from one community to another. However, this should not be excuse for not factoring the attributes when undertaking socio-ecological projects.

Nevertheless, in most of the societies, the socio-ecosystems are intimately considered to service humanity with wealth and security, which has gravely led to the transformation of the ecosystems into either more or less desirable conditions (Reser, 2007; Walker & Salt, 2012). Despite that fact, the humans obtain considerable services from the ecosystem such as clean water, food, clean air, fuel, cloths, materials for shelter, places of relaxation and raw material for the many industries, their actions significantly jeopardized the ability of the ecosystem to provide such services adequately (Bishop & Browne, 2007; Boonstra, 2016; Moloney *et al.*, 2014; Williams & Patterson, 1996). The cumulative consequences of the impacts greatly compromise the livelihood and security of humans increasing their susceptibility to adverse environments that claim their lives explains (Moloney *et al.*, 2014).

4. System Thinking and Theory

Our daily activities and expediencies continually squeezes life out of our common home, as much as we strive to make our home a better place, our actions have equally created an opposite force that is destroying environment cries (Pope Francis of Assisi, 2015). The elderly people are noted to lament of the heightened rate of destruction of the beautiful landscapes, the hunting grounds, and wildlife and plant diversity. The world is becoming more inhabitable, the water levels and global temperatures have risen, climate patterns are becoming unpredictable, water and air quality are not guaranteed, and some flora and fauna are nearly extinct (NRDC, 2015; Pope Francis of Assisi, 2015). Climate changes have proven to be a real

wicked problem.

The most pressing issues we face today can prove to be complex, but they have simple solutions. Do not be intrigued by the term simple solutions as the simplicity; most of the solutions of the complex problems and efficacy of the outcomes can be contested (Stoett, 2016). The basic definition of environmental psychology is a multidisciplinary field that has the potential of adopting multi-dimensional approaches to curb the common environmental challenges (Walker & Salt, 2012). Nevertheless, when adopting such strategies, it is critical to rethink the design and mode of delivering the solutions. The system theory advocate for the integration of all the elements in a system by embracing complexity of the system in every decision ever-made (Williams & Patterson, 1996).

Basing on the fact that environmental psychology bridges the human perspective and the environment, they are in position to help ecologists, conservationists, and planner among others to rethink the way they design and adopt to climate change mitigation and adaptation programs (Gieseking, 2014; Reser, 2007). They provide critical insights on the importance of incorporating a complex adaptive system, which recognizes the individual and cumulative behaviors of the system components change in relation to a response from either a single or collection of events over time (Stoett, 2016). Climate change is a complex adaptive system that reflects the cumulative and individual activities undertaken across the world overtime. Therefore, through environmental psychology and the application of the system thinking principles, humanity in general shall be able to understand that decision they make should not be self-centered but must equally put into consideration the other components in the system (Reser, 2007).

The environmental psychologists have an imperative role on determining dynamic and innovative remedies to the wicked problems that comprise the habitability and healthiness of our common home. The potential of environmental planning as a vessel of change and transformation within communities, nations and at a global scale should be harnessed. It embraces transdisciplinary dialogue capable of shaping our collective understanding of the vitality of projecting our development strategies for a sustainable future.

5. Ecological Resilience

Walker and Salt (2012) defines ecological resilience as the "capacity *of a social-ecological system to absorb or withstand perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions*." It describes the degree of a system to self-organize, learn, and adapt to the changing environment. Humans depend on the environment for survival and we continually influence the ecosystem from both a local and global scale. When the resiliencies capacity of any system is enhanced, it increases its ability to tolerate disturbances hence sustainably providing its services to the users. Subsequently, socio-ecological resilience helps humanity to anticipate probable changes and formulate amicable and ambient pathways for the betterment of future life (Folke et al., 2010).

Reduction of resilience increases the susceptibility of the system to perturbations limiting its capability to provide its services and sustain itself and other components that depend on it. The impacts of climate change postulate a system that is incapable of sustainably absorbing the disturbance (Walker & Salt, 2012). The consequences of the limited resilience are manifested with the change in the adverse climatic patterns, increase in world temperatures and water levels, shortages of quality and clean water and air, escalated shortage of food and food security issues among others. People who entirely depend on the ecosystem for survival gravely shoulder the consequences of the vulnerability. The exacerbated implication of global warming has resulted it calls for restoration measures of the environment (UNEP, 2016). Researchers though argue that restoration of the system to the previous state is a complex and expensive venture nearly impossible while others argue that it can never be restored and therefore advocate for preventive measures (Stoett, 2016; Walker & Salt, 2012).

Resilience is at the heart of environmental psychology principles, the interplay, and coexistence of humans and their natural environment directly implicates on the resilience abilities of the ecosystem and the social well-being of the people (Folke et al., 2010). Existence of a harmonious relationship between people, space, and place promotes resilience therefore, environmental planning seeks to understand

the factors that promote resilience and mechanism in which can be disseminated and shared (Walker & Salt, 2012). Incorporation of environmental psychology principles in management of natural resources and climate change has the capability of reducing the challenges as it promotes adaptive management and embraces system thinking in its projections (Gieseking, 2014; Moore et al., 2014).

Climate change has a salient focus from both social and ecological perspective as the impacts of the vulnerability of the ecosystems has both socioeconomic and psychosocial impacts to the populace. Human activities equally have dramatically contributed to the aggravating global warming. The changes and their impacts are understood differently from comprehensive social, economic and political perspective, which posts a great challenge in the development and implementation of climate change mitigation and adaptations programs (Reser, 2007). The EP thus has a key role to play more so to problem evaluation, risk and behavior change communication and strategies.

It is crystal clear that the wellbeing and survival of humanity strongly rests on the viability and integrity of the biophysical environment. There should be a balance between the human dimensions and the ecological aspects and integrity for the system to be resilient. The implication of the human activities cuts across not only to the physical spaces and places but also to their own health and survival. Integration of principles and expertise of environmental psychologists is critical in efforts of promoting restoration and salient measures for sustainable utilization of natural resources. The interrelatedness between the human perceptions and values and the environment provides insights of factors for ecological stress reduction and restoration.

6. Conclusion

Anthropogenic factors are at the core of the climate change induced by the behaviors, cognitions, motivations, values, lifestyles, and attitudes of individuals and societies as well as organizational and institutional policies and contexts. Both developed, and third world countries have played substantial contribution to the increased environmental degradation through the exponentially aggravating utilization of non-renewable energy, dilapidated agricultural productivity, overexploitation of

natural resources, conflicts and wars over natural resources and other cumulative and convergent human contributions.

It is subsequently clear that environmental deprivation equally compromises the wellbeing of human life as the laws of nature demand human and the environment to coexists in a synergic manner that both the human and ecological elements benefit from each other. Psychology being a discipline and a practice concerned with how people understand, value and relate with their socio-ecological systems show how the nature of the ecological systems interact with individuals and the society at large. Integration of the expertise therefore bridges the perspectives of the environmental problems and the human dimensions critical for sustainable management of natural resources and climate change. Psychologists play a critical role in many interdisciplinary and collaborative works but their potential in natural resources management has not been sufficiently embraced.

Due to the immense urgency and degree of the environmental issues prevalent at both the national and global level, it is essential to integrate psychological principles and factors to problems and remedies to and for climate change programs. Reser (2007) points out that the integration of psychologists in management of natural resources requires greater attention, visibility, concerted efforts, and collaborations. It multidimensional nature is relevant in addressing in the environmental concerns and as it provides a better understanding of the factors influencing the behaviors, attitudes and decisions of individuals, communities and organizations basing on both their adverse implications and the efforts for sustainable management of the environment. EP has the potential of effectively promoting awareness and changing the attitudes, behaviors and attitudes of people toward environmental concerns and responsibility.

A critical measure in the management of anthropogenic factors anchors on the ability to monitor the change in human behavior, perceptions, and attitudes as the needs of people change over time. The psychologists are very sensitive in determine and monitoring the change of behavior and attitudes in people hence able to provide ample deliberation of measures that coincides with needs and behavior of the people. By providing a better and multidimensional understanding between the human connections and the environment, the ecological planners, conservationists, private

investors and interested parties in natural resource management are able to have a broadened and comprehensive view of the system. This enables them to adopt complex environmental management programs and legislations appreciating the interdependency of every component of the system. Ecosystem management can only be successful thorough understanding the social and natural history of the system, which can be bridged by application of principles of environmental psychology and system thinking. The current approaches and programs to sustainable managements of natural resources and climate change are failing us. The programs are modeled on limited spectrums and expectations, which more than often overlook the major perturbations and often optimize some components in the system in preference of others. Through transdisciplinary research and collaborations, every component in environmental psychology shall be considered for the betterment of socio-ecological system.

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Girls' Education and the Sustainable Development Goals (SDGs): Issues and Concerns

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Abstract

That education and empowerment of girls and women transforms lives and improves quality of life is not in doubt. According to UNICEF, girls who stay in school longer are more likely to be healthier, have children when ready, get jobs and most importantly, invest in their children's future. Of concern, however, are issues of girls' access to education, performance at national examinations, dropout rates, prevalence of HIV and AIDS and vulnerability to sexual and gender-based violence. Globally one in five, that is about 20 per cent of girls are denied education and girls continually face discrimination and sexual abuse. The Kenya Demographic and Health Survey indicates that 1.3 million primary school age children are not in school. Out of this number, 55% are girls. Kenya's Basic Education statistics show a dropout rate of 23.5% for girls in Standard Eight. In 2015 at the secondary school level, only 29.3% of the girls obtained a mean grade of C+ and above. Significant progress has been made in raising awareness of gender issues and structures and strategies are in place. Girls' access and performance at the secondary level raises concerns and issues that have implications for the attainment of Kenya Vision 2030 and the Sustainable Development Goals. In this paper, the author provides data and information aimed at providing a basis for discussion on ways to increase girls' access to education, ensure that they complete schooling and perform well to enable them to participate fully in the attainment of Kenya Vision 2030 and the Sustainable Development Goals.

Keywords: *Education, Equality, Equity, Girls, Performance, Sustainable development goals.*

1. Introduction

At independence in 1963, the Government of Kenya recognized three enemies of human development-*poverty, ignorance and disease*-and set targets to eradicate them. To increase opportunities for eradicating ignorance, community schools that were mainly co-educational were set up and an Adult Literacy Programme was initiated. To eradicate disease, there were public hospitals and dispensaries in all

parts of the country and to eradicate poverty, the cooperative movement enhanced marketing of cash crops such as coffee and tea, and the Kenya Cooperative Creameries assisted farmers in getting money from the dairy industry. Through the cooperative marketing processes, farmers were able to pay school fees for their children, both boys and girls.

Later, with the introduction of Free Primary Education in 2003, the number of students, both boys and girls enrolling in primary school has increased tremendously. The Free Day Secondary Schools introduced in 2008 has also helped in increasing the number of students enrolling at secondary school. However, the Kenya Demographic and Health Survey, 2014 indicates that 1.3 million primary school age children are not in school. Out of this number, 55% are girls. The Basic Education Statistical booklet (2014) indicates a dropout rate of 23.5% for girls in Standard Eight. In 2015 at the secondary school level, only 29.3% of the girls obtained a mean grade of C+ and above.

While the gains in education in Kenya are evident and significant, there are several issues and concerns that relate directly to girl's education that need to be addressed if Kenya is to achieve Vision 2030 and the Sustainable Development Goals (SDGs). The situation of girls' education is not a concern for Kenya alone. It is a universal and international concern, hence the inclusion of Sustainable Development Goal 4 and Goal 5 that are specific to women and girls.

Research conducted by Plan International has shown that girls continue to be the single most excluded group in the world and face discrimination and sexual abuse simply because they are young and female. Plan International has initiated a global movement, "I am a girl" to ensure that girls can learn, lead, decide and thrive. The concept of thriving is particularly important because it anticipates that girls will grow and get an education that enables them to develop their full potential and enjoy equal economic opportunities as the boys to participate meaningfully in human development. In the State of Girls in Kenya report, 2015, it has been observed that despite progress made in increasing girls' enrollments at the primary school level, girls still face disadvantages and exclusion in education due to insurmountable challenges at home, on the way to school and at school.

UNICEF (2007) has documented evidence that well educated and empowered women are likely to live healthy for longer and raise healthier families. The Sustainable Development Goals (SGDs) were enacted by United Nations in 2015 and it was made clear that to achieve the SDGs, it was necessary to "unlock the power and potential of girls" and confront the root causes of discrimination to ensure the achievement of SDGs.

UNESCO (2000) defines learning outcomes as the skills, knowledge or behavior that students are expected to demonstrate because of a learning activity. Furthermore, UNESCO (1996) has identified four pillars of education: (a)Learning to know: to provide the cognitive tools required to better comprehend the world and its complexities, and to provide an appropriate and adequate foundation for future learning;(b) Learning to do: to provide the skills that would enable individuals to effectively participate in the global economy and society; (c) Learning to be: to provide self-analytical and social skills to enable individuals to develop to their fullest potential psycho-socially, affectively as well as physically, for an all-round "complete person"; and (d) Learning to live together: to expose individuals to the values implicit within human rights, democratic principles, intercultural understanding and respect and peace at all levels of society and human relationships to enable individuals and societies to live in peace and harmony.

In Kenya, the International Day of the Girl is celebrated each year on October 11 to celebrate girls and highlight the need for justice and equality. Several factors have been cited as militating against girls' education. These include the cost of education especially at the secondary school level, long walking distances to schools making girls vulnerable to sexual violence and cultural norms and practices that make girls marry early or get pregnant while in primary school. In this paper, data on girls' education is presented that forms the basis of issues and concerns that need to be addressed if the girls and women are to participate fully in the achievement of the Sustainable Development Goals.

Given the work that women and girls do, they are affected and impacted upon by each of the seventeen Sustainable Development Goals. Through the Constitution and other relevant policy frameworks, Kenya has made significant progress in ensuring

that there are legal provisions for gender equity and equality. Significant progress has also been made in raising awareness of gender issues and structures and strategies for affirmative action are in place. However, girls' access and performance at the primary and secondary school level raises concerns and issues that have implications for the attainment of Kenya Vision 2030 and the Sustainable Development Goals.

The purpose of this paper is to analyse trends in performance of girls at the secondary school level and make a case for the need to address issues of access, performance, sexual and gender-based violence towards girls that mitigate against their educational attainment. It is critical to ensure that girls have increased access to quality education, complete schooling and perform well to enable them to participate fully in the attainment of Kenya Vision 2030 and the Sustainable Development Goals.

2. Sustainable Development Goals

As a follow up to the Millennium Development Goals (MDGs), the United Nations set an additional 17 goals, 169 targets and 230 indicators, known as the Sustainable Development Goals to guide development by 2030.Women and girls are critical participants in the achievement of each of the 17 Sustainable Development Goals (UNWomen, 2016). While SGD 4 and SDG 5 are girls and women-specific, a closer analysis of the role of girls and women in society confirms that girls and women's participation in the achievement of all SGDs is critical. For girls and women to meaningfully and constructively participate they must have acceptable levels of education that equip them with knowledge, skills, attitudes and competencies that are necessary and sufficient for active and meaningful participation.

Goal 1: End poverty in all its forms everywhere

Data on women's wealth quintile reported in the Kenya Demographic Health Survey - Republic of Kenya (2014c) - shows that in the survey sample, women who have no education combined with those who have some education, comprise 73% of the women in the lowest quintile while a total of about 80 per cent of the women with a minimum of complete primary school and beyond are in the highest wealth quintile.

These figures imply that to end poverty in all its forms everywhere, Kenya must focus on strategies that make girls complete at least secondary school.

Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

In most of the rural populations, women and girls are responsible for tilling the land, providing food for the families and a majority involved in subsistence agriculture. Girls with no education or only primary education are most likely to continue using the old methods of *panga, hoe and jembe* and not benefit from the technology that is advertised in programmes such as Smart Farms. Women and girls in general do not have equal access to ownership of land.

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Women and girls are culturally expected to be submissive to their husbands or boyfriends when it comes to matters of sexual nature. This situation coupled with low economic status makes them vulnerable to disease and ensuring healthy lives becomes a serious challenge. On the other hand, girls who are empowered through education will have a strong economic base and options to assist them to make informed choices to protect themselves from serious infections including HIV.

Goal 4: Ensure inclusive and equitable quality education and promote life-long learning opportunities for all

Quality education is a right guaranteed in the Kenya Constitution. However, the drop out levels and lower performance levels of girls indicate that this goal will only be achieved if the access and performance levels of girls are increased to ensure inclusiveness and equitable quality education.

Goal 5: Achieve gender equality and empower all women and girls

This is a very important SDG because it is the only goal that women and girl-specific. Despite the legal provisions, it is important to change perceptions and attitudes towards girls and women and work towards elimination sexual and gender-based violence which is rampant among school age girls.

Goal 6: Ensure availability and sustainable management of water and sanitation for all

In the rural areas and the slum areas in the big cities in Kenya, women and girls are responsible for fetching water, sometimes from very long distances. The deplorable sanitation levels especially in the slums impact more on the health of women and girls because of their practical and unique needs such as washing during the menstrual cycle as well as disposal of used sanitary towels.

Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all

Women and girls spend significant amounts of time fetching firewood and in some cases not from their own parcels of land. It is possible that most women and girls in rural areas do not have access to modern sustainable energy sources.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

While there are more women who have climbed the ladder of employment, yet perceptions and attitudes that "leadership has a male face" persist. Very well-educated women continue to speak of sexual harassment in promotions at the work place.

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

In building resilient infrastructure, it is important to include the interest and needs of both men and women.

Goal 10: Reduce inequality within and among countries

It is important that all countries work towards elimination of biases and prejudices towards women and girls and deal more firmly with men who defile young girls.

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Most women, some with only primary schooling have moved into cities and work as house-helps. They live in slums that are unhealthy and unsafe. Thus, in making the cities and human settlements safe, gender considerations must be at the fore.

Goal 12: Ensure sustainable consumption and production patterns

For sustainable consumption and production patterns, both men and women must work towards equal participation and become "prosumers", that is people who not only consume but also produce. Women need to be involved actively in leadership and management.

Goal 13: Take urgent action to combat climate change and its impacts (in line with the United Nations Framework Convention on Climate Change)

When climate disasters take place, women and girls suffer the most.

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Women and girls in the fish industry need to be actively involved at all levels.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Women and girls are critical participants in the protection and promotion of sustainable management of forests and preserving the planet earth.

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

While the UN Security Council Resolution 1325 of 2000 recognises that women must play an active role in the promotion of peace, there are still few women in relevant leadership positions.

Goal 17: Strengthen the means of implementation and revitalize the global partnership.

The means of implementation of the SDGs will include recognition that gender equity and equality are necessary, and the country needs to deliberately focus more on strategies aimed at accelerating the attainment of gender equity and equality so at to result in the attainment of all the SDGs.

3. **Indicators of Development**

In Kenya, the Constitution guarantees a right to education for all. In 2003, the Government introduced Free Primary Education for All and later in 2013, introduced Free Secondary Education. The implementation of Free Primary Education led to significant increases in enrollment at the primary school level for both boys and girls. However, performance, particularly at the secondary level still needs to be improved.

3.1 Enrolment

3.1.1 Primary

Girls - Primary Enrolment (2011 - 2014)
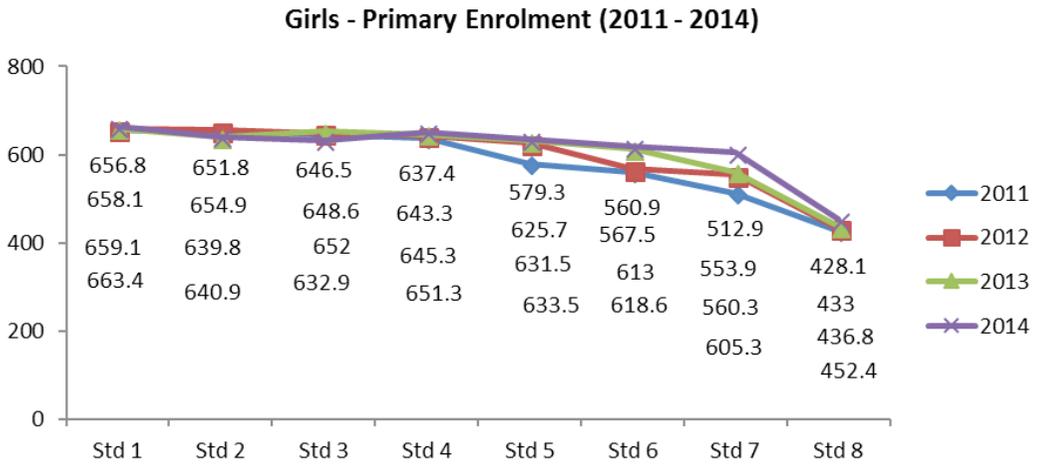
Source: Republic of Kenya (2014a)

According to the data in figure 1 above, the enrolment of girls in standard 1 has increased over the years; however, the enrolment decreases as the girls' progress to higher classes. For example, in 2014, the enrolment of girls in standard 1 was 663,400, while the enrolment of girls in standard 8 was 452,400.

Figure 2: Boys - Primary Enrolment

Boys - Primary Enrolment (2011 - 2014)
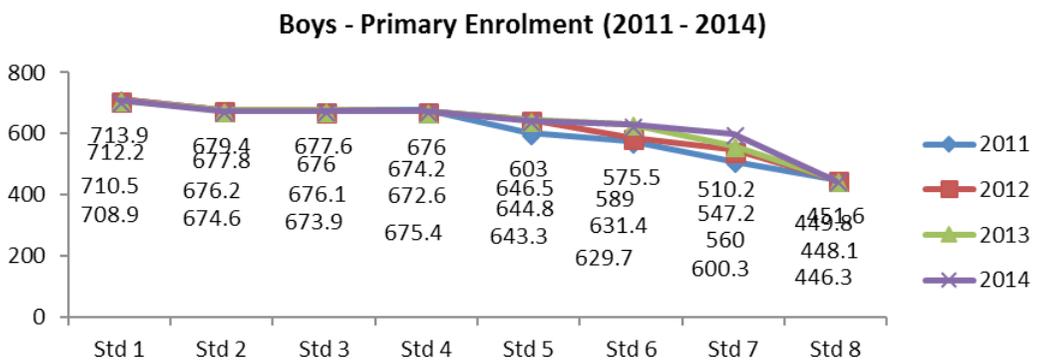
Source: Republic of Kenya (2014a)

From figure 2 above, the enrolment of boys also decreases over the years as the boys' progress to higher classes. For example, in 2014, the enrolment of boys in standard 1 was 708,900, while the enrolment of boys in standard 8 was only 446,300.

3.1.2 Secondary

Figure 3: Enrolment in Secondary Schools by Class (2011-2014)

Enrolment in Secondary Schools by Class (2011 - 2014)
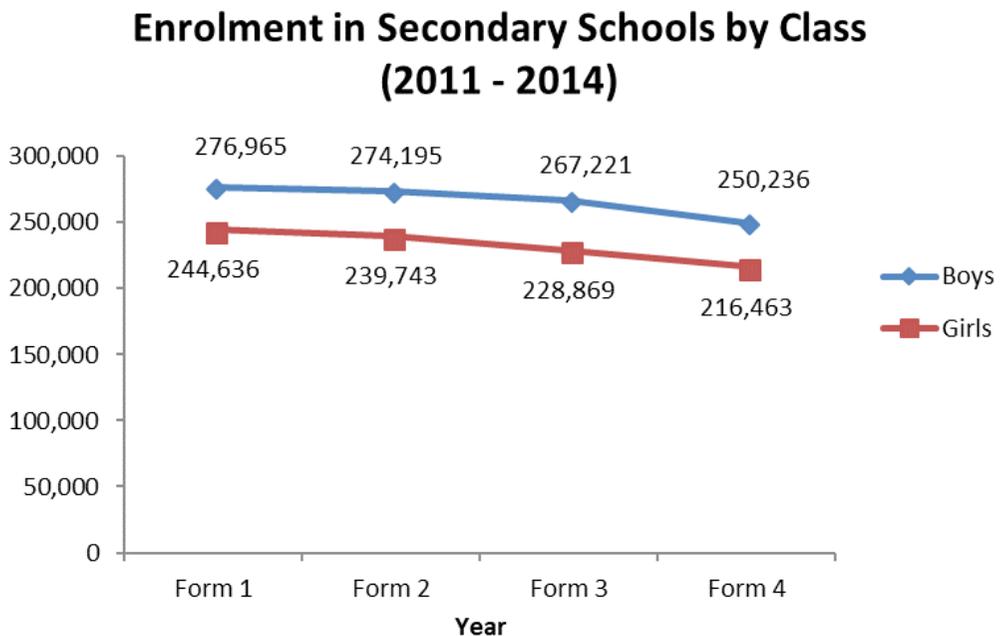
Source: Republic of Kenya (2016)

From the data in figure 3 above, we see that the enrolment for both boys and girls at the secondary level decreases as the students' progress to the higher classes. In 2011, the number of girls in form 1 was 244,636; however, by form 4, the number had dropped to 216,463, a decrease by 11.5%. The boys' enrolment also decreased from 276,965 in 2011 to 250,236 in 2014; a decrease by 9.7%.

3.2   Performance

3.2.1   Performance at the Kenya Certificate of Secondary Education (KCSE)

For admission into a Kenyan university, a student must obtain a C+ and above at the KCSE examination. Data on the performance at KCSE shows that very few girls get admission into university. On average, about 30% of the students qualified for entry into the university from 2011 to 2015 of which on average, 40% were girls and 60% were boys.

Figure 4: Percent that qualified for entry into the University

Source: Republic of Kenya (2016)

% that Qualified for entry intoTraining Institutions (Grades C, C-, D+)
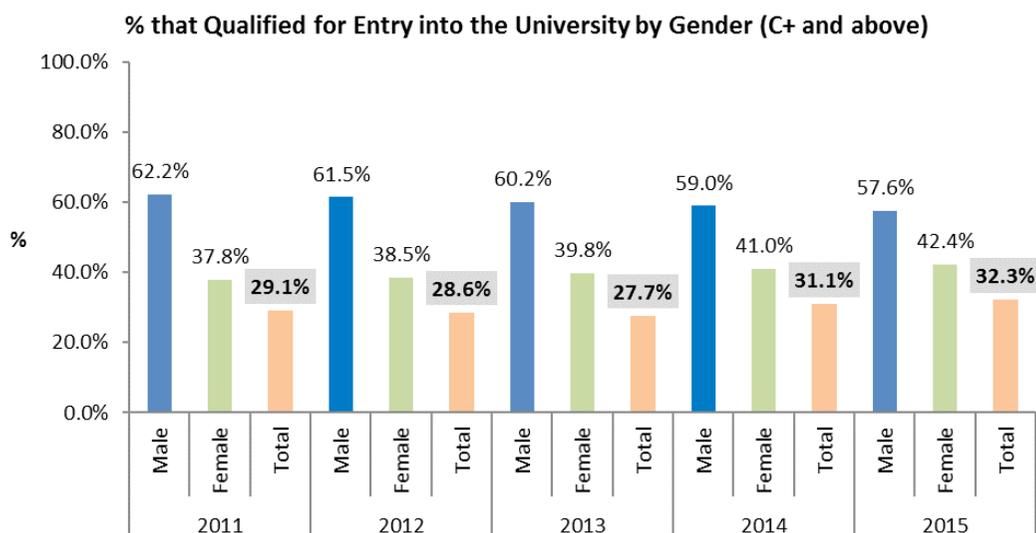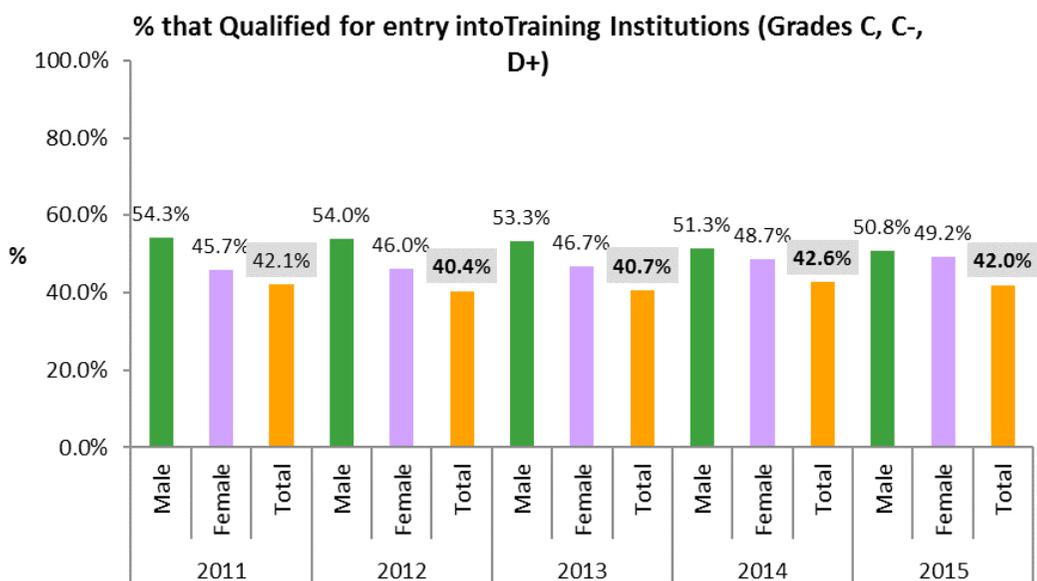
Source: Republic of Kenya (2016)

In the Kenyan education system, students who do not qualify for entry into the university (C+ and above), join training institutions; these are students who obtain C, C- and D+ grades. Figure 5 shows that between 2011 and 2015, on average, 41.5% students fell into this category of which 47.2% were girls and 52.7% were boys.

Figure 6: Percent that Obtained Failing Grades

% that obtained Failing Grades (D, D-, E)
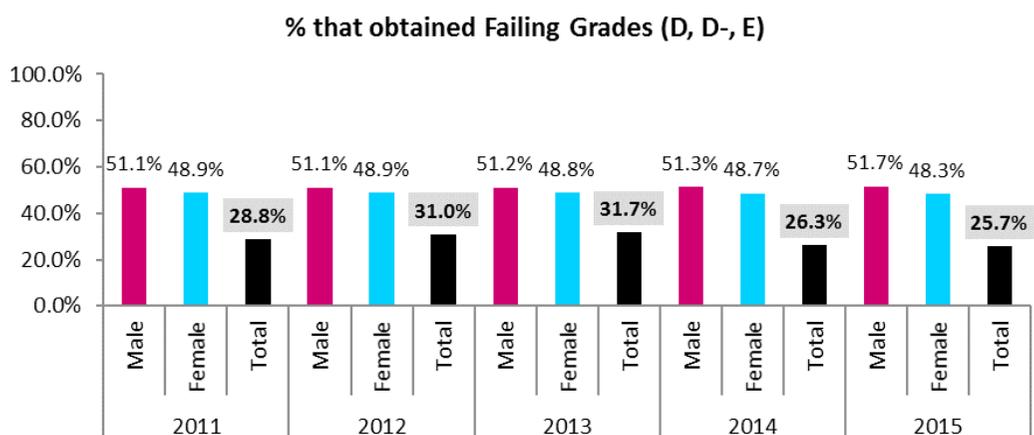
Source: Republic of Kenya (2016)

In this paper, failing grades are termed as those students who obtained D, D- and E grades at KCSE. In figure 6 above, between 2011 and 2015, on average, 28.7% of the students obtained failing grades of which 48.7% were girls and 51.3% were boys.

3.3 Transition Rate

Figure 7: Transition, Access and Retention Rate

Transition, Access and Retention Rates

Year	Transition Rate Primary to Secondary	Access Form 1	Retention - Form 1 to Form 4
2011	63.5%	53.0%	80.4%
2012	64.5%	53.0%	86.9%
2013	74.7%	60.0%	81.7%
2014	79.6%	63.0%	79.6% / 76.4%
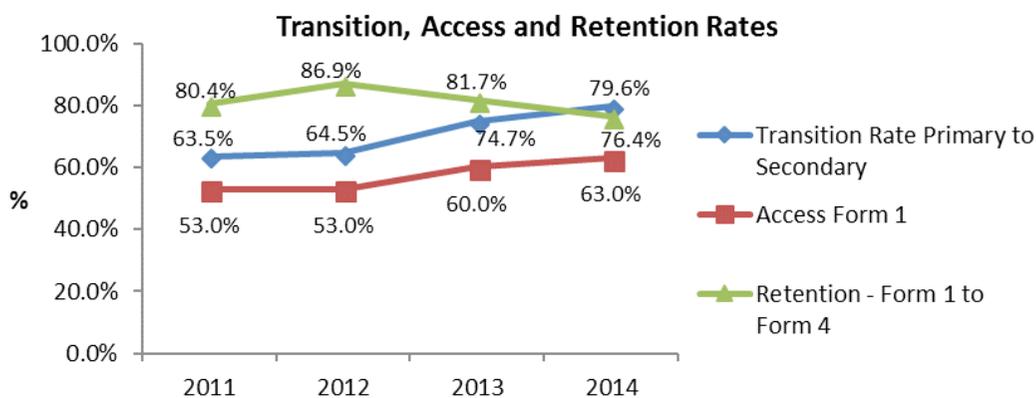
Figure 7 above shows data on the transition rate from primary to secondary school, the access rate for form 1 entry and the retention rate from form 1 to form 4.

- Transition rate: The data shows that the transition rate from primary to secondary increased from 63.5% in 2011 to 79.6% in 2014; a 25.4% increase. This means that more students are enrolling in secondary schools after completing primary school.
- Access to form 1: The number of students who were able to obtain form 1 places increased from 53% in 2011 to 63% in 2014. A lot more still needs to be done to ensure that all students have access to form 1 places once they complete primary school.
- Retention from form 1 to form 4: On average, 82.1% of the students stayed in school from form 1 to form 4 from 2011 to 2014.

3.4 Women Education Attainment

The table below shows that women who have completed secondary and more than secondary (26.8% and 29.4% respectively) fall in the highest wealth quintile implying that education increases wealth. Moreover, majority of those with no education and some primary schooling fall in the lowest wealth quintile (30.6% and 42.5% respectively).

Table 1: Wealth Quintile

Highest level of schooling	Wealth Quintile				
	Lowest	Second	Middle	Fourth	Highest
No Education	30.6	3.9	3	2.4	1.8
Some primary	42.5	44.1	29.6	17.1	7.5
Completed Primary	16.5	27.6	30.5	28.9	19.5
Some Secondary	7.1	15.3	20.1	19.9	15
Completed Secondary	2.7	7.5	12	21.6	26.8
More than Secondary	0.4	1.6	4.9	10.1	29.4
Median years completed	**5**	**7**	**7.5**	**8**	**11.2**

The data in table 1 is presented in figure 8 below.

Figure 8: Women Wealth Quintile
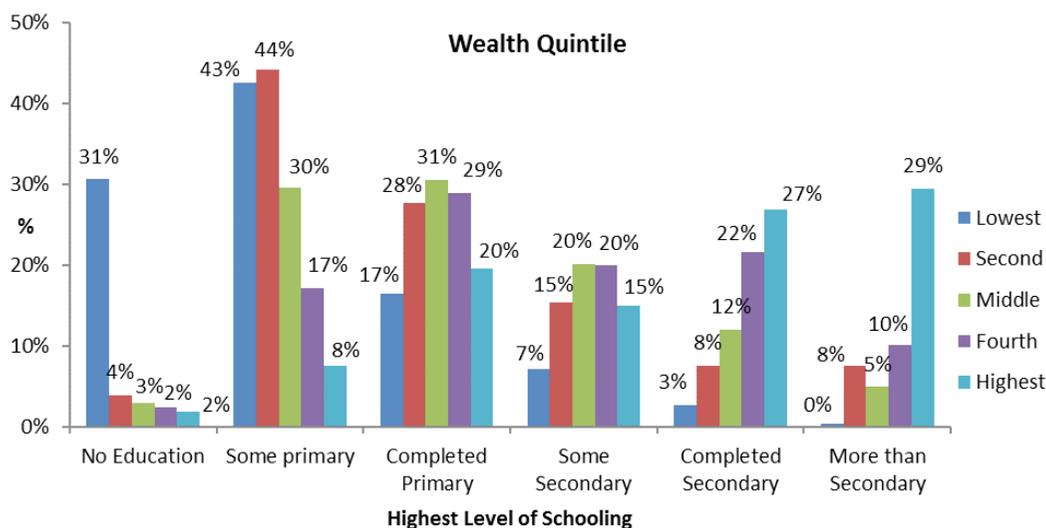
3.5 Fertility Rate

According to the Kenya Demographic and Health Survey Republic of Kenya (2014c), the fertility rates in women decrease as a woman's education increases. Table 2 below shows that the fertility rate for women with secondary or more education was 3 whereas the fertility rate for women with no education was 6.5. Furthermore, the fertility rate by county was highest in North Eastern (6.4) where majority of the women are not educated and was lowest in Nairobi (2.7) where majority of the women are educated.

Table 2: Total Fertility Rate

Total Fertility rate in the three years preceding the survey				
	No Education	Primary Incomplete	Primary Complete	Secondary+
Total Fertility Rate	6.5	4	4.2	3
Mean # of children ever born to women aged 40-49	6.5	6	5.1	3.7

Source: Republic of Kenya (2014c)

Table 3: Total Fertility Rate by County

Total Fertility Rate for the three years preceding the survey (By County)								
	Coast	North Eastern	Eastern	Central	Rift Valley	Western	Nyanza	Nairobi
Total Fertility Rate	4.3	6.4	3.4	2.8	4.5	4.7	4.3	2.7
% of women aged 15-49 currently pregnant	6.6%	12.0%	4.6%	4.8%	7.0%	6.7%	5.9%	6.8%
Mean # of children ever born to women aged 40-49	5.5	7.1	4.7	3.7	5.5	6.1	5.8	3.1

Source: Republic of Kenya (2014c)

3.6 HIV Prevalence

Data from the Kenya AIDS Response Progress Report (2014) - Republic of Kenya (2014b) - shows that the HIV prevalence was significantly higher for females compared to that of males among the general population. In addition, among the youth aged 15-24, the HIV prevalence for the females is also significantly higher than the males ranging from 5.9, 5.5, 4.5 and 3 in 2003, 2007, 2008 and 2012 respectively. Whereas for the males was much lower at 1.2, 1.5, 1.1 and 1.1 respectively

Figure 9: HIV Prevalence among the General population

HIV Prevalence among the General population
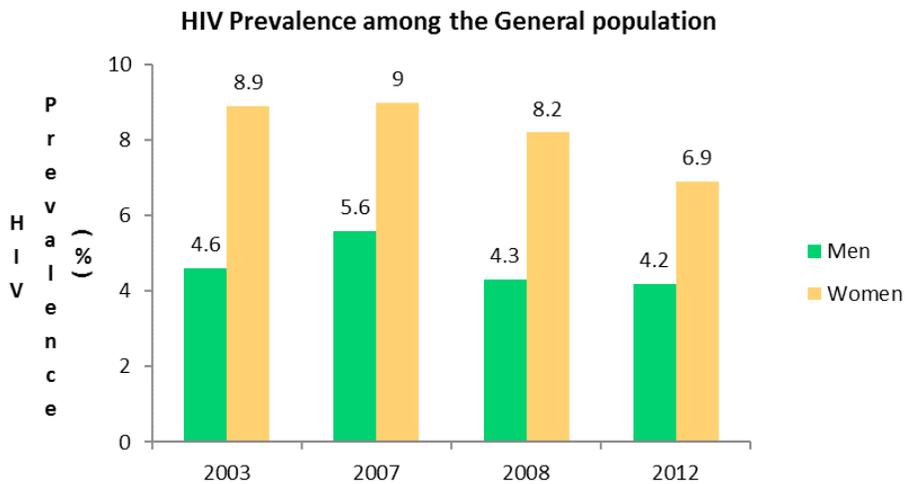
Source: Republic of Kenya (2014b)

Figure 10: HIV Prevalence among young people

HIV Prevalence among Young people (15-24 years)
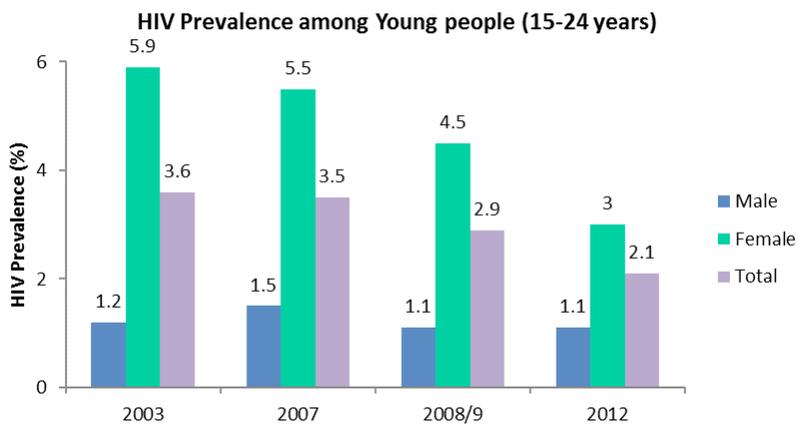
Source: Republic of Kenya (2014b)

4. Issues and Concerns

While the law does not discriminate against girls and women, there are social, political and economic imbalances that need to be addressed. These include: addressing the different needs for girls; addressing the injustices that exist to ensure that boys and girls, men and women start at the same point and end at the same point. The current situation is that while girls and boys start school at the same time, many more girls' dropout along the way either through pregnancy, early marriages or low performance. There are several barriers to girls' education that should be of concern to policy makers, educators and leaders interested in the achievement of the Sustainable Development Goals.

4.1 Early marriage/pregnancy

In the 2015 National Adolescent and Youth Survey - Republic of Kenya (2015), youth interviewed report that girls drop out as early as standard five to marry older men who can then provide for their families. Thus, girls continue to be considered a source of wealth for the family.

4.2 Poverty

Most families are poor, and girls drop out to make money for basic social needs. Since traditionally, male-children are more valued, parents mostly will focus on the girl-child as having completed schooling when they reach Standard Eight.

4.3 Societal perceptions toward the girl-child

There are some communities in which marriage is considered the most important aspect in a woman's life and there are fears that highly educated women are likely not to get married and bear children.

4.4 HIV and AIDS

The high prevalence of HIV and AIDS in the country and migration and movement of people has contributed to high incidences of HIV and AIDS. Many children have been left orphaned and this has made many girls the breadwinners of the home. The girls are forced to drop out of school so as to take care of their siblings and/or parents.

4.5 Safety and Insecurity

There are several incidences of girls being abducted and/or raped on their way to school. In the 2015 National Adolescent and Youth Survey - Republic of Kenya (2015), youth interviewed report that;

> "*girls in West Pokot and Bungoma reported to be raped on way home because they stay very far from home. Most children stay far from home and when they are sent home after classes and it gets dark while they are still on the way. They meet with strange people who rape them.*" *(Focus Group Discussion, 10-14-year olds, West Pokot, p..21).*

The youth emphasize that rape is very common, and seventy-year old men rape seven-year-old girls.

4.6 Sanitary facilities in the schools

The sanitary facilities in some of the schools are not girl-friendly- the toilets have no doors and there is no running water. Upon reaching puberty, some girls are unable to stay in school during menstruation because either they cannot afford sanitary pads, or they have the pads, but the facilities are such that the girls cannot stay clean and boys laugh at them, so they prefer to stay at home. This translates to one week out of school every month and leads to high levels of absenteeism and hence poor performance.

4.7 Illiteracy

High levels of illiteracy among the parents especially the mothers contribute to poor participation of girls in education at all levels.

5. Action to be taken

Women and girls are the centre of development and the achievement of the Sustainable Development Goals (MDGs) and the Kenya Vision 2030 will remain a dream, an illusion or a mirage unless specific action is taken to promote the education of girls at all levels, especially at the primary and secondary school levels.

1. Re-introduce pre-service programmes for teachers at primary school level and secondary school level to provide an opportunity for school principals, administrators to understand the aspirations of Kenya Vision 2030 and the Sustainable Development Goals and how they can integrate the aspirations into their teaching and learning strategies;

2. Expand the Israel supported programme of Education for Sustainable Development to more schools in the Primary and Secondary School;

3. Expand opportunities at secondary school level to ensure more girls enter and complete Secondary Education;

4. Provide bursaries for bright needy girls in all areas and especially in the arid and semi-arid areas;

5. Recognise the need to sensitize parents and communities on the importance of educating girls and work towards eliminating retrogressive cultural and religious practices that hinder development in education and health and bring about social ills such as early marriages in certain parts of the country;

6. Improve the sanitary facilities in primary and secondary schools and make them girl-friendly;

7. Introduce a compulsory course on gender issues in teacher training colleges and schools of education in universities and sensitise all teachers and school administrators on gender issues;

8. Focus more on raising learning outcomes for girls at Primary and Secondary School level;

9. Deal more firmly and decisively with men who defile young girls on their way to school;

6. Conclusion

While enactment of laws that do not discriminate girls and women from attaining the levels of education that are necessary for meaningful participation in the attainment of SDGs is necessary and is well documented, evidence shows that enactment of laws is necessary but not sufficient to bring about equality and equity in the participation of girls and boys, men and women in human development. Institutions must address the deeply rooted perceptions about women and men and girls and boys and ensure structures that were created without including and considering girls and women are

changed. Further, there is a need to strengthen mentoring and coaching programmes at the school level to ensure that there are deliberate strategies to raise girls' learning outcomes in the four pillars of education, identified by UNESCO, learning to know*, learning to do, learning to be and Learning to live together.*

> *Educating Kenyan girls and ensuring that each girl has an opportunity to study up to secondary level (as a minimum) is the single most important strategy for achieving the Kenya Vision 2030, the Sustainable Development Goals and creating a better Kenya!*

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Spatial Temporal Factors in Luo Traditional Religion: A Case Study of the Luo Homestead

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"Science and art are curiously connected. Each inspires the other; together they describe human experience. Both are shaped by common principle: the human mind seeks order and is only satisfied as it wrests design from complexity or apparent chaos."(Phillips, Filles, & Cohen, 1979).

Abstract

This paper investigates how the Luo of Kenya make homes according to time, space and the general topography of the landscape. These are the factors that determine the orientation and the alignment of the homestead which in turn are influenced by gravitational forces of nature. The location of the houses depends on a fixed pattern aligned to the cosmic dichotomy. The spatial and temporal order is controlled by nature and folklore taboos. For example, if one contravenes the sanctioned order and pattern, the family would be afflicted by incurable diseases that can only be remedied by correcting the disorder and realigning the structures. When such corrective measures are taken, they involve sacred objects and religious rituals that are conducted on sacred spots of the homestead at specific times. The study investigates the intersection between time, and space and how it resonates with Luo Cultural heritage. It would appear that the Luo home is adapting to fundamental physical laws that govern matter, space and time. The paper discusses how the Luo belief system makes them conform to a scheme controlled by the Solar system. And on this basis, the paper examines the Luo home as a temple in which peace is brought about by divination and land tenure is subjected to a formatted blue print that must remain constant. The study has been carried out by fieldwork survey and observation together with interviews and Focus Group Discussion. There was also library research to help with theorization, interpretation and analysis.

Keywords: *Folklore Taboos, Luo Belief System, Luo Cultural Heritage, Religious Rituals, Sacred Objects.*

1. Introduction

The Luo people live around the Lake Victoria region. According to Ogot, (1967)

and Ayot (1976), they originally lived in Sudan. Some folklore indicate that they were the inhabitants of Egypt when the pyramids were constructed. Today the Luo are found in Uganda along river Nile, and in Kenya around the Lake Victoria and some of them are found in Tanzania around Mwanza and Mara region. For a long time, the Luo were pastoralists, but have since evolved out of this occupation and become fisherfolk instead. As the fish stock in the lake have dwindled because of overfishing and pollution, the Luo have gradually taken to crop farming. It appears that rivers, valleys, and lakes have played a significant role in their migration routes and settlements. This is why they are known as Nilotics, named after the Nile river, and they are also called *jonam* meaning people of the lake. Their other sub tribes that live in Uganda and Sudan are known as the Padhola, Dinka, Acholi and Nuer.

2. The Luo Homestead

The Luo people construct their homestead according to a design and pattern received from their ancestors from time immemorial. It is mandatory that the gate of the home faces a water body such as a lake, a river or a pond. This plan ensures that the runoff water flows away from the home and does not enter houses. But that is not all, Ogembo (2005) learnt that the houses of younger family members are put up in descending order, towards the gate. This way, the younger you are the nearer you should be towards the gate. There is a strict interplay between the temporal and the spatial factors. If there is a good balance of space and time use, the outcome is health for all the inhabitants of this home. However, if the blue print of the home is not followed, the Luo believe that the consequence is a long chronic illness called *chira*. To some extent, Blunt and Varley (2004) agree with them on the concept of the home as a space of belonging and alienation, intimacy and violence, desire and fear. The home is a cultural space, which expresses relations between material architecture, the people and the world. When a family member is afflicted by an unknown illness among the Luo, the first place and space to be examined is the home pattern. In many cases, the medicine man would discover discordant or incongruent building patterns or a noncompliant timing in which a junior brother put up a cottage known as *simba* before his senior brother. In this kind of situation, the medicine man would offer medicine known as *manyasi*, then reorganize the structure, Mboya (1978) describes the Luo homestead almost as a worship place or

a temple, where 'holiness is observed' according to the cultural heritaged received. Dependent on gradient of the landscape, the runoff water distributes the settlement pattern. The older people pitch their homes at the highest altitude, then the rest follow in a systematic descending order to the youngest person or couple. This is not unique among the Luos because in many ethnic communities, several factors determine settlements patterns and the way they are designed. It is common to consider things like the relief, climate, vegetation and political orientation including socio-economic, historical and mythical beliefs over their origin.

3. Religion

If we take religion to mean a set of beliefs concerning the cause, nature, and purpose of the universe, especially. When considered as the creation of a superhuman agency or agencies, usually. Involving devotional and ritual observances, and often containing a moral code for the conduct of human affairs, as the Webster Dictionary describes it, the Luo homestead is indeed a worship place. According to Gottlieb and Mbiti (1996) the African environment and nature are infused in every aspect of traditional religions and culture. They show that cosmology and beliefs are intricately intertwined with the natural phenomena and environment. The things such as weather, thunder, lightning, rain, day, moon, sun, stars, and so on are subject to control of African people and in turn, they also rule the human affairs. This belief reinforces the Luo tradition that demand strict observation of environmental dynamics and synchrony with confluent points. When all the natural factors are united, then there is harmony and peace. However, if they are off tune and the people fall sick, then the environment, like the homestead, must be examined to figure out the adverse effects that might be emanating from the structural dislocation.

4. Science

Merriam Webster defines science as the knowledge about or study of the natural world based on facts learned through experiments and observation. In conformity to this principle, the Luo resonate to the water bodies and their flows to settle on the landscape, fitting in the scheme of their observation. It is arguable that these people's taboo system is dependent a scientific phenomenon which they may not

comprehend fully, but in which they base their faith for health and illness. Such scientific phenomenons include the gravity that control and sustain waterflow. In fact, Mifflin (2002) states that all surface water is trying to reach sea level due to gravity. It is also said that water will find its own level, thereby avoiding the resistant points, preferring the point of the least resistance and no obstruction. It is even speculated that the flow of water is not only caused by landscape and topography, but also the rotation of the earth. However, Rydell (1997) thinks that what determines the direction of river flow is elevation, topography and gravity. It is these scientific principles that determine the rituals of healing or simple prior conformity to avoid calamities and tragedies. It will be later seen how the Luo heritage is suffused and blended to these scientific concepts and so there are no conflicts and antagonism between the two.

5. Luo Ritual on Space and Time

The home provides a unique arena or platform on which the 'worship' rituals are undertaken or performed. The architecture of the houses must observe certain permanent shapes, sizes, sequence, and orientation. To have peace, health and prosperity for the family, the location of the houses must follow a given spatial-temporal order and position. This is a strict cultural pattern, which can only be defied at the cost of long and chronic illness called *chira.* Mboya (1978) made a passionate plea with Luo to keep their traditions in order not to get infected by this deadly disease that is very difficult to treat. He justifies the ritualization of the spaces in the homestead on this basis alone. The traditional homestead had a euphorbia round fence all around it and all houses were circular. In terms of geometry, the circle was easier to draw in perfect form and to keep that way. Before the other geometrical patterns were discovered probably the Luo knew only of this shape. The circle dominated their art, painting and creativity. As expected, there were gates on the fences for purposes of going in and out. For security, the gates were closed at night to keep intruders out and to make sure that those inside were safe. The fence was a liminal sketch marking the threshold which was significant in terms of indicating those who were insiders from those that are outsiders.

Putting up a gate was not just a physical exercise that one simply woke up one day

and established. One's father must have put up his own as a prerequisite. Other than that, the father must come and identify the spot and bless it, if the home were going to be prosperous. Again, the gate, being the spot of transition or an in between position, define the insiders against outsiders, and for this reason, it is a highly contested space. The antagonism between the outsiders and insiders are settled here at the gate. Sometimes the contest is physical, involving material things like cattle or property, being subject of robbery. But in many other cases, it is the most subtle and vulnerable space, where the wicked neighbour would plant the charms of witchcraft to harm the residents as they come and go. Therefore, as the gates are constructed, it must be ensured that the delicate space is protected against such potential opponents or adversaries. This is done by ensuring that the mode, style and rules of construction are followed to the letter. And for the most superstitious families, a witchdoctor is engaged to perform rituals to fend off future aggression. Normally, a chicken must be slaughtered, and its blood sprinkled over the gate spot. Looking at the design and architecture of the home stead, its landscape and terrain would most likely ensure that the *oula* runoff water, will flow out of the home through the gate. In a way, therefore, gravitational force, fixes the space taken by the gate and the location in which all disputes with outsiders are settled. However, when things go wrong, and a home dweller falls sick, this is the space to be examined to figure out what could be ailing the patient. This often will involve the medicine man with reputation for dealing with such matters. Like the gate, there are other openings for the home such as the doors windows and *rode* that are given equal if not similar protection.

6. The Binary Phenomenon

It must be remembered that the topography, landspace and elevation will determine where the father who is the owner of the home puts up his house, and where his sons will pitch their huts known as *simba*. It can be seen here that there is an up down binary structure, where the old people occupy the upper end of the space while the younger ones settle on the lower spots. Should this given structure be ignored for one reason or another, there will be a resultant illness and a medicine man must be engaged to perform rituals to restore health. One is raised with these faiths and one is not free to break away from them. There are also binary forces at play in

terms of where which son puts up his hut. The first son puts up his hut or simba at the right-hand side of the mother's house, as one faces the gate. The second son will go to the left and this tradition is followed in turns until all the boys have been accommodated. There is fusion between up-down and left-right phenomenon at play in distributing population on the surface of the earth, all going by gravitational pull of water and its flow. Where one is a polygamist, the wives are also settled down according to the up-down left-right principle. At death, the male ones are buried on their right-hand side, while the females are buried on their left. In fact, the land tenure, adjudication and inheritance are determined according to the norm of binary ideas described above. The males lie on their left while the females lie on their right in the graves too. The reasons for this departure from the established routine where the left signifies female and the right signifies male is out of the scope of this paper but remains an interesting subject for investigation.

7. Spatial Linearity and the Home

The home space is organized in a linear order marked by the serial manner in which the residents are born and how this order is observed in putting up of homes, huts and ploughing patterns. The first-born son puts up a *simba* first before his siblings and he go on in turn to construct his own home before them all. The rest, however, must follow in descending order. For ploughing, cultivating, planting, wedding and harvest; the order is strictly followed. It starts with the eldest couple, who also happen to occupy the top of the terrain and landscape and comes down in sequence to the youngest couple. All these activities are preceded by ritualistic sexual activities that are mandatory. It is a taboo to jump the queue! Since the farming activities are synchronised with seasons, it becomes imperative that the linear organization of this society is tied in the long run to the solar system and its impact on seasons. For that matter, the health of the residents of the home depends on harmonious alignment to the solar system. The abundance of harvest and in turn, the health of this community would revolve around the congruence with nature. Incongruence is immediately punished by inflicting illness that cannot be healed until a seer, shaaman or medicine man is invited to diagnose the problem, then rectify it by administering *manyasi* herbal medicine. This lenear organization is observed by generations to generations

and from eternity to eternity according to Mboya. The procreation, fertility rate, mortality and morbidity and life expectancy all depend on these observations.

The medicine man would come to the home and 'read it' to figure out what could have gone out of tune with the rules. He might find it in the misplacement of the gate for example or might find it in the wrong timing of the act or not having followed the order given in the cultural blueprint. He acts as a cultural detective, examining witnesses, investigating the history and hunting for the exhibits of bits and pieces that might have been left on the environment. The past is brought into play in order to gaze at the future, therefore one can argue that the Luo homestead is designed in a futuristic pattern. There is style, shape and pattern that would ensure that all the succeeding generations thrive and conversely, there are patterns that would decimate the entire generations to come. The home becomes a site of cultural contests in which ensues subversion, conformity and confrontation (Collins, 1989). Sometimes one sees the home's contested meanings as a thing that hesitates between different spaces and times; between natural and supernatural explanations, or between the hidden and the open (McHale, 1992). A trained culturalist personality should be able to interpret the spatial-temporal semiotics and discover the genesis of family tragedies. The people in this context live in a fictive and imaginary world with patterns and this world could have some inherent limitations, but these phenomena have been time-tested, tried and trusted over a long duration.

A Luo who rebels against these beliefs is taking a self-destructive mode or trying to commit suicide (Hutcheon, 2014). Conforming to constant artistic form is a life-giving force to the Luo and if one promotes disorder, chaos and distortion or confusion, it will result in madness. The Luo ontology and history indicate that when order is maximised, production in farming activities and even reproduction is equally maximised. Ambiguity where things are left in a vague position becomes vexing and makes people vulnerable to disease. Such ambiguity that emanates from discontinuity, heterodoxy, pluralism, randomness, revolt, perversion, deformation and fragmentation Hassan (1987), do appear to be not tolerated in the Luo community. Yet the home as a text is an artistic creation, with shifting meanings because of instabilities engraved intrinsically in its image. The Luo seem to be happy with what Hassan calls the tyranny of wholes. One is not free to subvert, convert or

pervert the spatial-temporal image of the home.

The Luo home construct has endured time by replication from place to place or time to time and has resisted the onslaught of westernisation and the advent of colonialism, just by yielding the margins of the structure but maintaining the original main frame. Even where the residents of a home are adherents of Christian faith, when faced with chronic diseases or unexplainable malaise, they resort to their traditional practices to ward of dire consequences. For example, when a man has died away from his home, his body cannot be brought back into the home using the normal *rangach* gate. Instead, *otuchi* entrance [small opening] is made on the fence to let in the coffin. It is believed that if the body passes through the normal gate, the home will be infected with illnesses coming from the spirit of the diseased. The same way, if a teen age girl dies at her father's home before she is married off, the body will be interred out of the homestead. This means putting up the grave outside the circular euphorbia fence that separates insiders from the outsiders. Otherwise, her spirit will bother the family and stop all her sibling girls of the present and future generations from settling in marriage (Mboya, 1978). This is why the Luo refer to the girls as *ogwang'* meaning the wild cat, that belongs to the bush outside the home space. It is observed that such architectural designs can be used symbolically to communicate, through their shapes like the circle, in many cultures, to signify the mysticism of houses, tombs, and religious spiritualism (Collins, Ackerman, Scruton, & Gowans, 2016). The anthropologists like Setha (2014) consider this the phenomenon of spatializing culture, which is the linking of culture and space through material, metaphorical, and social conceptualizations to life.

Low (2014) appears to back the Luo notion that the meaning of space is not limited to narratives of the folklore, but also includes interacting with the physical materials in the environment. This is why the spaces and times signify concepts that give or take away life. Though these are socially constituted notions of space and time, they impact on every member of the community very gravely because they are inbuilt in their psychology. The landscape, elevation, topography and orientation become strategic in terms of whether the home inhabitants live or die. As we have observed above, when illness attacks, the healing process begins on the environment according to Mboya (1978), and that environment is designed in space and time

according to the gravitational forces reflected by the pattern of runoff water flow. Diagnosis and remedial action often involve rituals and sacrifices, and this is the point in which a synthesis occurs between Science and Religion. Even though the Luo are not scientists in the literal sense, the symbiosis here becomes too strong to be ignored. It is like scientific principles engage human kind, shape them, control their thinking and manage their beliefs and out of that interplay, a religion is born. Probably this is why Whynne-Hammond and Charles (1979) and Ahmed, (2009) observe that human settlements are specifically located on the earth surface where human habitants spread out according to a unique phenomenon of nature. They also go on to observe that the phenomena that control human settlement have fascinated scholars and researchers over the years. In their view, the questions of settlements are important in all facets of life because it is through their development that man can explore the environment for his needs. Given that several factors do influence location and distribution of settlement over space, the two researchers emphasize that human settlements, forms, patterns, distributions, types and sizes do change with time. For the Luo, the gravitational force plays a very significant role on these matters and stabilizes their world view.

8. Conflict between Science and Religion

For the Luo, there is no conflict or incompatibility between science and religion. The supernatural forces or entities intervene in the Luo affairs according to whether the subject has conformed or contravened the cultural provisions of the home. It is their traditions and alignment to the natural forces such as sunrise, sunset, the rainy or dry seasons or landscape that govern their worship. While the west bases their scientific analysis on observation of natural evidence, the Luo just tie their religion to the natural patterns of nature. The liminality of the homestead, regarding such places as doors, gates, windows and fences and spots of performances of rituals become crucial in the life cycle of the Luo. These spots and times become sacred spaces and times. The sacred spaces and times are sites that are contested and protected at all costs, because the Luo believe the family could become sickly out of charms planted in such places if left unprotected.

Science and religion are so integrated in this faith and one cannot find contradictions

between them. The homestead is designed by the scientific flow of water caused by elevation of the landscape and gravity. It is treated as a temple where the worship is integrated to the cultural heritage. On this platform, the unborn are linked to the living and the dead. Procreation is spaced out by timed mating synchronised to the cycles of natural seasons. Such interactions are also ordered according to the age sets in a descending order. After birth, the time the baby spends in the house before it is brought out depends on its gender. The baby girl takes three days and the male ones take five days. This interval in reversed at death. The burial ceremony of *tero buru* is organized in a week for a female but in a month for a male character. In between birth and death, the people's rites of passage are ordered strictly according to sequence in which the people were born. The sacred spaces for offering sacrifices in the home include the gate, the door and the centre of the house above which there is *osuri* on the roof. There is a pole running from the centre of the house to the roof. It is this pole which holds up the roof. If sickness afflicted the inhabitants of this house, a medicine man would examine this space among other spaces to determine the causes of the illnesses and figure out their remedy. The binary thinking demands that the males are buried on the right-hand side while the males are buried on the left.

Long time ago, a man of the house used to be buried at the Siro pole at the centre of his house. The grave was not supposed to be too deep because the dead man's spirit was expected to continue guarding the family. He would oversee the family by sending back dreams and visions. It was believed that a deep grave would deter the spirit from coming back. That apart, it also signified that the family did not love the dead and they expressed it by digging a deep grave. After the coming of colonialists, this practice was discouraged as indecent and repugnant to descent civilization. It was abandoned and replaced by burying people outside the door. Even this has ceased. However, the non-Christian families still insist on burying a man of the home with his head facing *rangach* gate, to allow the dead to continue to guard the home by watching his gate. We have seen the homestead's surrounding, the surface and how they are organized by rituals, ceremonies and to some extent by sacrifices. The space above the home is not left unprotected. Of course, the altitude will have been observed by the *oula* phenomenon and spacing of houses. On the main house of the first wife, there is planted a stick known as *osuri*. It plays

multiple roles. First, it holds the grass thatched on the roof together. The subtle role it plays is to signify the presence of the husband. When the man dies, this stick is removed following certain rituals and the roof sends out signals to all and sundry that the house is without a husband. One can compare this with national flags that symbolize the presence of the head of state or government. After a given period, when the woman in question has found a substitute husband, a ritual is organized to mount up a new *osuri* and welcome the new husband to the home.

9. Conclusion

It is possible to see the Luo homestead as a temple. It is designed and governed by strictly observed taboo system. For some reasons, these taboos can be contravened and when that happens, the restorative remedy is brought about by *manyasi* and sacrifices. The home is also spaced out according the altitude, landscape and elevation. This is enforced by the *oula* waterflow that spreads populations across the land. The distribution is done through the binary structure of left right and up down pattern. While the spatial patterns are organized according to the flow of water, the temporal factors are enforced by observing the circles and cycles of nature which are linear. The gravity as a scientific principle does not antagonise the faith of the people. Far from that, it is an invaluable ally to the faith and belief system of the Luo. These beliefs have influenced the Luo life style from eternity and will go to eternity. The researcher found out that even though modernization and Christianity have wiped out such faiths, this was only found to be on the surface. However, when the chips are down, and the people face an insurmountable problem, they resort to traditional ways of organizing the space and time around them. Such traditions are very much alive in sorting out social, medical or property disputes. The elders still apply the rules to hold communities together and uphold peace. It is also observed that since such beliefs are taught through folklore, they are self-enforced and do not need external policing. For that matter, they are cheap to maintain, and they reduce protracted disputes and litigation that would otherwise end up in our modern courts.

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An Understanding of Healing in African Christianity: The Interface between Religion and Science

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Abstract

Most of African Christian Churches place a lot of emphasize on healing practices as a response to the teaching of Jesus Christ. This explains why churches or crusades that practice healing in Africa are very popular and command the greatest numbers of adherents. According to these churches, the Lord commanded them to heal, and so they heal. Although some of these churches do not discourage the use of modern medicine, they are convinced that spiritual healing is a higher method than the scientific method used in hospitals. Others on the other hand think that science is an effort to compete with God and yet there are others that completely discourage the use of modern medicine. Seen from the modern Kenya where science is understood to be the foundation of development and progress and religion as an important spiritual component of a healthy society, there is need to examine the conflicting stands. This paper assesses African Christian Church believe on the relationship between religion and science. It also explores African Christian Church's attitude towards medical and faith healing. Finally, it enumerates the influence African spirituality has had on African Christian Church healing practices.

Keywords: *African Christianity, African Tradition, Healing, Medical Healing, Traditional Healing.*

1   Introduction

The issue of religion and health is found as an integral part of faith in all religions of the world. Human experience shows that religion deeply influences the health practices of any part of the society. Indeed, all regions of the world have healers, methods and techniques of healing and specific teaching on holistic approach to

good health. In fact, the redemptive messages taught by all religions are expressed in terms of deliverance from a state of bad health to acceptable and full heath as expected and intended by the creator. The ministry of healing was paramount in the teaching of Jesus Christ from the very beginning. Jesus was referred to as the great physician and the healers. Jesus healed many people during his ministry on earth and demonstrated that his healing was intrinsic to the gospel. Jesus indeed used healing to demonstrate to John the Baptist that he was the "one who was to come (Lk 7:18 -23).

On the other hand, healing has been practiced from time immemorial in Africa as an essential component of African spirituality. African integrates their Spirituality and healing practices and systems of medicine in their worldview. This African worldview emphasizes on the relatedness of healing and the African traditional religion. For this reason, the efficacy of all traditional medicine is always interpreted as the work of the Supreme Being and thus the Akan proverb "People Cure. God Heals". It is not therefore possible to separate African healing from African spirituality since disease and illness is interrelated with the Supreme Being and the universe.

In the pre-colonial period, the African healers rendered their services of healing to the community for a modest fee. Among such healers were diviners, seers, priests, herbalists and ritual elders. The introduction of Christianity and colonization in the nineteenth century however, marked the decline of African healing practices in many parts of Africa. The Christian missionaries perceived that African healing practices were superstitions, ignorance and that it lacked scientific evidence. It was for this reason that the missionaries and colonial governments discouraged and even punished those who practiced Africa healing and other beliefs associated with traditional healing.

The newly introduced Christian faith however, introduced western medicine and constructed hospitals to heal the sick using modern scientific methods. Indeed the 18th and the 19th philosophies in Europe swept clean the idea of Christian healing. Luther and Calvin among others believed that "the day of miracles was past and the "the gift of healing disappeared with the other miraculous powers which the Lord

was pleased to give for a time" (Kelsey, 17). In the same way existentialism argued that there were no bases for Christian healing for God was no longer active in the world.

It was this emptiness of healing in their new-found faith that the Africans found inadequate. In the 1920's and 1930's, new African Christian Churches emerged out of the political, educational and cultural struggles. The Africans who belonged to mission churches left and formed independent churches outside mission control to enable them infuse elements of African spirituality in their faith. One of this spiritual belief which was absent in the missionary Christianity was healing.

African Christian perceived Jesus Christ as an active participant of all healing experiences including those brought into effect by traditional healers, western medicine and more importantly those brought about by miracles. It is such African Christian churches that continue to emphasize the practice of healing in their churches today. The healing of physical illness is seen as telling evidence that the spirit of Christ is actually present and at work among Christians. Indeed, some are so convinced about healing through Jesus that they do not allow their adherent to attend to modern hospitals.

In his book, *Christian Healing: The Anointing of the Sick (2007)*, Rinaldo Ronzani writes about the sacrament of the anointing of the sick in the Christian Church. He explains that anointing is a gift offered to the seriously ill or those close to death. Ronzani admits that many people in this world need healing. It is therefore the responsibility of the church to offer the sacrament to those who are rejected, discriminated against, stigmatized and abandoned. He further explains that the Christian community is called to be prophetic and to reach out for the sick.

In his first chapter, Ronzani address the issue of African healing. He observes that "health is a major concern … in Africa where people are very often exposed to all sorts of diseases" (Ronzani, 2007, p. 15). He states that Africans see sickness as "lack of harmony and balance" (Ronzani, 2007, p. 16). The Church therefore is called to respond in such a way that the faithful will experience the gift in a tangible

manner (Ronzani, 2007, p. 16). He argues that to serve the needs of the sick the church should recognize that it is God who ills regardless of the approach taken. He writes:

> *The combination of both – scientific skills as well as resources from a spiritual view – seems to be the last approach, as it deals with the whole person (Ronzani, 2007, p. 18).*

Ronzani further examines the Independent Churches in Africa and shows that these Churches place great emphasis on the healing ministry. The people flock to crusades meetings and other healing services with great enthusiasm and with high expectation. He also explains how the Catholic Church has for many years encouraged medical research. They have built hospitals and medical schools to assist treat the sick people. Influenced by the Charismatic renewal in the last forty years, there is now among the Catholics an "emphasis of the experience of baptism in the spirit…Prophecy, healing and deliverance from evil" (Ronzani, 2007, p. 21). Apart from individual healing practiced by those who have received the gift of healing, the Catholic Church also has "healing masses and healing retreats" (Ronzani, 2007, p. 21). All these demonstrate that the African Church experience and practice healing today in most of the churches.

Morton T. Kelsey in his book *Psychology, Medicine and Christian Healing* has provided a comprehensive summary of the ancient art of healing in Christian history. He noted that modern Christian Churches do not see any direct relationship between worship and healing the sick. The Christian Church, he argues, is contented that our bodies can be sufficiently be handled by medical and physical means and that sickness is God's disciplinary gift (Morton 1988, p. 20). The general attitude of the Church can thus be summarized:

> *Here the job of the Church is to impact ethical and moral values by teaching and by example or by social action - by building hospitals and providing social agencies, for instance. There is no way to bring in healing, nor any need to do so (Morton 1988, p. 9).*

Kelsey attributes the lack of concern by the church for Christian healing to the

Western worldview which is closed and has "no place for active presence of divine power operating in the world (Morton 1988, p. 265). This attitude seems to be prevalent in the main stream Churches today. Despite this attitude, Kelsey concludes that healing has always been integral part of the Christian practice. He writes:

> *Many of us have concluded that Christian healing was an integral part of Christian practice and evangelism in its most vital period of growth and is still an integral part of ministry today (Morton 1988).*

James L. Cox and Gerrie Ter Haar have written an interesting book entitled *Uniquely Africa* (Cox & Ter Haar, 2003). The book is a collection of works by scholars who explored "uniquely African identities which include the encounter with Christianity with traditional Societies" (Cox & Ter Haar, 2003). In his article, Leslie E, T. Shyllon discusses the role of ministers in the African Independent Churches. He shows that such ministers are powerful individuals who performed not only rituals, but they also performed healing and exorcism (Cox & Ter Haar, 2003, p. 20). This point was further emphasized by Mercy Amba Aduyoye who indicated that AICs, and in this case, Aladura Church, are firmly rooted in healing prayers. She observes that this concern of prayer and healing is an extension from African Religion. She notes:

> *Traditional prayers requests are made for prosperity, for procreation and all that brings life, victory and power. Health and healing are central to these Churches, as they are to adherents of African Religion (Cox & Ter Haar, 2003, p. 98)*

She further argues that among the Prosperity Gospel Churches, casting out demons and faith healing are replacing both Western and African traditional medicine (Cox & Ter Haar, 2003, p. 100). Ezra Chitando, in his article also stress on the role and importance of AICs in Zimbabwe. He says that these Churches have achieved remarkable success in health and healing. He further argues that the Churches have adopted African interpretations of disease and have gone ahead to use the African approach to healing. He writes:

> *The churches have provided an alternative therapeutic system and their interpretation of illness and disease closely parallels the traditional one. Their use of cloths, symbols and dances is inspired*

by the traditional concepts (Cox & Ter Haar, 2003, p. 113).

This study was concerned with documenting the African traditional elements found in the African Christianity and how African Religion and therefore contributed to the African Christianity.

The Story of Archbishop Milingo about his gift of healing has been written by Gerrie ter Haar in her book, *How God Became African (2009)*. Archbishop Milingo, a Catholic priest of Zambia healed people from physical and mental ailments through the power of Christ. The Catholic Church found it difficult to allow him to continue healing services since the idea of healing was not accommodated in the western worldview which did not believe in the intrusion of evil spirits. She observed that:

> *European mission, on the other hand, rejected the popular belief in evil spirits, which apart from any theological considerations implied an unacceptable rupture with the scientific type of thought that the western Christian Church has appropriated since the enlightenment (Gerrie, 2009, p. 26).*

Due to this position held by western worldview and indeed the church, Milingo was transferred to Rome where his healing powers were kept under watch. Although he was able to attract many followers many of whom he healed, the church had difficulties comprehending his healing abilities. Indeed, "some considered him to be mad – and his theological views; the term "superstition" could be heard in this contest, both in missionary circles and in the Vatican" (Gerrie, 2009, p. 26).

Ter Haar suggests that this "closed minded dogmatism" is also common among scientists who adhere to the materialist paradigm of the world. She however notes that "recent research using classic scientific methods does suggest some new and interesting ways of understanding spiritual phenomena (Cox & Ter Haar, 2003, p. 7). She observes than euro-sciences one of these sciences and religion closer. Quoting Chalmers, Ter Haar observes:

> *Neuro-science, in his view, will be a (major) part of a new and more comprehensive theory that will bridge the gap between science and subjective experience (Cox & Ter Haar, 2003, p. 7)*

Francis Anekwe Oborji has discusses the healing churches in African. He confirms that the centers for prayer assemblies for healing are flourishing in Africa. He notes that healing practices are contacted by unskilled founders and priests and bishops of established churches (Oborji, 2005, p. 138). The Pentecostal Churches on the other hand, like the North American mega-churches, seems to be concerned with blessing, achievements, victory, prosperity among other types of success. Some of their most prominent pastors have entered politics.

Another type of Christianity discussed by Gifford is spirit Christianity. This type of Christianity in Kenya tends to emphasis on spiritual forces. Some of the churches have borrowed from African traditional culture and thus has its emphasis on spirits, witchcraft and sorcery. Others have been influenced by western cultism while others on demonic forces. He further notes that this phenomenon is not necessarily restricted to one denomination but cut across the board. It is observed that all these churches have great emphasis on healing which became the central activities in most of the churches.

Francis Anekwe Oborji in his book, *Towards a Christian Theology of African Religions (2005)* has added his voice to express the importance of healing in African churches. According to him, "most African Independent Churches practice faith – healing"(Oborji, 2005, p. 149) and that the main worried of most of the churches is associated with healing. Oborji explains that healing in African churches are influenced by African religion, He thus observes:

> *When faced with difficult times, some African Christians turn to traditional religious practices to obtain practical and quick results. Since this Christians come from the background of their traditional religions. They concentrate on searching for what good and on protecting themselves from evil (Oborji, 2005, p. 145).*

Diane B. Stinton's book; *Jesus of Africa (2004)* has a chapter which describes models of contemporary African Christologies. Here Jesus is perceived in Africa as a life-giver and traditional healers. In this book which is a product of her research, Stinton says that the image which resonate with most African Christians of that of

Jesus the healer. One of her interviewee from Kenya responded thus:

> *Obviously for any African, the image of healing is important. Healing is a ministry within Africa tradition because our understanding is that a person is whole, and we try to alleviate anything that interferes with the wholeness of life (Stinton, 2004, p. 65).*

An Encyclopedia of History, culture and Controversy (2015) edited by Arri Eisen and Gary Laderman has several articles that address the issue of healing in all the traditions of the world. A few of these articles are on African healing. Among them is an article by Adam K. arap chepkwony on "African Traditional medicine and Healing" (Eisen & Laderman, 2015, pp. 642-648). Here he discusses African traditional healing practices from pre-colonial period to the present. Of importance in this article is his suggestion that African healing can work in collaboration with western medicine for the betterment of health serves of the sick in Africa (Eisen & Laderman, 2015, p. 647). In the same book, hazel Ayanga has written on AIDS, Science and religion in Africa. She is content that AIDS epidemic has been interpreted "according to African cultural; ways of explaining disease" (Eisen & Laderman, 2015, p. 165). She concludes her paper by suggesting that AIDS has forced traditional medicine men/women to work together with modern medicine. She writes:

> *It is imperative that a holistic approach be taken to manage it (AIDS). Religion and Science need to work hand in hand. This is beginning to happen (Eisen & Laderman, 2015, p. 645)*

Nkurunziza R. K. Deusdebit book entitled, *Understanding Religion and Science in the African context* (2002), has several chapters write by various scholars in Africa on the issue of religion and science. He notes that the attitude towards science and religion has become a source of controversy. Alice Tuyizere for example has argued that African people strongly believe that   religion and science are opposed to each other. She explains that for some people science invalidates religion and that the two disciplines are contradictory (Nkurunziza & Mugumya, 2002, p. 22). Tuyizere finally support the idea that although religion and science address questions from different perspectives, they should however work together. She writes:

> *The two should come together without fusing. There should be interactions, dialogue and mutual interaction between science and religion rather than confrontation and segregation (Nkurunziza & Mugumya, 2002, p. 25).*

Brofman Martin in his book: *Anything can be Healed (2006)* explores quite a uniquely different school of thoughts on healing. After healing himself from a terminal illness that had defeated doctors to treat, he came up with two main assumptions. First, he argued that anything can be healed – even those diseases that clinically fail to have therapy or cure. Secondly, he believed that everyone is a healer in his or her own capacity with an inborn knowledge of there being a cure for everything. He argues that:

> *...those we call healers have the ability to have successful results with the process. We believe that everyone is born with this ability and only needs to learn how to use the tools they already have. To this degree, we believe that we are all healers, either latent or accomplished (Brofman, 2006, p. 2).*

The book then goes further to enlist ways and techniques in which one can become a healer and heal himself or herself without relying on healing by another persons' intervention. The objectives of this study were, to investigate African Christian Church believes on healings; to explore African Christian Church understanding on the role of medical healing; to assess the what the African Christian Church believe the relationship between religion and science and to enumerate the influence African spirituality has had on African Christian Church.

2   Materials and Methods

The research study was descriptive, seeking to investigate the interplay between religion and science. This method was chosen because it secured both qualitative and quantitative information from the respondents. The locale for the study was Kenya. The study selected African initiated churches from various counties that emphasized on African concept of healing. The various churches were identified using non-probability purposive sample. The target group in this study was both

pastors, church leaders, and those who have experienced healing within the various churches that were purposefully sampled. The respondents were identified through non-probability purposive sample. A sample size of 219 respondents was used. The data was collected using questionnaires, interviews and Focus Group discussion. The data was analysed using both qualitative and quantitative methods.

3 Results

3.1 Demographic profile of respondents

The study sampled a total of 219 respondents through questionnaires. The demographic profile of the respondents had distributed representation of various churches in Kenya as follows:

Church	Number of Respondents
African Gospel Church	62
African Inland Church	24
Seventh Day Adventists	21
Catholic	16
King's Outreach	52
Pentecostal Churches	19
Other Churches	25
TOTAL	219

Table 3-1: Distribution of respondents for the study

Out of the above sample, 92 of the respondents were purely from churches while 127 or the rest were from university students.

3.2   Results for respondents from the church sample

There were several questions posed for the respondents to answer that were focused on discerning the respondents' views on the following:

- faith healing and miracles,

- scientific healing in relation of their faith,

- relationship between science and religion,

- the potential of science and religion to coexist.

For this specific sample, respondents were to tick either agree, disagree or maybe to the questions or statements of the questionnaires. The following were the questions asked and their overall results:

	Question	Responses	Frequency	Percent
1	I believe in a supernatural being called God.	Non-response	2	2.2
		Agree	90	97.8
2	I believe in a personal God that takes interest in individuals, hears and answers prayers.	Agree	90	97.8
		Disagree	1	1.1
		Maybe	1	1.1
3	I believe that there is life after death.	Nonresponse	2	2.2
		Agree	90	97.8
4	I believe that science and religion can peacefully coexist.	Nonresponse	4	4.3
		Agree	52	56.5
		Disagree	24	26.1
		Maybe	12	13
5	I believe that God created the world as narrated in the Genesis story in the bible.	Nonresponse	2	2.2
		Agree	89	96.7
		Disagree	1	1.1
6	I believe that the world was not created but evolved over time.	Nonresponse	5	5.4
		Agree	5	5.4
		Disagree	77	83.7
		Maybe	5	5.4
7	Science tried to compete with God.	Nonresponse	4	4.3
		Agree	67	72.8
		Disagree	13	14.1
		Maybe	8	8.7

8	I believe that science and religion are often in conflict.	Nonresponse	5	5.4
		Agree	70	76.1
		Disagree	12	13.0
		Maybe	5	5.4
9	I don't believe in faith healing at all.	Nonresponse	2	2.2
		Agree	4	4.3
		Disagree	81	88.0
		Maybe	5	5.4
10	I believe that one can be healed through faith alone.	Nonresponse	1	1.1
		Agree	78	84.8
		Disagree	12	13.0
		Maybe	1	1.1
11	I believe that God heals the sick.	Agree	91	98.9
		Maybe	1	1.1
12	I believe in modern medical healing.	Nonresponse	4	4.3
		Agree	47	51.1
		Disagree	34	37.0
		Maybe	7	7.6
13	I believe in the African traditional healing.	Nonresponse	1	1.1
		Agree	25	27.2
		Disagree	51	55.4
		Maybe	15	16.3
14	I believe that the African Christian healing has borrowed a great deal from the African traditional healing.	Nonresponse	1	1.1
		Agree	25	27.2
		Disagree	44	47.8
		Maybe	22	23.9
15	I believe that the age of the earth is approximately over 3 million years as approximated by science.	Nonresponse	1	1.1
		Agree	15	16.3
		Disagree	26	28.3
		Maybe	50	54.3
16	I believe that the age of the earth is approximately 6000 years as narrated in the bible.	Nonresponse	1	1.1
		Agree	51	55.4
		Disagree	7	7.6
		Maybe	33	35.9

Table 3-2: Summary of questionnaire questions and their response

From the questions and their results, the frequency column represents the total respondents per option on a given question; percentage column is an out of a hundred rate on the questions' responses.

3.3   Results for respondents from the students' sample

Participants from this sample population were asked to state if they are a member

of any church. All the sampled individuals belonged to either one of the churches mentioned above. A number of several other questions were also asked through questionnaires. The following is the key questions asked with their responses as follows:

	Question	Responses	Frequency	Percent
Q 1	Do you believe in faith healing?	Yes	101	80
		No	26	20
Q 2	Do you know of anybody who has been healed?	Yes	68	54
		No	59	46
Q 3	Is science important in Kenya?	Yes	125	98
		No	3	2
Q 4	Do you believe in medical healing?	Yes	122	96
		No	5	4
Q 5	What does your church teach about science?	Positive	122	94
		Negative	5	4
Q 6	Is there a conflict between science and religion?	Yes	82	65
		No	45	35
Q 7	Do you believe in creation or evolution?	Creation	117	92
		Evolution	10	8
Q 8	Does science tend to compete with God?	Yes	88	69
		No	39	31
Q 9	Have you ever experienced any personal healing?	Yes	42	33
		No	85	67
Q 10	Can science and religion complement each other?	Yes	41	32
		No	86	68

Table 3-3: Results from the student sample

There was also a need to analyse some specific questions more in-depth with relation to the respondents' churches. These questions were treated special because they would latter on help in discerning whether some respondents' beliefs in healing were tied to the practices at their churches. These questions and their results were as follows:

1) Do you know of any person that has been healed through faith?

Church	Respondents	Yes	No
AGC	20	8 (40%)	12 (60%)
AIC	24	13 (54%)	11 (46%)
SDA	21	9 (43%)	12 (57%)
Catholic	16	8 (50%)	8 (50%)
Pentecostal	21	12 (57%)	9 (43%)
Others	25	18 (72%)	7 (28%)
TOTAL	127	68 (54%)	59 (46%)

Table 3-4: Church comparative response analysis on whether respondents knew people that had been healed.

2) Is there conflict between science and religion?

Church	Respondents	Yes	No
AGC	20	14 (70%)	6 (30%)
AIC	24	8 (33%)	16 (67%)
SDA	21	17 (81%)	4 (19%)
Catholic	16	12 (75%)	4 (25%)
Pentecostal	21	15 (71%)	6 (29%)
Others	25	16 (64%)	9 (36%)
TOTAL	127	82 (65%)	45 (35%)

Table 3-5: Church comparative response analysis on the conflict between science & religion

3) Have you ever experienced any personal healing?

Church	Respondents	Yes	No
AGC	20	18 (90%)	2 (10%)

AIC	24	4 (17%)	20 (83%)
SDA	21	5 (24%)	16 (76%)
Catholic	16	4 (25%)	12 (75%)
Pentecostal	21	4 (19%)	17 (81%)
Others	25	7 (28%)	18 (72%)
TOTAL	127	42 (33%)	85 (67%)

Table 3-6: Church comparative response analysis on personal healing

4) Can science and religion be complementary?

Church	Respondents	Yes	No
AGC	20	6 (30%)	14 (70%)
AIC	24	8 (33%)	16 (67%)
SDA	21	5 (24%)	16 (76%)
Catholic	16	10 (63%)	6 (37%)
Pentecostal	21	8 (38%)	13 (62%)
Others	25	4 (16%)	21 (84%)
TOTAL	127	41 (32%)	86 (68%)

Table 3-7: Church comparative response analysis on complementarity

This section was a complete overview on the analysed results that were derived from the instruments of research. Each result was simply described in this section but no attempts to discuss the reasons for specific trends were done. The discussion of these research findings can be found in the next section.

4   Discussions

4.1   Demographic profile of respondents

Although there was specific intentional target of the King's Outreach church members as respondents to the research, respondents from the other churches were purely randomly selected. The study had no way of predetermining the exact church a respondent belonged to forehand in view of the sampling methodology that was applied. Interestingly however, it turned out that most of the respondents were from the African Gospel Church followed by the case study King's Outreach Church,

Africa Inland Church, The Seventh Day Adventists and the Catholics as represented by the pie chart below.
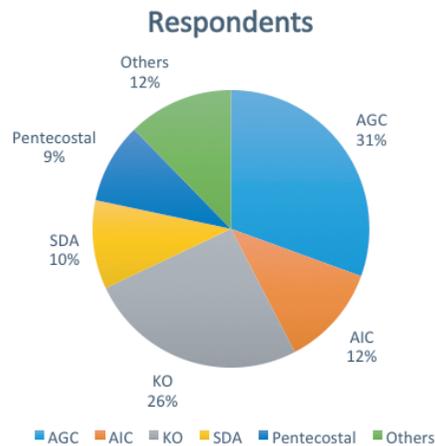

Figure 4-1: Respondents chart

What this could mean is that the African Gospel Church has more popularity in comparison with other churches from the population that the study selected a sample from. Kenya is a predominantly Christian country with almost three quarter of the population subscribing to the Christian faith. There are over 4000 registered churches in Kenya[1] from different denominations and faiths. According to the 2009 Census, Protestant Christians tops the list of popularity followed by the Catholic population and finally the other Christian population.[2] The non-Christian population include the Muslims, the Hindus, the Traditionalists, many people who do not subscribe to any religion and a small number of people who are not sure where they stand. The mainstream churches in Kenya as at 2016 include The Roman Catholic Church, The Anglican Church, The Full Gospel Churches, The Presbyterian Church of East Africa, The African Inland Church, The Methodist Church and the Baptist Church among other churches.

From the above discussion, the study succeeded in sampling at least a number of respondents from all the mainstream churches in Kenya. The popularity of the African Gospel Church can be attributed to the fact that AGC is one of the dominant church in Kericho County from where the sample was selected, and it was logical that most of the respondents would have belonged to the African Gospel Church.

[1]Registrar of Churches in Kenya
[2]http://Softkenya.com/Kenya/church-in-kenya/

Churches in Kenya have developed competitive atmosphere where most of the time

 the question of which church is greater than the rest arises. Amidst this atmosphere, the believers tend to subconsciously tend towards the seemingly dominant church and shift from church to church as the dominance curves change.

The dominance trait is most of the time gauged through the actual structural buildings of the church; the organisations of the church leadership; the financial capability of its believers where a church where most members own cars is termed as dominant to the rest; the instruments and networks a church possesses among others. Using these traits, it could be said that AGC is the most dominant church in Kericho County which explains why the sample expectedly ended up containing more respondents from the AGC than any other church. It is however wrong to say that AGC is the most dominant church in Kenya because different churches exhibit different popularity and dominance across different counties in Kenya. A church thus can be 100% popular in one county and almost unheard of in other counties.

Initially, the research intended to sample 300 respondents and sent out the same number of questionnaires to the 300 respondents. However, only 219 questionnaires came back. There was a keen note of discipline exhibited from the respondents from the King's Outreach Church who returned all the questionnaires assigned to them and filled neatly all the questions. However, some seeming secrecy blanketed the churches especially when one asked questions about Dr. David Owuor, their spiritual leader (Prophet) or the significance of some of the practices that the church believers subscribed to. In totality however, the sample population's variety turned out exactly as anticipated by this study. The different beliefs different African Churches have towards healing could be to some level of confidence be extrapolated by this sample.

5   Discussion of the Results from the Church Sample

To ward off ambiguity, these results were selected purely from church settings on Sundays before, during or after church services. This was a sample of exactly 92 participants. The primary reason why the study needed to have a sample derived from purely church going respondents was to find out whether the current misunderstanding between religion and science stems out from religion's misunderstanding or lack of acknowledgement for science. Could it be that religion had no regard at all for

scientific facts or did it respect scientific facts as long as they wouldn't interfere with the interpreted religious facts?

For example, Galileo Galilei was condemned by the Church for 'vehement suspicion of heresy' when he supported heliocentrism. At this time everybody thought that the earth was stationary with the sun orbiting the earth's axis as opposed to heliocentrism idea where in fact it was the sun that was stationary with the earth revolving around it. Did the church at that time disregard a scientific fact or was it an attempt to suppress the fact to prevent it from generating a religious challenge among the believers? There were several questions that intended to find out what the church respondents thought about science as follow:

1) **I believe that science and religion can peacefully coexist.**

For the past millennium, science has made quite several discoveries inventions and innovations that either directly or indirectly challenge the legitimacy of religious believes. For example, Dinosaurs fossils of over 200 million years have been found and brought doubt to the biblical account of the origin of earth that puts earth at merely 6,000 years old; space research and travel has been achieved to the far ends of the universe casting doubt on the exact position of heaven; medicines, drugs and therapeutic procedures have been developed that have reduced the dependence on people on religious healing; heliocentricity has been proven nullifying the previous interpretations of the bible that held the theory of everything revolving around a fixed earth and several other discoveries. The problem however is whereas science believes in researching, accepting and adopting proven changes to its facts, religious facts remain constant. Changing anything in the bible for example amounts to blasphemy and anyone who attempts to do so is viewed as an advocate of evil. In fact, the bible itself has verses like Revelation 22:18 that forbid any changes to it. That said and done, a biblical fact will remain valid religiously even a thousand years from now whereas a scientific fact today might not be valid scientifically tomorrow. One of the respondents who seemed to be a scientist posed some very interesting questions in an informal interview. "The bible says God created only Adam and Eve, where did all those other people that Cain used to interact with and even marry come from?"

he asked. Studied that attempt to answer this question give valid explanations that suggest that he must have married his sister. But if people keep asking such questions and asking them to the people that might not have convincing arguments to counter, the relationship between science and religion become a problematic one. When this project was in its initial stages at the university, organising a meeting and calling it a science and religion meeting would have attracted only people that take religion as one of their courses at the university. A pure scientist would have asked like one did "What has science got to do with religion?" During the first ever data collection fieldwork that took place at a religious crusade in Eldoret, religionist showed seeming hostility to the research team just because the research team adopted at first a purely scientific data collection mechanism. You couldn't question any of the over a hundred thousand random attendees at the crusade without being suspected of malice or ill intentions by the persons that had been assigned the responsibility of sentinels. Perhaps this was one of the unintended consequences that occurs because of the conflict between science and religion in Africa because you couldn't even take a photograph of anything at the crusade if you introduced yourself as a scientist. However, when the researcher took a less scientific approach suddenly there was a better and more positive response. This time one could have even taken photographs. One of the respondents who was a bishop at the crusade defended this behaviour citing that most scientists come to their crusades to poke holes into their practices and invalidate the many miracles that such a crusade ends up supposedly attracting. The other questions were as follows:

2) I believe that the world was not created but evolved over time.

3) Science tries to compete with God.

4) I believe that science and religion are often in conflict.

5) I believe in modern medical healing.

6) I believe that the age of the earth is approximately over 3 million years as approximated by science.

Several questions also intended to gauge whether African Christians are affected

by African culture or whether African culture influences the beliefs and practices of African Christians on healing as follows:

7)   I believe in the African traditional healing.

Prior to the Portuguese invasion of East Africa, there was no Christianity in Kenya. But there were still many religions from the several tribes of Kenya. These Religions manifested in forms of rituals, practices and beliefs that acted most often as moral guidelines to the local inhabitants. After Islam and Christianity came to Kenya, there was a serious disregard of these local religions and specifically the Muslims labelled anyone who wasn't a Muslim as a 'pagan' (*kafiri*). This must have caused stigmatization and made the local religions and value systems look like they were all inferior and bound for doom. People converted to either Muslim faith or the Christian faith and eventually there were more Christians and Muslims than 'pagans'. The two religions prevailed against the local religions. However, even to date, so many Kenyans are caught between their local religious practices that are mostly called traditional religions and their new found Christian faith. For example, a community that used to pray to their local god under a *mugumo*[3] tree would still pray under the tree but to a different god. You will find Christian songs being sang and prayers being mixed with traditional rituals at funerals, weddings, memorials and wakes. Every Christian in Kenya can be said to be subscribed to a given traditional value system that is most of the time concurrent with his or her tribe. The beliefs in the local traditional rituals and their healing ability is one of the things this study needed to find out. Only 27.2% of the sampled population agreed to have faith in traditional healing. This however sounded interesting because one of the things new converts are told is to abandon their traditional faiths and beliefs and follow the Christian beliefs, probably the reason why 55.4% of the sampled population disagreed to this question. The dilemma that Kenyan Christians face in their day today life can be further seen from the fact that 16.3% of the sampled population could not decide whether or not they believed in the African traditional healing.

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[3]Kikuyu traditions hold this tree to be very sacred. Animals are slaughtered for cleansing ceremonies every time a twig falls from the fig trees.

8) I believe that the African Christian healing has borrowed a great deal from the African traditional healing.

As already discussed above, most Kenyan Christians are caught between pure traditional beliefs and pure Christian beliefs. For example, if a sick person fails to be healed at hospitals, the next resort would be the church for a healing miracle from God. However, if even the church fails to heal the person, desperation would make the same person who sometimes has strong faith in Christianity to go to traditional healers as a last resort. Contrary to the negative publicity that African traditional healing gets, studies show that sometimes people get healed. The psychological conviction by a believer in traditional healing goes a long way to causing his or her own body to stimulate mechanisms to heal itself. Some of the healing methods employed involves giving the sick herbal medicines and even recommending some behavioural changes – sometimes just like modern day hospitals. If someone for example believes that he or she is cursed (this happens a lot in Kenya), how do you treat or heal that as a doctor? There isn't a scientific medicine discovered out there that can break all possible forms of curses! In fact, science might view cursing as a psychological phenomenon where a seemingly cursed person starts would attribute all the negative things that happen to his life to be because of the curse. Science would argue that the negative things would have happened anyway even if the person would not have been cursed. But do you tell that to a person who strongly believe in the existence of curses? If you do for example, do they believe? Christianity offers prayers as one of the mechanism for breaking curses for example. But the way different churches would go about these prayers would give away a lot of hints on the level of influence African traditional healing practices have on modern Christianity in Kenya. Most often than not, you will find a preacher 'shouting out' his prayers just like a traditionalist would have 'shouted out' curse breaking charms and the 'cursed' person would most often than not be seen rolling on the ground (if not only falling) just like traditionalists would do. It should be noted that the original evangelistic missions by the Portuguese in Kenya had no trace at all of such behavioural worship characteristics. This begs this question where respondents were to air their views on the level of influence that traditional healing has had on Christianity. Especially healing. Once again, only 27.2% believed that African traditional healing has an

influence on the modern Christian healing. A majority (47.8%) seemed to disagree with this statement and 23.9% thought that maybe there was some significant level of influence. The study assumed that the people who said 'maybe' seemed to 'agree' that there is some influence. This thus meant that 51.1% agreed with this statement.

9) I don't believe in faith healing at all.

Someone sceptical would argue that faith healing does not work or doesn't exist all in all. One respondent for example noted that a sick Christian would for example go to the hospital to get tuberculosis treatment and when he or she is healed, all credit would be given to miracles and it will be said as a testimony at the church of the healing power of God with serious disregard of the medicines and the doctors. "They say doctors treat and then God heals, but if doctors wouldn't have treated the tuberculosis, God would have had a dead person to heal" the respondent argued. Some very commercial faith leaders who own churches in Kenya have exploited the Christian faith of their believers and turned it into an avenue to make money, generate political followings and create employment. Initially, the church was to be a non-profit making entity that survived on tithes to spread the word of God and help the disadvantaged in the community. These days in Kenya, just switching through television or radio stations on Sundays give an exactly opposite picture of the church. You will hear some preachers selling 'holy' water at surprisingly alarming prices. Some will keep mentioning their *Mpesa*[4] numbers every few minutes of preaching and will quote so many bible verses that would make you feel guilty for not sending your 'tithe' via your mobile phone. These preachers would give you a minimum limit on the amount of acceptable 'tithe' and the whole scenario would feel like paying insurance for your car. Recent reports have unearthed malicious practices where some preachers use science or buy accomplices to fake healing miracles. One such interesting occurrence was when a preacher was found using *potassium permanganate*[5] to fool believers that they were cursed. Believers would have their feet washed and the water would surprisingly turn purple with sewing

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[4]This is a very popular money transfer service in Kenya. Almost everyone that has a phone uses this service.

[5]This is a chemical that turns purple when mixed with water.

needles sunk at the bottom of the washing basin. The preacher would proclaim that the person had been cursed and he the 'mighty healer' had broken the curse. Any person watching this could have been baffled by the occurrence and just because it would have been hard to explain and because the hard to explain phenomena happened at a church, someone would have been quick to call it a healing miracle. If this is what the mainstream preachers do to fake healing miracles, how do you believe in faith healing when the scenarios you site as faith healing turn out to be cleaver science from crafty people? Anyway, interestingly this study showed that 88% believed in faith healing. Only 4.3% agreed with this statement and 5.4% seemed to be undecided. This question was not at all after the religious beliefs in faith healing but just beliefs in any type of healing where one needs faith as one of the recipe of regaining health.

10) I believe that one can be healed through faith alone.

This statement was antagonistic to the previous statement. 78% seemed to agree with the statement and the reasons revolved around personal experiences of faith healing and experiences of other people with faith getting healed. One respondent argued that if you had faith in something or anything at all, the faith gives you a sense that things can only get better. Interestingly, the respondent used an example of a cursed person. If a person has faith that he or she has been cursed, things will start 'getting worse in a better way'. Such a person will blame every misfortune on the curse. But if you do something to the person and make him or her have faith that the curse is gone, the person would notice more positive occurrences and seem blind towards the negative occurrences. A scientist would have created a debate around this scenario but to the cursed person's point of view, healing has occurred and changed his life! Only 13% disagreed with this statement while just 2.2% seemed undecided.

11) I believe that God heals the sick.

This was a pure test on the respondents' Christian faith towards healing. The study

expected 100% agreement with this statement but 1.1% seemed not to be sure if God heals the sick. The reason for the minority dilemma might be as reiterated earlier a result of the rise in proven incidences of staged healings.

The rest of the questions intended to tell if a respondent is a true Christian through asking them about some religious facts that all Christians share as follows:

12) I believe in a supernatural being called God.

It was no surprise when 97.8% of the respondents professed their belief in God. The sample was purely from a religious setting and one would expect such response because the entire Christian faith is based on the belief in God above everything else. In fact, the remaining 2.2% is made up of respondents who did not respond to the question. This might be assumed to be because maybe they thought that it was an obvious question or even felt offended by the question for one reason or the other. There was however no record of anyone who said that he or she didn't believe in God from this sample.

13) I believe in a personal god that takes interest in individuals, hears and answers prayers.

97.8% of the sample population once again agreed to this belief. It was only logical that if you believed in God then you would still have beliefs of a personal god that is represented by God. However, there might be a small chance that some respondents could not tell the difference between this question and the previous question, a challenge that perhaps altered their response to this question. Whereas the previous question specifically tested respondents' beliefs on the biblical God, this question was targeted to respondents who didn't believe in the bible. One would perhaps lack faith in the bible but still have a conscience that tells him or her that even though they do not believe in God, there is something or someone superior somewhere out there.

14) I believe that there is life after death.

Again, 97.8% agreed to this biblical fact. Well, what kind of a Christian would one have been if he or she didn't believe in this hope giving promise that the bible offers? The bible specifically says that the dead would resurrect and live forever after death.[6]

15) I believe that God created the world as narrated in the Genesis story in the bible.

This is one of the places in the bible where religion starts parting ways with science because whereas there are 96.7% respondents who subscribed to this belief, there are several scientific theories of the earth's origin like 'The Big Bang' that totally pay no regard to the religious views on the origin of the world. In fact, 1.1% of the sample seemed to disagree with this biblical fact with the rest of the sample opting not to respond to the question at all.

16) I believe that the age of the earth is approximately 6000 years as narrated in the bible.

This is also one area in which science greatly challenges the accuracy of biblical facts. One might imagine that scientists intentionally go out of their way in a bid to discredit or disapprove religious facts. On the contrary, most scientists in history were very religious people. In fact, when Galileo Galilei supported the fact that the earth goes around the sun and not the other way round, he argued that it was in line with what the bible said and even quoted a number of scriptures to support that.[7] But the church as well responded with counter scriptures[8] against his theoryand eventually prosecuted him for blasphemy. It is interesting enough to note that even years later there is still a subtle friction between science and religion in form of competing facts. For this question as an example, 54.4% believed that the world was 6000 years old. A large portion (35.9%) of the rest were in dilemma about this

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[6]John 11:25, John 5:24, Luke 23:43, John 3:16, Mathew 10:28
[7]Joshua 10 12-13, Job 26:7
[8]1 Chronicles 16:30, Psalms 93:1, Psalms 104:5 Ecclesiastes 1:5

biblical fact. Probably because of their encounter with other equally convincing but contradictory scientific facts, 7.6% strongly disagreed with this question. This response could once again probably be attributed to the advancement of different scientific methodologies that can carbon-date artefacts and prove their existence to be over the 6000 years stated in the bible.

6   Conclusions

There is a lot of knowledge that still needs to be understood about the interaction between science and religion in the African Christianity perspective. However, this study noted that although there is looming conflict between the two, there is a discontinuity in their acknowledgement and regard. Scientists seem to be as much religious as any churchgoer. In fact, you would even find a scientist who doubles up as a religious pastor on Sundays. The relationship between science and religion in the African perspective is in such a way that each faction is allocated its own time and set of behavioural criterion. Even in school, a religious class teaching creation can be immediately followed by a history or biology class teaching evolution without any apparent conflicts. There seem to be some religious touch in every person, the scholars included. This is why prayers will be done before starting and ending scientific conferences without any conflict being witnessed. This is why the responses from the university samples in most parts matched the responses from purely church samples. This study can therefore conclude safely that even though there are some few competitive principles against each other between science and religion, the two are not in a serious conflict in the African Christian perspective. There seem to be mental boundaries that mark the limits each can go. The study thus concludes that science and religion can indeed co-exist when the right paradigm of thoughts is cultivated.

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Binary Identity Constructs: Christianity in the White-Black Supremacist Discourse

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Abstract

There exist supremacy perspectives fuelled by identity constructs that pit the North against the South. This identity construct is established through a set of differences that have progressively become accepted. The differences are requisite to its being that if this co-existence is not to be built on these differences, it would not exist in its distinctiveness and solidity. Entrenched in this relation is a set of tendencies, a confluence of interests; the North's instigation of problems and her converse solver stance, and the South's preference of the North's assistance which the former views superior. Blacks have long been otherized by the whites. Black as a colour has been vilified. It has been connoted to signify negative aspects: Blackspot, blackmail, blackmarket, blacksheep, blackball, black cat while everything relating to colour white is celebrated so that the general perception for instance is that God and Jesus are White. Christianity is christened while African Traditions are barbaric. That historically there has never been a black pope is a White conspiracy propagated by the "white smoke" "black smoke" ideology to lock the black race out of global world leadership. This paper seeks to examine how Christianity has been employed as a regression tool for dominance by the North on the South, drawing legitimacy from religious hypnotism that glorifies the Master-Slave set-up, a concept responsible for the development continuum gap.

Keywords: *Christianity, Identity, North, Otherization, Politics, South.*

1. Introduction

There are as many religions as there are worshippers. Since antiquity times, the division of religion and politics has been a thin line. There has thus tended to be a

conflation of the two in historical times and often creating problems. The genesis of the Anglican church of England for instance is an open case of the conflict that there was between Religion and Politics. King Henry VIII of England and then Pope Clement VII conflicted sharply on the King's marriage. The king wanted to divorce his wife while the pope was against it. The difference was so severe that the King led to a massive walk-out of worshippers out of the Roman Catholic and into the new Church of England, with the King as its head. He appointed the first Bishop of Canterbury who immediately officiated the King's new wedding. For the King, he did not want control of his affairs from the Pope's perspective.

Consequently, from antiquity to date, there has been a distinction between state and religion. State in this paper implies the political class or leadership that in a binary opposition is put side by side with religion. Each side has its following with religion making very strong claims of allegiance on people. Islam for instance claims that none is to be Worshipped but Allah, and Mohammed is His Prophet. This implies therefore that everyone ought to have allegiance to only Allah and no one else. In Islamic states therefore, Politics is conflated with Religion to form oneness in offering the state leadership. France however, has put forth a clear distinction between state and society. On 9th September 1905, The French Law on separation of Churches and State was passed (*loi du 9 décembre 1905 concernant la séparation des Églises et de l'État).* Pope Pius X condemned the law in 1906 which sought to make France a secular state and hence reduce or eliminate the influence of the Roman Catholic Church in France.

2. Discussion and Findings

2.1 Power Relations

From the onset, in this paper, "North" will connote the European world while "South" will mean the third world more especially Africa. Unless stated otherwise in progression of this paper, the two definitions of the terms will remain static.
The extant conflict between the rich and developed countries of the Northern hemisphere, and the poor and less developed countries of the Southern hemisphere entered a new era with the realization of the increasing materialistic inequalities.

Despite the geographical suggestion, the separating line between the North and the South is not a spatial one (Krueger, 2008). Central to this concept of North-South conflicting relation is the assorted social, economic, cultural and political structures which collectively generate different levels of development. These levels are based on indicators such as inequality, illiteracy, unemployment and life expectancy among others. Coalitions within the relation set up however exist in which those of the North concern themselves with the interests of the North, while those of the South act as viceroys of the North perpetuating interests of the 'Master'. To this lopsided relation is the history of colonialism which contextualizes the source of the existing subjugation and oppression in the domain of international politics. This has led to the establishment of colonial, and anti-colonial identities.

In the quest for hegemony, the North has employed mechanisms that coat the unequal relation and pattern of exchange. These power relations cannot be analysed outside the context of external penetration and interventions. These interventions have necessitated the creation of structures that have in turn affected and titled the power axis to the benefit of the imperialist North, Frank (Published in Jameson and Wilber 1996). Krueger (2008) offers that exploitation and oppression the zenith of the North-South relation is an inescapable factor in the dependency paradigm, the basis of the twisted relations between the two. Forms of this exploitation which aid in the North's accumulation of power are seen in various areas; the fluctuating prices in the international markets, financial relations, a domain actively abused by the North to further submerge the South into international financial debts.

The integration into the international markets as exporters of a bunch of agricultural product and few raw materials had a consequence on the economies of the South, thus subordinating the North's. This made them dependent and the economies oriented towards the markets of the North (Neu & Therrien, 2003). This unequal exchange between the North and the South polarize global relations.

2.2 'Holy' Religion: From North to South

During the invasion of Africa by both the white imperialists and the Arabs, there occurred one conquest; that of introducing 'liberating spirituality' to the ostensibly

backward, primitive culture and religion of the black people. Islam was brought first by the Arabs, but it is the European entrance with their Christianity that is the major focus of this paper. Kohn argues in his work, *The Age of Nationalism: The First Era of Global History* for Europe's enlightenment which they brought to the dark worlds such as Africa:

> *European penetration of the peoples of the globe at the turn of the century had a threefold impact on them: It awakened them out of their traditionalism and lethargy to the influence of modern civilization, which thereby became the first universal civilization* (Kohn, 1962).

Hegel dismisses the importance of discussing Africa in his writing and opines:

> *At this point we leave Africa, not to mention it again. For it is no historical part of the World; it has no movement or development to exhibit. Historical movements in it — that is in its northern part — belong to the Asiatic or European World* (Hegel, 1956, p. 117).

Kohn seems to heap all praise to the Northern world, as the centre without which the world cannot hold; the centre from where distribution of civilization is done to other oriental worlds. Hegel on his part emphasizes on Africa and Africans savagery that is not worth studying as all civilization is entirely the business of the European world. Christianity therefore is one of the major European 'Magic' performed to Africans with the supposition to culture the backward society. This religion to a narrowed perspective was meant to ease the penetration of Europeans to Africa, to indoctrinate and subsequently to conquer Africa.

2.3 Christianity as a tool for oppression

Citing Religious dominion, or Christian rationale, the North has continuously justified its expropriation of the South. This relation has undeniably been characterized by oppression with the North deriving legitimacy from Christianity. Viewing the African religious culture as barbaric, and African as savages, the North would come to Africa motivated by the doctrine of Discovery to invade, search out, capture, vanquish and subdue all pagans whatsoever and enemies of Christ, Pope Nicholas (cited in Whitehead 1994). It was on the backdrop of this ideology that slave trade would be born. The belief was that the colonial agenda was like the Christianity agenda in Africa that colonialism was such a hallowed mandate to liberate the Africans

from social political and economic savagery. This they would do by sharing the blessings showered to them by Christ through the inspired western civilization with the otherwise satanic oppressed Africans. The imperial North would then combine political social and economic machinations to Christianly create regimes that would benefit both the ruler and the ruled (Falola, 1998, p. 33).

Edward Andrews writes:

> *Historians have traditionally looked at Christian missionaries in one of two ways. The first church historians to catalogue missionary history provided hagiographic descriptions of their trials, successes, and sometimes even martyrdom. Missionaries were thus visible saints, exemplars of ideal piety in a sea of persistent savagery. However, by the middle of the twentieth century, an era marked by civil rights movements, anti-colonialism, and growing secularization, missionaries were viewed quite differently. Instead of godly martyrs, historians now described missionaries as arrogant and rapacious imperialists. Christianity became not a saving grace but a monolithic and aggressive force that missionaries imposed upon defiant natives. Indeed, missionaries were now understood as important agents in the ever-expanding nation-state, or "ideological shock troops for colonial invasion whose zealotry blinded them."* (Andrews, 2009).

Religious underpinnings have constantly attempted and successively so to alienate the African from global leadership. The ideology of White smoke, Black smoke provides a clear idea of the approach the church and largely Christianity has taken with regards to Africans. To have black smoke signify an unsuccessful search for a new pope not only oppresses all that which relates to black but also degenerates the Black African. It is the Zenith of Christian based oppression driven by the powerful North. The post-colonial Christianity will not make sense unless it renounces all its ties to the colonial missionary work of Christianity. This is unless it gives credence to the rape, murder, forceful evictions and displacement of native Africans under the colonial Christian missions. These Christian evangelists were intimately involved in the colonial process and consequently influenced the political, social and cultural change which is hitherto applied in relations between the developed and the underdeveloped.

The powerful nations still do not recognize, in some strict sense Africans as human beings. U.S President, Obama had to contend with undertones that were aimed at

derailing his ascension to the presidency, not based on ideologies or policies but on him possibly being a Muslim and African. In other instances, the North has used judicial pretention based on religious prejudice to oppress African countries for their national interests in the process violating the countries rights sovereignty and territorial integrity. The war in Libya that culminated to the death of the Libyan leader Muammar Gaddafi would be tied to a North's instigated war and which they would later claim to attempt to offer lasting solutions to. This war left many citizens dead, property destroyed and the economy of the country near its death-bed.

Colonial Christianity brought with it the concept of oppression of women through marginalization; years before colonization, the woman had as a vital role as the man. Their productive labour saw them produce and process food maintaining their right in social, political, cultural and economic spheres. Women were central to production in the pre-colonial society and inequality therefore based on gender was non-existent. Colonial Christianity as imported to Africa by the Northerners exudes oppression in various ways. Patriarchal Christianity for instance promotes monogamous families which are meant to pass private property from one male generation to another. The modern nuclear family is founded on a somehow obscure domestic slavery of the woman/wife. With such a great population constituting women who are economically unstable, the Africa remains entrapped in the dependency trap of the North, subjecting her to the mercies of the donors who pursue their interests at the expense of Africa's prosperity. Christianity has largely been used to justify Euro centrism through reinforcing the idea that all that which is white is superior and that which is black is inferior thus subjecting the Black African to mental, economic, social, political and cultural oppression.

3. Conclusion

Both the North and the South need to undertake an objective deconstruction of the Biblical ideologies with the aim of re-visioning repressive ideologies advanced in the Bible and executed by the North. Ideas such as that of the grand Master-Slave narrative:

> *"Let all who are under the yoke of slavery regard their masters as worthy of all honour, so that the name of God and the teaching may not be blasphemed. Those who have believing masters must not*

be disrespectful to them claiming they are members of the church; rather they must serve them all the more, since those who benefit by their service are believers and beloved. Teach and urge these duties. Whoever teaches otherwise and does not agree with the sound words of our Lord Jesus Christ and the teaching that is in accordance with godliness, is conceited, understanding nothing, and has a morbid craving for controversy and for disputes about words. From these come envy, dissension, slander, base suspicions, and wrangling among those who are depraved in mind and bereft of the truth, imagining that godliness is a means of gain." 1 Timothy 6:1-5.

The Christian ideology therefore advancing the repressive master-slave concept should be done away with to actualize Africa's quest for equality in the international affairs. Christianity as imposed on Africans will remain a justification for racial discrimination, unequal relations and subjugation for as long as it glorifies the racial superiority exhibited by the biblical argument that Jesus was "white."

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Assessing Contemporary Ethical Issues Which are an Impediment to Human Development

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 Abstract

There is a wanting urgency of alerting the young on the dangers of life on one hand and an improved attitude towards one`s sexual life and social self-empowerment as adults on the other. It is a sure way of avoiding unnecessary social crisis and trauma in future. This research is meant to educate the young and the elderly towards the avoidance of dangers which can easily lead them to hopelessness of life despite being youthful in spirit and vigor. Among some ethical issues lined up for assessment are pornography drug addiction, alcoholism, rape, sexual harassment, bestiality, adultery, abortion, radicalization, youth criminality, dressing code, and corruption among others. In a public interview with members of the public, respondents attributed this moral laxity to parents, teachers, guardians, pastors / priests, as well as indiscipline among children. My informed view is that religion as the custodian of morality in the society is squarely to blame. It has abdicated its role as the shepherd of souls. My reasons are simple to comprehend. Support of status quo: Nowadays religion appears to advance interests of the ruling class and it is not identifying itself with the poor. It has absconded its duty and it is busy baptizing the sins of politicians. By so doing they are unable to warn, shout, condemn and address moral concerns. Religious leadership is becoming authoritarian and it's not giving its member's space to air their concerns about the moral trends in the society. Unfortunately, due to Dogmatism and ideological stagnation, the Church has been burying its head in the sand amidst the prevalent current ideas. The doctrinal methodology has not been able to address and articulate on current ethical issues. It is boring and idle for the church to keep on repeating the same old ideologies without allowing change of interpretation and exercise of cultural ideals. Social Stigma: The language of the clergy is traditionally holy and involvement in matters of morality like sex is considered profane. Unbelievably the same clergy is now being accused of hypocrisy and living double lives where they preach water but drink wine. Half-baked spirituality is therefore a major concern and religion mus**t** redeem its image now and not tomorrow. Consumerism, Elitism and wealth rather than quality of

life is fast becoming the yardstick through which success is measured. Success and worth of a person is being decided on economic, political and educational norms. Individualism is a cancer that is eating away the very fabric of the African community consciousness. Religion must reign on this cancer now. This study fits well in the theme category of the conference science and culture (*contemporary ethical issues in the society*) Science and religion. The study will collect data using purposive sampling procedure from a population of 600 comprising of lecturers, students and business entrepreneurs. The scope will be Tetu Constituency in Nyeri County.

Keywords: *Conscience, Contemporary, Ethics, Society, Values, Virtue.*

1. Introduction

What captures my mind immediately when I read the present Kabianga conference theme "Encouraging interdisciplinary research and Innovation for the betterment of Humanity" is that humanity needs redress. All is not well and for us to move on, something drastic has to happen. All disciplines must come out and address this urgency. "Kamuingi koyaga ndiri", (strength and development are found in unity) the kikuyu proverb goes. I strongly belief that if all disciplines were to unite, and perhaps even research together, there can never be this stalemate of human advancement that we are witnessing today.

With that introductory note, let me start by defining briefly the major terms in my work, because failure to understand them will render difficult the thought flow of my presentation. Contemporary means very recent in comparison to ancient, middle Ages, and Modern times…. of recent happening. What we are living in…., or rather the turbulence of the day. Ethics is the philosophy of how things ought to be. Oughtness here refers to an ideal situation which can as well be called utopia…… the world over there. Ethics is the driving mirror of morality in the society and we gauge our behaviour against it. If we need to better our humanity, we must constantly remind ourselves who we ought to be. If we lose that track, we will be lost forever. You must constantly struggle with maintaining the image of man as intended by his creator, a dignified creature made in the image and likeness of God (Gen 1:27). Ethical life therefore is strictly a life of choice between possibilities but must opt for the highest good.

Society means where we are operating from. It is the basement. The community under which our culture oscillates, bonded and finds meaning. It is the maker of the temporal values that govern us in our everyday life. Value is the object of human desire and striving. The study of human values is called axiology. The main question here is; what is the ultimate value for man? For classical Greeks (Socrates, Plato and Aristotle), happiness was the object of human striving, but happiness based on reason. For Christians the value is to live a life leading to union with God. For utilitarianism (Epicurus, Locke and Bentham), it was pleasure and social utility, For Karl mark, value is an earthly paradise with a classless society. What is our value as Kenyans…., as Africans? The answer to this is what I am going to focus on in my presentation.

Virtues are qualities of excellence by which man is rendered more perfect. Classical tradition has courage, temperance, justice and prudence. As life moves on, it is good to perfect oneself always otherwise there will be no betterment of life. Conscience is the practical judgment of reason concerning the moral goodness or badness of a human act to be performed here and now. It is a judgment that commands, forbids, allows, advises an individual before or after committing a human act. It is regarded as the inner voice of God in us. Some of the types of conscience are antecedent, consequent, certain, doubtful, lax and superfluous.

2. Assessing Contemporary Ethical Issues Which are an Impediment to Human Development

Many are the issues that we can consider for our presentation regarding contemporary issues that pose a hindrance to the growth of the human person as it has been highlighted in the abstract, but due to space and time, I would like to concentrate on the following: pornography, incest, drug addiction, bestiality, adultery (marriage and family), and finally youth radicalization and criminality. I personally believe that the above mentioned contemporary ethical issues are a serious block to human development and I now welcome you to accompany me pursue the presentation. It is important to note that, in the treatment of the above topics, I will try to define them, analyse the kinds, give the challenges and give a positive way forward.

2.1 Pornography

Pornography is a word derived from the Greek language. It is divided into two; Porni- meaning prostitute; and Graphein-meaning to write. Pornography is defined as any work of art or literature depicting the life of prostitutes. It is also defined as a representation of sexual behaviour in books, pictures, statuettes, videos, DVD's, motion pictures, internet and other media, that is intended to cause sexual excitement among the viewers. Lastly, pornography can be defined as the explicit representation of the human body or sexual activity with the goal of sexual arousal.

2.1.1 Forms of Pornography

Pornography is divided into two categories.

1) Hard-core pornography: This is pornography intended to intimidate individuals to think that one is free to use one's body as one pleases. Vulgarity therefore becomes the order of the day. Video cassettes and disks are rented or sold in most adult bookstores and have become a growing industry for pornography. Usually these videos display a high degree of hard-core pornography and illegal acts. Another source of hardcore pornography is the internet. Audio pornography includes "Dial-a-phone"- (telephone calls) which are the second fastest growing market for porn. By dialling a telephone number, they can hear degrading sexual messages and can also chat. Commercial television has often adopted programs which are pornography friendly. Other motion pictures and films have become so obscene and are intended to intimidate viewers.

2) Soft-core pornography: This is a mode of pornography intended to entice the recipients e.g. couples to increase the urge of getting closer together. Soft pornography helps married couples improve their sex life by learning more about the sexual act. Adult magazines are primarily directed towards an adult male and female audience. It is understood that this form of pornography does not violate the legal standard of obscenity, and so they can be legally distributed.

2.1.2   History of Pornography

To many people, a sexual revolution occurred during the 1960s and 1970s. It was characterized by the development of "the pill". It was for the most part, a revolution about sex and the communication of information. For the first time in history, people were able to ask questions and get information publicly, discuss their own behaviour and compare it with their friends and neighbours. Most importantly during that time, Americans celebrated sexual love both in and outside marriage as a joyful and legitimate end. Sexual partners had a new power to experiment and to alter their sexual behaviour, based on what they perceived their friends and neighbours to be. There was a great increase in the number of divorces, and more young people were living together without being officially married, yet these decisions were mere modifications of the context within which sexual behaviour occurred. A second sexual revolution was characterized by two major aspects: a willingness to engage in a variety of sexual practices, some of which may once have been deemed deviant or at least unacceptable to people's social status, and a regulation of sexual interest and behaviour among the mature population. It is during this revolution that people discovered they could practice sex and record it in clips as well as in printed sources and sell it commercially.

2.1.3   Causes of pornography

1) Peer pressure **-** Many people especially youngsters are influenced by their allies to involve themselves in pornographic activities.

2) Availability of pornographic materials **-** Pornographic materials like films and magazines are easily reachable since they are stocked in bookstores and music stores. They may be a little expensive, but the youth often buy them without any restriction.

3) Easy access to pornography **-** Due to improved technology, one can access pornography on the internet by use of computers and mobile phones.

4) Drug abuse **-** People who use hard drugs like bhang are more prone to immorality since they are never in their normal senses.

5) Idleness **-** People who are idle and do not have any kind of work may opt to

involve themselves in pornography.

6) Availability of sexually arousing drugs e.g. Viagra- This may stimulate sexual activity by people who will indulge in pornographic acting to earn their living.

7) Lack of proper rules to govern pornographic materials –The system of administration on pornographic materials has not implemented proper rules to govern pornographic materials and activities.

8) Pressure and enjoyment – Many people engage in pornographic acts for enjoying themselves.

9) Sexual posters – Erotic posters that are posted on many advertising bill boards may lead people into such activities.

10) Poor parenting – Many parents do not share much about sexual immorality with their children nor check on their sexual behaviour, thus children end up indulging in pornography.

11) Profession – Married couples who work far from each other may be forced to engage in pornography to satisfy their sexual desires.

12) Unfaithfulness – Some couples may divorce due to unfaithfulness in marriage. They may end up separating and to satisfy their sexual feelings, they may indulge in pornography.

13) Poverty- as a means of survival, some people engage in the selling and distribution of pornographic materials.

2.1.4   Negative effects of pornography

1) It is addictive – Pornography addicts may waste a lot of time watching pornography thus interfering with their day to day activities.

2) Leads to spread of HIV/AIDS and other STDs – Most of the people who act pornography do not know their status and thus the infected people may infect others while practicing the act.

3) it leads to social evils like rape and other anti- social attitudes i.e. male

viewers tend to be more aggressive toward women, less responsive to the pain and suffering of rape victims and more willing to accept various myths about rape.

4) It leads to sexual dissatisfaction - couples who watch pornography tend to be disinterested in their partners since they watch new styles daily.

5) It encourages intake of sexual steroids to enlarge their organs for better play, thus affecting their fertility.

6) It leads to theft: Some pornographic films are expensive to buy, and one is easily tempted to steal to get money to purchase them.

7) School dropout outs – Some school children who are influenced to indulge in this pornographic activity may end up dropping out school all together.

8) Leads to social isolation – people who act pornography may be unacceptable in certain communities thus experiencing social isolation.

2.1.5   Way forward

Pornography is a virus that has far reaching detrimental effects that threaten to rip apart the moral fibre of the society. Any form of pornography should be discouraged among youths since it leads to immorality. A lot of care should be taken by the couples who use those materials, so that the young ones do not encounter them. Parental responsibility is therefore very necessary in the whole scenario. Just as poisonous pesticides are dangerous to children, so also are the pornographic materials, hence they should be kept out of reach of children. It is important for local and national governments to introduce policies to censor and restrict the distribution of pornographic content. The media, especially television and radio must refrain from airing sexually explicit materials to the public. It is important for the married couples to note that pornography cannot replace the physical presence of their partners whatsoever; and that pornography only results in imagined satisfaction.

2.2 Incest

The etymology of incest is derived from Latin *incest* or *incestum*, which means sexual activity between closely related persons with reference to the immediate/

nuclear family. Incest is the sexual activity between family members of either sex and age, with or without consent. The word incest was introduced into the English language around 1225AD as a legal term to describe the crime of sex between close relatives. It was also used to describe sexual relations between married persons, one of whom had taken a vow of celibacy [often called spiritual incest]. In old English it was also known as *sibleger*, from *sib* meaning kinship and *leger* which means to lie. Incest probation is determined by the society in which the person lives. Some societies consider it to include only those who live in the same household, or those who belong to the same clan or lineage, while other societies consider it to include those related by adoption or marriage. In all, however no single definition of incest is widely accepted as the degree of kinship in which marriage is accepted varies, and so does the age of consent.

Incest is one of the commonest of all cultural taboos both in the current world and in many past societies. The type of sexual activity and the nature of the relationship between persons that constitute a breach of law or social taboo vary with culture and jurisdiction e.g. most modern societies have legal or social restrictions on close kinship unions. Incest is the result of a sexual disorder which is caused by lack of psychosexual development. Sexual fixation at an early developmental stage can affect one's adult choice of a sexual object. In the traditional African communities, incest was considered a taboo and people who did it brought a bad omen to the community and therefore were subject to punishment. Punishment existed in many forms, the most common being eviction from the community where one became an outcast, or paying a heavy fine meant for reconciliation. A cleansing ceremony followed later in order to appease the gods. The Africans developed the incest taboo as an attempt to reduce sexual competition within the nuclear family. The incest taboo led to people marrying out of the immediate family members, thus creating a wider network of interfamily alliances, thereby enhancing cooperation, social cohesion and survival. In addition, biologists now believe that mating outside the family is an important way of establishing larger social units and of reducing the danger of inbreeding, which causes genetic disorders.

2.2.1   Types of incest

1) Incest between adults and children is the most reported. Incest perpetrated

by an adult of either gender against a child is called interfamilial child sexual abuse. Father-daughter and step father-daughter incest is most common. Other reports consist of the sexual relationship between mother or step mother and the son. Emotional incest occurs when a parent relates to a child as a substitute for an adult partner. That child may become emotionally bonded to, and co-dependent with, the parent. Emotional incest usually occurs before physical parent-child incest. Even without physical sexual contact, the consequences of such "bonded" children include a lifetime of partnership difficulties with the father or mother.

2) Childhood sibling-sibling incest is also considered to be wide spread but rarely reported. The most commonly reported form of abusive sibling incest is that between an older brother and a younger sister. Sibling incest is most prevalent in families where one or both parents are often absent or emotionally unavailable, with the abusive siblings using incest to assert their power over a weaker sibling. Many types of sexual contact between children are not considered harmful or abnormal but become child on child sexual abuse when there is lack of consent, coercion or simply an imbalance of power or knowledge in the relationship.

3) Incest between consenting adults can include parents and adult offspring, siblings, or cousins who are not coerced or forced in any way. While incest between consenting adults has not been widely reported in the past, the internet has shown that this behaviour does take place, possibly more often than many people realize. Internet chat room and topical websites exist that provide support for incestuous couples. Proponents of incest between consenting adults draw clear boundaries between the behaviour of consenting adults and rape, child molestation, and abuse. Consensual mutually desired adult incest is very rare, found almost exclusively between kin who were separated early in life and therefore did not experience early association and the related development of the natural adaptation for incest avoidance. Consensual incest between adults is criminalized in most countries, although it is seen by some as a victimless crime. Often, a taboo against incest is extended to first cousins, but in some societies, marriages between first cousins are not prohibited.

2.2.2   Causes of incest

1) Political, religious or economic reasons for some members of royal families permit them to marry their siblings because they want to preserve their wealth and influence. Some people therefore do not have frequent social contact with people of a different background.

2) Curiosity among childhood siblings happens when one or both parents is/are often absent or emotionally unavailable.

3) Disturbed family relationships generate a shift in individual responsibilities and expectations that can lead to incest. Disagreement between the father and mother in having sex may make the father to turn to his elder child for sexual satisfaction. When couples separate for a long time, the one who remains at home might turn to children for sexual gratification.

4) Lack of proper psychosexual development is another cause. The person is apparently emotionally sick because he is endlessly attracted to family members.

5) Drug addiction, alcoholism, pornography and lack of severe stringent punishment against the offenders may often contribute to incest.

6) Due to higher levels of education and technology, customs, taboos and traditions have been watered down, and this has led to legalization and intermarriage between cousins.

7) Some religious faiths prohibit their members from marrying members of other religions, race, ethnic background and social class, hence more families may be aware of incest but allow it to continue even more.

8) Anger and revenge especially when one is affected by venereal diseases or Aids may also be another cause. One wants to transmit the virus under all costs so that others too can suffer.

2.2.3   Negative effects

1) Mating between close kin who are likely to carry the same harmful recessive genes tends to produce a higher incidence of genetic defects which increase

susceptibility to diseases and higher mortality rates.

2) Incest between adults and prepubescent children is a form of child sexual abuse that has been shown to be one of the most extreme causes of childhood trauma. Trauma has serious and long term psychological damage and its prevalence is difficult to generalize. However, research has estimated 10-15% of the general population as having at least one incest experience, with less than 2% being involved in intercourse or attempted it.

3) Adults who were incestuously victimized by adults in their childhood often suffer from low self-esteem, difficulties in interpersonal relationships, sexual dysfunction, and are at an extremely high risk of many mental disorders, substance abuse, personality disorders, and complex post-traumatic stress disorders.

4) Incest has serious long-term consequences for the child since he feels guilty for participating and is afraid of disrupting the family union by revealing the incestuous relationship. This leads to promiscuity, early marriages, prostitution, sexually transmitted diseases, HIV/AIDS and unwanted pregnancy which eventually end up in abortion. 60% -90% of prostitutes claim to have been sexually abused as children. Their perpetrators are parents, step parents, extended family members, grandparents, aunts, uncles, surrogate parents, or even the common spouse.

5) Incest results in unwanted pregnancies and unwanted babies. In such cases, babies with deformities have been born. In others, normal babies have been born, but develop serious conditions as they continue to grow and develop.

6) It creates jealousies in the nuclear family because there would be a competition with one another for a partner e.g. a father and his son competing for a daughter. This interferes with family cohesion and socialization.

7) It creates ambiguous roles and confusion e.g. if a child is born from the union of a mother and the son, the child's father will be the son's half-brother.

8) It brings shame especially when it is a known fact that the father impregnated his daughter. Incest causes mistrust among family members and even leads to separation and divorce. Families feel compelled to separate or seek divorce

especially from pressure emerging from friends and relatives.

2.2.4   Way forward

Incest is a crime against the innocence and dignity of children and it should be totally condemned. Since in most cases, adult males are the perpetrators while young children are victims, mothers and women in general have a critical role to play in being watchful over their children. This will help end the habit of men preying on children. Any case of suspicion should be dealt with immediately and any malpractice reported to the elders or police for action. Parents and close relatives should be role models and guides towards good moral behaviour. They should respect their children as such. Though reports on incest have increased in the recent past, many cases go unreported due to the secretive nature of some families who try to avoid shame. Self-respect is important, and it is good to know that destroying a child`s innocence is morally unforgivable. Finally, even for the consenting adults, sexual closeness brings maladjustments, retardation of mind and health friskiness in general and therefore the tendency should be avoided.

2.3 Bestiality

Bestiality is also referred to as zoophilia. The word originates from the Greek terminology *zoo* meaning animal and *philia* which means love. Bestiality is therefore the unnatural sexual intercourse between human beings and animals. Individuals involved in such acts are called zoophiles. Human animal sex is occasionally described as farm sex, dog sex or animal sex. Zoophilia is legal in a few countries but not condoned in most countries in the world today. It is illegal in Africa under the animal abuse laws. The Jewish, Christian and Muslim theologians are categorical in denouncing bestiality. The Shia Ayatollah Khomeini approves sex with animals under certain conditions. There are also unsubstantiated references in Hindu scriptures to religious figures engaging in sexual activity with animals. A good example is the sculpture of a man engaging in sex with a horse on the exterior of a Hindu temple in Khajuraho.

Prominent homosexual activist Kamey found that bestiality is harmless so long as the animal does not mind. Philosopher and animal liberation author Peter Singer

argues that zoophilia is not unethical if there is no harm or cruelty to the animal. But this view is not widely shared, with the majority opinion supporting the view that animals, like children are not capable of informed consent. Zoo sexuality argues that human versus animal relationship can go further beyond sexuality and that animals can form a genuine loving relationship that can last for years and that it is not functionally different from any other love or sexual relationship Zoophilia is considered a lifestyle. Separate from those whose interest is curiosity, pornography or sexual novelty, there are those zoophiles whose habit can be called a lifestyle or orientation. The starting age is at or before puberty, around 9-11 years. About half of zoophiles have their first experience of zoo sexual activity between the age of 11 and 14. Kinsley found out that the most frequent incidence of human versus animal intercourse was eight times a week. Zoophiles view animals as having positive traits of honesty and unconditional love which human persons often lack and, they feel that society's understanding of non-human sexuality is misinformed.

2.3.1   Causes of Bestiality

1) Contact with animals is the most significant cause of bestiality. Most rural dwellers engage in this activity, compared to urban dwellers, because rural dwellers are in continuous contact with animals. Sexual excitement in watching animals mate is also influential. Some often view animals as having positive traits of honesty and unconditional love that humans often lack. Curiosity, pornography or sexual novelty among both males and females at puberty stage is another cause.

2) Social individualism also plays a role. Introvertism, isolation, loneliness, shyness, and independence of thought, are a great handicap in socializing with members of the opposite sex. Due to lack of contact with others who share this attraction or a belief that they are alone, they consider animals to be real companions.

3) Drug abuse is another cause. Most people who engage in drug abuse such as bhang, Viagra, cocaine, and mandrax, end up having sex with animals. Frustrations and unfaithfulness of married couples and denial of conjugal rights may lead to having sex with animals.

4) Fear of sexually transmitted diseases and HIV/AIDS also influence people to have sex with animals because they think it is much safer.

2.3.2   Negative effects

1) The biggest difficulty that faces many zoophiles is the inability to accept or open up about their animal relationship and feelings with friends and family. There is fear of rejection or loss of companionship if the habit is known. They also face loneliness and isolation due to lack of contact with others.

2) When an animal dies, the zoophiles often feel a loss especially if they considered the animal as a soul mate but unfortunately, they cannot express grief or talk about their feelings. They suffer from stress and might even get a depression because they do not talk about their loss openly or seek comfort from friends. The impact of repeated death of animals they consider lifelong soul mates is immense.

3) On health, there are infections that are transmitted from animals to human persons called zoonoses. Many zoonoses are transferred through casual contact, but others are more readily transferable through activities that expose humans to semen, virginal fluids, urine, saliva, faeces, and blood from animals. Examples of zoonoses are brucellosis fever, leptospirosis, and toxocariasis.

4) Animals are incapable of forming meaningful relationships with humans. This activity is harmful to animals, and humans can damage the animal's reproductive organs.

5) Animals mate instinctively to produce offspring hence they are deceived when these activities are performed. Many people are against this kind of sexuality because animals just like children are not capable of differentiating what is right or wrong.

2.3.3   Way forward

Sex is the bodily union of two people who love each other. It gains respect when

it is practiced among equals because both have a certain level of reasoning and determination. This is not the case with zoophiles. It is important to note that sex is not an end. Self-control is always advocated, and it is the measure of one`s maturity. Loneliness and isolation should be avoided at all costs, since no man is an island. Socializing with others is the best thing ever to avoid indulging in bestiality. Bestiality should be avoided because it does not benefit any party. It is immoral and lethal to most religions of the world.   Lastly, bestiality adds to more stress and shame and cannot be a substitute for conjugal love whatsoever.

2.4   Adultery (Marriage and Family)

Adultery is generally breaking the promise of a mutually exclusive and everlasting love. It is voluntary engagement in sexual intercourse with someone else other than one's marriage partner.

Marriage is a contract between two people to live together and be faithful to each other until death. Marriage is a sacred union which joins two people together and they are supposed to stick to one another for better or for worse. It starts as a high peak of love, trust, commitment and passion for one another. Adultery violates this personal and intimate human contract into which people have already entered. It involves lying and cheating on the part of the partner and this vice is viewed as morally reprehensible by most ethical systems.

2.4.1   Causes of adultery

1) Working distance: Some spouses tend to be work alcoholic, they spend most of their time at work and due to the distance involved; they tend to forget their partners. The other partner becomes lonely and seeks fulfillment of conjugal rights elsewhere since his or her partner is not fulfilling them. A good example of this is the long-distance haulers or drivers who take two to three months away from home due to the nature of their work.

2) Lack of mutual communication between the two brings about counter accusations and mutual affection becomes adversely affected. They are no longer certain that they can solve their own problems and they end up

looking for other people outside their marriage for help. This may end up worsening the situation.

3) Lack of sexual satisfaction can cause the dissatisfied partner to move out of marriage purity and engage with other people outside marriage. Some elderly men tend to be sexually attracted to the young women even when they have wives back at home. Also, when a woman gets pregnant and she is about to give birth, her sexual drive goes down and she is not able to satisfy her husband sexually. After birth it takes time before they resume to their normal sexual life and during this period a man may be prompted to commit adultery to satisfy the needs that are not met. However, this varies from couple to couple.

4) Sickness of one partner is another cause. If one gets bed ridden for a lengthy period, chances are that the other partner may have an affair with an outsider sorely for sexual satisfaction.

5) A person who often watches pornography may have wild feelings about men or women. This curiosity may end up inciting him/her into an extra marital affair.

6) Alcoholism diminishes one's level of reasonableness and self-control. This increases his vulnerability to the vice. Alcohol takes away a person's normal defenses against such behaviors. Under the influence of alcohol and drugs, men and women will often behave in ways that would be foreign to their normal conduct.

7) Financial constraints and poverty in general may impel one to indulge in sex outside marriage as an exchange for employment, promotions, or other related favors.

8) Moral promiscuity and a don`t care attitude in family values contributes adversely to cheating of one`s companion.

9) Peer pressure and vulgar language of adulterers` adventure during discussions might lure some innocent listeners into an unquenchable curiosity to seek a sexual partner outside marriage.

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10) In this technological age, influence by the media cannot be underestimated. Watching movies and listening to biased radio discussions on general relationships may dupe or prompt one to think that it is common practice to have many sexual partners.

2.4.2   Negative effects

1) When someone is having intercourse outside the marriage, it is easier to contract venereal diseases like gonorrhea, syphilis and even Aids.

2) Separation and divorce might come up as a result. According to 1998 Gallup poll, 17% of marriages are dissolved due to adultery. It occurs because the two partners cannot resolve their marital problems and they have become unfaithful to each other despite the vows they made during their marriage.

3) Frequent disagreements between the couples arise, while the love bond decreases and confidence and trust are completely damaged.

4) Some societies punish adulterers by death, heavy fines, or excommunication as a warning to the rest of the people. In others, adulterers are considered an abomination and a curse to the community.

5) Suicide can easily occur after discovering the unworthiness of a `so called` permanent relationship. It is so hurting to discover the insincerity of a trusted partner. The betrayed partner may be depressed and consequently fail to find any sense and purpose in life.

6) Adultery may lead to murder. When one partner finds out that the other has cheated on him/her, the thing that rings in the mind is to revenge. They take law into their hands and end up poisoning their spouses in case of a woman or brutal killing in case of a man. Killing of suspected wayward lovers is also reported in most cases.

7) Finally, Individual dignity and that of the family is at risk. The family is dubbed as a family of adulterers and many people will not like to be associated with it.

2.4.3   Repairing a damaged relationship caused by adultery

1) Ending the affair: - One must stop the affair immediately and deregister all contacts with the other person/s and focus his/her attention on his partner alone.

2) Apologize and be honest: - One should confess his/her mistake and then apologize. One should also be honest enough to explain to his partner what prompted him to commit adultery so that they can correct the situation. The forgiving process is at times very demanding, but if both are willing to try to rekindle their love and develop passion for one another by forgetting their past, it becomes an easy process.

3) The society however should set a law that punishes the offender to discourage people from interfering with the sacredness of the family institution.

2.4.4   Way forward

Faithfulness towards the other partner or partners in case of polygyny/polyandry is of paramount importance. Adultery is the ultimate betrayal in marriage and this behavior endangers the status of marriage, the other partner as well as the offspring. Couples should try their level best to keep their matrimonial bed holy. Adultery greatly affects marriage by breaking trust and reduces passion and love for one another. Self-respect and the respect of others too is imperative. Self-control is crucial irrespective of whether one is near or far from the spouse. Infertility may not be a real cause for betrayal because companionship is a duty towards one another. Finally, it is good to note that an irregular emotional or physical quest for sexual satisfaction with another person outside the bond of marriage mostly brings pain and suffering.

2.5   Drug Addiction and Abuse

A drug is a term used to describe or refer to any substance other than food and water which when taken into the living organism, alters the structure and functioning of an individual. It is a chemical substance that affects the central nervous system and is used recreationally for perceived desirable effects on personality, perception or behavior. Drug abuse is the compulsive, excessive and self-damaging repeated use of the substance for purposes other than its intended use. This is harmful to the

individual. Drug abuse has become one of the most dangerous and major problems facing our society today. The level of drug abuse in our society can be termed as disastrous and pathetic since all are affected or infect by it. Drugs can either be taken orally, injected into our bodies, sniffed or inhaled. Drug abuse involves one or more of the following: - Recurrent drug use resulting in a failure to fulfill major responsibilities at work, school or home, recurrent drug use in situations in which it is physically hazardous, such as before driving a car, and continued drug use despite persistent social or interpersonal problems caused or exacerbated by the effects of the drug.

Addiction is a habitual and uncontrollable behavior, usually involving a drug. Addictive behaviors are habits that have gotten out of control, with resulting negative impact on a person's health. Most drugs associated with addiction are called psychoactive drugs and they cause intoxication. Characteristics of addictive behavior are; Reinforcement: – when some aspects of behavior produce pleasurable physical and emotional states or releases negative ones. Compulsion or craving; - when one develops a strong need to engage in the behavior. Loss of self-control: – when the individual loses control over the behavior and can't block the impulse to engage in it, and lastly Escalation: - when the substance is required to produce its desired side effects. Dependence is a cluster of cognitive, behavioral and physiological symptoms that occur in an individual, despite suffering significant substance related problems leading to impairment or distress.

2.5.1   Type of drugs

There are several types of drug namely; soft, hard, herbal, medically prescribed and lastly drugs over the counter.

1) Soft drugs include stimulants and volatile drugs. Stimulants speed up the acting of nervous and muscle system. Under their influence the heart beat rate accelerates, blood pressure rises, blood vessels contract, pupils of the eyes dilate resulting in gastric and adrenal secretions. Small doses may make people feel more awake and alert, less fatigued or bored. Most common examples of stimulants are tobacco, caffeine found in coffee

and tea, carbonated drinks like coca cola and other beverages, and miraa (khat). Tobacco is usually taken in the form of cigarettes or snuff. It can also be chewed. Tobacco contains substances that are harmful to the body like nicotine, carbon monoxide and tar. Khat/miraa is a wild-growing shrub and its stalks and leaves are chewed to induce excitement. The juice in the miraa when ingested causes temporary excitement in the user. Volatile drugs make the consumer intoxicated, dizzy and have distorted speech. The best known in this category are used as solvents such as petroleum products, paint thinners and drug cleaning fluid. Their fumes are sniffed to get the desired effects. An example is glue sniffing which is common sight among street people in most urban and rural areas. Alcoholic beverages belong to this category. They range from the traditional local brews and wine to the distilled alcoholic drinks.

2) Hard drugs are also referred to as narcotic drugs. They are hallucinogens because when taken, they produce dreams and illusions. They also distort visual, hearing and touch perception. The most common ones are cocaine, morphine, bhang, and heroin. Cocaine is a narcotic drug deferred from coco leaves. Cocaine powder is derived from a plant and it is a white in colour. It is inhaled (snuffed), injected or smoked. Other street names of cocaine are crack, coke, blow, snow, toot or candy. Cocaine is a stimulant and it stimulates the central nervous system resulting in high levels of alertness, a 'rush' of self-confidence and a sense of euphoria. Coke is very expensive and highly addictive. Morphine is derived from cocaine and can be used medically to suppress pain. A Surgeon uses morphine as a local anesthetic. Consequences are like those of cocaine. Bhang comes from a plant called Indian hemp and it is orally smoked or ingested. It is a herb and has many street names such as marijuana, cannabis sativa, pot, reefer, dope, joint, Mary, Jane, weed, grass, kent, ngwelu and hammer when mixed with tobacco. It is a hallucinogen which creates absence of euphoria and relaxation. Bhang use lowers blood glucose level and increases the appetite. All parts of this plant are addictive. Heroine is a depressant that is normally injected sub-continuously but also

can be burnt and sniffed by nose. Its street names include horse, smack, slag and brown sugar. It is a highly addictive narcotic drug that has been processed and looks like white crystallized powder. It is injected through the veins into a person's body. It causes loss of appetite for food, loss of weight, heart and liver diseases. The short-term effects of heroine include a 'rush' accompanied by a warm flushing of the skin. It also causes clouded mental functioning and a brief suppression of pain and nausea.

3) Herbal drugs are in form of herbs and are derived from plants. Herbal drugs are not regulated by law and they include aromatics such as *aloevera* and stimulants like tea.

4) Over the counter drugs (O.T.C) are the drugs that are not prescribed by the physicians or doctors but are legally sold in drug shops, chemists and other shops for self-medication. Examples of such drugs include pain killers such as panadols, *mara moja,* de wormers, multivitamins and a variety of cough syrups. Prescribed drugs require a written order or a prescription from a qualified doctor for any person to use. Examples of these are tranquilizers, family planning pills, sleeping pills, etc.

5) Lastly, we have Narcotic lipoids which are laboratory made drugs that relieve pain, cause drowsiness and induce euphoria. They include opium, methadone, mandrax, codeine, meperidine and fentanyl. They reduce anxiety and produce lethargy, apathy and inability to concentrate. Users become less active, less responsive to frustration, hunger and sexual stimulation.

2.5.2   Causes of drug abuse

1) People misuse drugs to cope with frustrating situations of life for example when one is unable to achieve dreams of a successful life and living appears meaningless.

2) Financial stress may lead to drug abuse especially when there is inability to provide for the families. These frustrations may eventually lead people to become peddlers, pushers and users of drugs to get money.

3) Idleness is another cause. When people have too much time for themselves

and have nothing constructive to do, they tend to experiment with drugs to get excited.

4) Although some people use drugs because they have a desire to alter their mood or behavior, some are motivated by desire to escape boredom, anxiety, depression, feeling of worthlessness or other psychological problems. They use drugs to cope with difficulties they experience in life.

5) Extravagance and too much money to young people as pocket money or otherwise without regulating its use is another cause of abuse to drugs.

6) If parents and other respected members of the society are abusers of drugs, then they become a catalyst of abuse to the younger members in the society because there are no role models.

7) Peer pressure which sidelines individuals who are not doing the same common things may feel tempted and eventually succumb to the whims of the majority. The non-conformists are considered primitive and out of touch with reality. Most innocent young men and women end up abusing drugs in the struggle of winning back their old friends or in search of acceptance by their friends.

8) Some parents are unavailable for their children because they are either too busy or indifferent. Such children feel neglected and unloved and they may indulge in drugs to get their parents` attention. We are all a product of our parents. If our parents have addiction struggles, chances are that children will also be more susceptible to addiction.

9) Western culture has negatively influenced African traditional values. It has promoted individualism to an extent of some lacking concern for the needs of others. Individuals therefore may feel that they have a right to indulge in drugs because this makes them feel aerated and high.

10) Curiosity of the young and a craving for the feeling to establish what is in the drugs might prompt others to engage in the same. Young people especially from middle class backgrounds are drawn to drugs by the allure of excitement and intoxication. They may be curious and rebellious.

11) Finally, drugs may be used to relieve one from undue pain or sedation in

hospitals during surgery or other bodily medical interventions.

2.5.3 Negative effects

1) Tobacco contains nicotine which is both a stimulant and sedative. The use of tobacco accounts for one-third of all cancers including mouth, stomach, pancreas, cervix, kidney and bladder. Tobacco causes lung cancer which is the number one killer of men and women today. It causes chronic bronchitis and aggravates asthma, stroke and vascular diseases. Cigarette smoking during pregnancy is associated with small fetal growth, an increased chance of spontaneous abortion, prenatal deaths, increased still births, low birth weight, as well as growth and may attribute to development of mental problems during early childhood.

2) Alcohol is a depressant commonly called booze in the streets. It is a central nervous system depressant and at low doses can produce feelings of relaxation and reduced anxiety. High doses result in slurred speech, vomiting and blackouts. Rapid injection of large alcohol doses can result in coma or death. Its chronic use results in liver damage, high blood pressure and weakened heart. In addition, alcohol dependency and abuse are major factors in marital separation and divorce. Driving under the influence of alcohol and other drugs reduces the ability to judge distances, speed, affects concentration, and increases the tendency to take risks.

3) Bhang causes aggression in people. It may cause illusion and accelerate the function of the heart. Chronic use of marijuana may result in some adverse effects on the lungs, brain, reproductive system, attention and even memory. Marijuana slows reaction time hence many road accidents are caused by people who are high on pot. It also causes a sense of paranoia.

4) Cocaine or 'coke crash' is characterized by depressive irritability, paranoia, anxiety and an intense craving for more. The drug leads to dependence, addiction, mental problems, and even death. Other side effects include confusion, vomiting, convulsion, circulatory collapse and rapid pulse. Pregnant women using crack risk miscarriage, premature births, severe

hemorrhage and still births.

5) Needle sharing contributes to the spread of HIV and other infectious diseases e.g. "flashing blood" where a heroine user will draw blood from himself to inject into a friend`s bloodstream with the aim of transferring some of the heroin. Heroin use damages the lining of the heart and causes liver, kidney, and arthritis problems. Other negative effects may include; Nausea, heart failure, constipation, damage to central nervous system, paranoia, impaired perception, depression, damage to kidneys, bone marrow, respiratory damage and chronic bronchia limitation.

6) Families that have some of its members or a member abusing drugs pass through hard moments. Such people lack a sense of responsibility and it is even worse when the head of the family is the culprit. Other family members are not well taken care of and even the drug abusers themselves do not take care of themselves. Family rows which eventually lead to separation and divorce find their lee way. Ultimately their children suffer adversely and lack proper upbringing.

7) People have lost their jobs because of underperformance and numerous social related conflicts with their workmates brought about by drug abuse. Some holding crucial positions have led to collapse of organizations capable of performing well.

8) Drug abuse slows economic development in that unemployment rate is high and economic productivity low. Leaders, who abuse drugs tend to mislead their subjects, underperform their duties and even dictate upon their subjects.

9) Drug abuse has contributed to crimes such as murder especially when the drug barons see the danger of being caught in their illegal trade. Advocates of decriminalization argue that drug prohibition makes drug dealing a lucrative business, leading to much of the associated criminal activity. Drug trafficking is a business of the rich and the powerful and it would require great effort to break the network.

10) Unwanted pregnancies, young marriages, rape, incest, prostitution and other social ills in the society emanate from this uncontrollable dependency on

drug abuse.

11) Academic levels have gone down after the infiltration of drug peddlers into schools' colleges and universities. The following are some of the signs portrayed by the affected students; decrease in quality of school work without a valid reason, personality change in terms of unexpected behavior, little attention in class or lecture halls, irritable to small issues, becomes antisocial, has a money borrowing syndrome, associated with loss of items, theft or conman ship and an acute weight loss. Other possible signs are; redness of the eyes, loss of appetite, memory loss, and notable lack of motivation. Mostly, strikes in learning institutions which lead to senseless misconduct and wanton destruction of property are organized and carried out by students who in a way have been taking drugs.

12) Drugs are reducing life expectancy for young people. Since so many young people die of diseases related to drug use, many are concerned that a population pyramid shift may leave too few people of working age to support the country`s senior citizens.

2.5.4   Way forward

Apart from the prescribed drugs, drugs found legally over the counter, and herbal drugs given by certified personnel, other usage of the drugs is open to abuse, addiction and dependence and often the abuse reduces individuals into zombies. There is less accountability, reasonableness of one`s actions and ultimately becoming "a moral wreck". The individual continues to live in a world of fantasy where good morality is not the priority. Intoxication affects the conscience and sobriety of a human mind and this should be discouraged at all costs. Drowsiness and other after effects reduce voluntariness and reasonableness and they end up acting as sub-humans. It is important to acknowledge that drug taking does not take your problems away, rather they escalate them. Prevention programs should be devised to equip all with skills and knowledge of trying to resist pressure of drug involvement. Boredom should be avoided, and good relationships established. Actual parental and teacher monitoring of children is crucial to create an environment free from drug abuse. Drugs have been trapped in airports and roadblocks, yet this has not deterred the drug barons

from their lucrative trade. Governments therefore must put in place stringent rules, fines and charges against anyone caught in drug peddling pursuits. Religious, governmental, and non-governmental organizations should hold regular seminars to educate people on the dangers and risks of a drugged individual, community and race. Counseling and rehabilitation may also be offered to those affected.

2.6 Youth radicalization and Criminality

Crime is an action or an instance of negligence that is deemed injurious to the public welfare. It is an illegal act or activity that involves breaking the law. Criminality is the quality or state of being a public offender. Youth on the other hand is an elastic concept. It means different things at different times, and in different places. It is the category of people who are not yet adults and are generally within fifteen to twenty-five years. Youths are described often in a very approximate manner as teenagers, adolescents or juveniles. In appearance they look young, depict freshness, vigour, motivation and have a high enthusiasm of performance. Crime among the youth basically refers to the commission of illegal activities among adolescents and often referred to as juvenile delinquency. It is true that teenage is a period when social control is weak. It has been suggested that weakness of social control, coupled with search for excitement, can lead to a drift in delinquency. A satisfactory definition by Walter Miller states that; a youth gang is a self-forming association of peers, bound together by mutual interests, with identifiable leadership, well developed lines of authority and other organizational features, who act in concert to achieve specific purposes which generally include the conduct of illegal activity and control over a territory, facility or type of enterprise.

A recent research carried out by the National Crime Research Centre on organized criminal gangs in Kenya, (Saturday Nation, 31st August 2013) revealed the existence of forty-six organized criminal gangs involved in murder, extortion, kidnapping, and violent robberies among others. Some have been recruited as politicians` bodyguards, others offer protection and intimidate opponents, mobilize people to attend political rallies, illegal levies on businesses or private property, hired for campaigns and revenge, illegal detention, execution, attacking mourners at night, threats of eviction, provide water and electricity illegally, settlement of disputes,

cattle rustling, ethnic cleansing, pick pocketing, drug and human trafficking as well as theft. Other complex crimes such as terrorism, piracy, cybercrime, corruption, money laundering, sexual and gender-based violence were said to be common social concerns globally are said to be perpetrated by the youth.

Hereditary, physical and psychological trait is today generally ruled out as an independent cause of crime, but psychological states are believed to determine an individual's reaction to potent environment influences. Some criminologists assert that certain offenders are born into environment such as extreme poverty or discrimination against minority groups. Psychiatry on the other hand generally considers crime to result from emotional disorders often stemming from childhood experience. Though the activities of young people are both visible and more closely policed than those of other age groups, it is undeniable that a significant proportion of crime is committed by young people. Relationship between age and crime has been the subject of considerable criminological analysis and probably, the most important single fact about crime is that it is mostly committed by teenagers and young adults. That involvement in crime diminishes with age is a view that is widely accepted in criminology. It is important for sociologists to understand that the aspect of youth crime is dynamic and varies among different communities or societies. No two gangs are exactly alike. Gender wise, there is a marked difference between crime rate of males and females. Male rates are five times higher than female ones. Vigilante justice has taken over normal activities for their own gains. These groups of young people embrace three main types of crime; professional crime by young professional criminals, crime syndicates in pursuit of illegal financial gains, and secret expansion of their assets and territories to the detriment and exploitation of other people.

2.6.1   Types of crime

1) White collar crimes refer to illegal acts carried out by respectable members of the community. Individualized motivated white-collar crimes are non-violent and are carried out by the youth of relatively high social status who attempt to gain money, property or personal benefit through deceit. The public is victimized by these activities and the law offenders go sometimes

unpunished.

2) Corporate crime is unique in that offenders are large organizations, corporations rather than individuals. This results from deliberate decisions made by corporate personnel to increase resources or profits. These crimes include multinational bribery, price fixing, game fixing, sale of unsafe and expired products, and polluting the environment. Punishment of corporate crimes is generally limited to fines because you cannot attach individual blame and is impossible to imprison a corporation.

3) Organized crime exists mainly for conducting illegal activity. This includes the importation and distribution of illegal drugs, prostitution, gambling, piracy, cattle rustling and poaching. Organized crimes gain control by using threats and promises.

4) Political crime is the abuse of government or political office or position to gain office or political influence. Such activities include bribery and are directed towards personal gain. These activities range from wiretapping, opening mail and other forms of illegal spying.

5) Victimless crime refers to illegal acts whose participants are consenting young adults. In other words, crimes in which the only victims are the offenders. Examples of this crime are drunkenness and prostitution.

6) Violent crimes are committed using force.

2.6.2 Criminal law divides murder and non-negligent manslaughter into four categories.

1) The first-degree murder is when the offender plans to kill. It also includes felony cases like rape, robbery, causing a person`s death, and setting houses on fire. Arson means any wilful burning or attempt to burn with or without intent to defraud a dwelling house, motor vehicle or personal property.

2) Second degree murder is when the offender intends to do serious bodily harm short of killing the victim, but the victim dies.

3) Voluntary manslaughter is killing committed out of intense emotion such as

anger or fear.

4) The last degree is the involuntary manslaughter which refers to killings committed because offenders have acted recklessly e.g. where a parent shakes a crying child and accidently kills it. Reckless conduct which results in death falls under this category, e.g. road accidents or medical negligence.

Property crime refers to burglary or unlawful entry of a structure to commit felony or theft. It doesn't involve force and includes pick pocketing, shoplifting, purse snatching and mugging.

2.6.3   Causes of crime

1) Drugs and alcohol abuse are clearly linked with age. Use of illicit drugs is rare in early teenage years but increases sharply in mid-teens and is generally shown to peak in the late teens or early twenties. The rate of use of drugs such as cannabis and heroine, amphetamines and ecstasy are significantly higher among young serious and persistent offenders than they are in the general population. The expansion of illegal drug markets increases solidarity of existing gangs.

2) Peer pressure- Young people tend to commit crime at this age mainly due to peer influence and self- identification.

3) Poverty - The lowest social class or working-class areas report crime and delinquency eight times more than middle class areas meaning that poverty is a great contributor to youth criminality. Lower class responds violently to trivial remarks and insults.

4) Unemployment- Adolescents have an increasing need for money, that part time job or parental allowances may not satisfy them. For some adolescents, crime provides money. With such a situation crime reduces when one moves to adulthood and gets full time employment and greater financial resources.

5) Retaliation – Racial, class, educational or spiritual victimization of ethnic minorities provides an unequivocal example of protest and unimaginable delinquent activities. They fear that everybody looks down upon them and so they express their frustrations in delinquent behaviour.

6) Inadequate Education- Career criminality is more common among those with low education and bleak job prospects, a characteristic most common in urban undergraduates. An educated person will most probably think twice before making any commitment to a supposed crime.

7) Overcrowding- Migration of youth to towns has increased strenuous living among people and it is difficult to identify individuals in case a crime is committed. Crime ratios tend to be higher than those in rural areas which may be attributed to differences in social control and cohesion. Many of the urban poor, live in slums and squatters' settlement with overcrowded unhealthy housing and lack of basic services which lead to robbery and other several crimes

8) Poor parenting - Poor parenting due to various commitments and minimal surveillance over children contributes to the failure of upholding the values of society. People who are deprived of motherly affection in infancy later are likely to become criminals. Lack of family support may lead to high rate of criminality in the youth.

9) Personality traits - Two types of personalities as a child develops come to the fore. An introvert is quiet and reserved; he keeps his feelings under control, seldom behaves aggressively and doesn't lose his temper quickly. An extrovert is fun-loving and outward going but tends to be aggressive and loses his temper quickly. His feelings are not kept under tight control and he is not always reliable. It is thus easier for an extrovert to fall into criminality than an introvert. The theory of classicists' stresses that the causes of crime lie within the individual offender, rather than in his external environment. Here offenders are motivated by rational self-interest and self-free will. They weigh the pros and cons before committing a crime and when the pros overweigh the cons, they execute their actions.

10) Stress is another cause for juvenile delinquency. Some believe that there are institutionalized paths to success in society, and that they are far from them. They believe that those already institutionalized to success will not be affected by their menace. These are gangs who accept socially approved goals, but not necessarily through socially approved means.

11) Youth manipulation - Politicians are known to be directly involved in using illegal gangs to oppress their political opponents and achieve political superiority. They finance gangs and make them grow in number within certain areas or regions.

12) Poor police surveillance- Failure of the police to offer surveillance round the clock in overcrowded areas increases despondency among the young people.

13) Readily availability of guns –There are new admissions into criminality due to the readily available guns. They become the most dangerous in terrorizing the locals.

2.6.4   Negative effects

1) Life, property and money as well as peace is lost while insecurity prevails.

2) Mostly the gang members risk death or a shootout with police. Both parties may end up suffering fatalities. Most of the gangs are killed through mob justice.

3) Life imprisonment and other types of severe punishments may be given by the courts as a deterrent measure to criminality.

2.6.5   Remedies to radicalization and youth criminality

1) Rehabilitation of wrong doers and adoption of new skills and attitudes are crucial.

2) Parents should offer guidance and good care to their children.

3) Family intervention and training ought to enhance morality of the youth and prevent them from dropping out of school.

4) Young people too should be educated on how to overcome pressure from their peers.

5) Employment and training assistance to the youth is needed to enable them to establish an economic base and meaningful sources of income. Development

of urban policies directed at solving problems that train or create gangs and their hiring ought to be stepped up.

6) Establishing youth outreach programs to provide multicultural training on how to avoid crimes as well the establishment of community centers to rehabilitate youth who are addicted to crime and drugs.

7) Conflict of interest among adolescents requires mediation programs between the youth and other members of society and should be spearheaded by the community leaders. Creation of interesting and capturing recreational activities that keep the youth busy and prevent them to seek recreation in crime is also deemed necessary.

8) The government should ensure that incentives of economic aid for people who cannot find work or who find work but still cannot lift themselves out of poverty are given to create self-employment strategies. The government must take measures to expand community policing and increase gun control efforts.

2.6.6   Way forward

The young people should know that their actions should embody personal responsibility. Though I want to use a friendly approach and call them wrong doers and not criminals, individual consequences must be met, and the full force of the law employed. The young should avoid idleness at all costs and seek self-employment opportunities wherever possible. Maturity is called for when indulging in group activities and peer influence itself should not be a reason to involve oneself in criminal episodes. In an overcrowded circumstance where identification is poor, seek and hide game is not the solution. The family is the primary source of socialization and it plays an important role in the prevention of criminology among the underage by trying to teach them how to live harmoniously with other people socially in the society. Parents therefore should spend more time with their children. The government and other relevant organizations, particularly youth organizations should consider forming information campaigns and educational training programs to sensitive the youth on personality and socially detrimental effects of violence in the family, community and society, so that they can protect themselves and others

against violent crimes.

3. Conclusion

The concept of human development was first laid out by Amartya sen, a 1998 Nobel laureate and expanded upon by Martha Nussbaum, Sabina Alkire, Ingrid Robeyns among others. It stated that, "Development concerns expanding choices people have to lead lives that they value and improving the human condition as well as building human capabilities". If you compare this with what I said about value in the Introduction, then Kenyans and the world have no option but to act in a responsible manner to avoid retrogression into the animal world.

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Exploration of Anthropic of Principle as Theistic Argument: A Study in Christian Thought and Science

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Abstract

There have been conscious and systematized attempts to establish the existence of God as far back as the 4th century BC. This attempt is tagged theistic arguments; arguments for the existence of God. This paper is another in the series of attempts at engaging in discourses about the existence of God. The focus of this paper is to establish the legitimacy and appropriateness of using insights from the natural sciences in the formulation of theistic arguments. This paper specifically examined the concept of anthropic principle, which connotes that the fundamental parameters and properties of the universe, as described in physics, cosmology and other areas of natural science, fall within precise values and satisfied the narrow requirements needed for life to have emerged in the Universe, thereby raising the question of ultimate causation. A qualitative approach to research was employed in this paper. Literatures on the concept of anthropic principle were consulted and analysed. The study revealed that chance, necessity, multiverse, and design are explanations for anthropic principle. In view of the weaknesses and inadequacy of the first three, it was argued that design is an appropriate explanation for anthropic principle; and where there is design, it makes sense to postulate a designer. The designer, however, may not necessarily fit in into the traditional description of the Christian God. The broad implication of this is that natural science can, at least, point beyond naturalism, thereby corroborating the idea that dialogue between Christian faith and science can enrich human epistemic commitments.

Keywords: *Anthropic Principle, Christian Faith and Science, Christian God, Human Epistemic Commitments, Theistic Arguments.*

1. Introduction

Central among issues that is of concern in the preoccupations of theologians and philosophers of religion is the question of God. It is also a very important issue in a comparative study of the relations between religion and science. Discussions about God could take various dimensions, starting from God's existence to God's nature and attributes. Of no less concern are questions ranging from how God is involved in the debate about the problem of evil as well as the continuing relevance of God-talk in the world today. While the focus of this paper is the dialogue between Christian faith and science, the centrepiece of the dialogue employed in this paper is the concept of God's existence.

There are indeed a variety of attempts at establishing the existence of God by philosophers of religion, theologians and other interested individuals. The traditional arguments for God's existence which are found in curriculum of Christian studies in Nigerian tertiary level of education National Universities Commission (2007, pp. 166-188) include ontological argument, cosmological argument, teleological, moral argument and argument from religious experience. All these have variations.

However, efforts in the natural sciences, particularly from the latter part of the 20th century Murray and Rea (2008, p. 150), have led to an upshot of another form of theistic argument (within the wide umbrella of teleological arguments though) which is sometimes tagged the theistic anthropic principle or argument from fine-tuning. The claim in this argument is that the fundamental properties of the universe seem, from observations in some areas of natural science, to have been fine-tuned for the emergence of life in the Universe thereby raising question of ultimate causation. Questions of ultimate causation in respect to the fine-tuning of the conditions, laws and constants of physics would no doubt require explanation. Among a variety of explanations, theistic explanation for evidence of fine-tuning of the universe is favoured by many thereby leading to the formulation of theistic anthropic principle as an argument for the existence of God.

This paper sets out to explore the explication of anthropic principle as theistic argument. In other words, the paper would determine whether or not inputs from the natural science can be streamlined into an argument for the existence of God. By doing this, the paper would *ipso facto* make a statement on the need or otherwise of a rapprochement between Christian faith and science. In this paper, attention shall be paid to the meaning of theistic arguments as well as the meaning of anthropic principle and its use as a theistic argument.

The words "theos" and "logos" are both Greek words meaning 'God' and 'reason' respectively. It needs to be pointed out that "logos" can be interpreted to mean 'word'. However, some interpretation has rendered it to mean "reason." It is to this that reference is made in this paper. Reason may further be interpreted to mean 'rational discourse', thereby rendering it to imply the rigorous attempt at carefully evaluating a phenomenon as is done in various studies. As such, we may refer to 'reason' as study; and this provides a good cause for arguing that since 'reason' can be presented to mean study, and "theos" refers to God, what results from the two words would be a 'study of God'. But studies of God are diverse. As pointed out above, the point of study about God could be the nature of God, the attributes of God, God's involvement in the Universe, and ultimately, God's existence.

Within the context of combining "theos" and "logos" to mean the study of God in this paper, the reference is to the concept of the existence of God. Thus, the objective of this 'study of God', is ascertaining the veracity of claims about God's existence. Rather than take theistic arguments as just the study of God, it has historically, in philosophy and philosophy of religion, been construed as studying the existence of God. Theistic arguments are therefore arguments for the existence of God.

Being arguments, they require provision of valid reasons or grounds for the affirmation of claims pertaining to the existence of God. Arguments are not just assemblages of statements in an order pleasing to the person advancing such arguments. Rather, arguments are carefully arranged schema of statements that are well knitted into one another, such that a pattern of thought emerges from the schema (Achilike, 1999). From this consideration therefore, theistic arguments need to enjoy the hallmark of

rationality. It can be described as rational attempts at establishing the existence of God. They are attempts at establishing the existence of God through critical thinking. The demand of theistic arguments is that claim(s) for the existence of God would not be grounded on mere feelings, common consent, or reliance on an authority, say for example, a pastor. It differs from claiming the existence of God as a matter of religious faith because, in the case of theistic arguments, there is the need to provide rational justification for the claim that God exists.

Such attempts at providing rational grounds for the affirmation of God's existence are replete in history, starting, on the authority of Omoregbe, by Plato. Omoregbe believed Plato was the first philosopher to offer philosophical arguments for the existence of God under three themes of motion, design, and universal conviction (Omoregbe, 1993, p. 66). There have been almost innumerable numbers of such arguments after Plato. Apart from the number, there are continuing attempts at providing theistic arguments and the current is still present today. Onimhawo and others testified to this when they wrote that "[r]eformulated versions of the theistic arguments are copious, clearly testifying to their living and impressive nature" (Onimhawo, Izibili, & Igboin, 2006, p. 5). As commentaries, critiques, expositions and interpretations of theistic arguments abound, there are also continuing and concerted efforts at providing new and reformulated versions of theistic arguments. The purpose of this is not just for the sake of doing it but for the purpose of updating knowledge and at times, viewing issues from entirely different perspectives, which could bring about positive innovations and contributions to the knowledge pool. Apart from the claim that theistic arguments are emerging from studies in the natural sciences; one of which is the focus of this paper, good evidence that theistic arguments in terms described above (updating previous knowledge and developing new ones) can be seen in a version of theistic argument developed just a bit over a decade ago by Pantaleon Iroegbu. He referred to it as *hermeliontic proof* for God's existence (Iroegbu, 2002, pp. 98-123). For anyone with sufficient acquaintance with literatures in religious studies, theistic argument may be familiar. But how familiar is the concept of anthropic principle?

2. Exploring Anthropic Principle and Anthropic Coincidence

The term 'anthropic' in anthropic principle was derived from the Ancient Greek word "anthropos" meaning "man" or "humankind". Thus, anthropic principle has something to do with talks about humanity or human life. However, anthropic principle refers to more than human life. The principle refers to emergence of life in general and the fundamental properties of the universe which are inevitable for the emergence of life. Thus, Michael Corey asserted that the term "anthropic" is a misnomer, since the crux of the matter are physical properties which are required for the emergence of life. The phrase then should have been biocentric principle (Corey, 2003, p. 17). For convenience and maintaining uniformity with current literatures and for the fact that the phrase "anthropic principle" does not refer to issues centred only on the emergence of human life as aptly pointed out by Polkinghorne (2006), we shall maintain the phrase 'anthropic principle" in this paper. It is important to quickly indicate at this point that the concept of anthropic principle necessarily implies mentioning anthropic coincidences. Anthropic coincidences form the basis of the concept of anthropic principle, and it involves a combination of outcomes of researches in physics, cosmology (this includes astronomy), and biology. The anthropic coincidences range from biological, chemical, and physical properties of nature.

To establish a thorough understanding of anthropic principle therefore, there is the need to first discuss the concept of anthropic coincidences, upon which the concept of anthropic principle is based as an explanation.

2.1.   Anthropic Coincidences

It is no doubt that ignorance is endemic among humans in respect to knowledge of the natural world and its workings. Most of the human population just takes it for granted that they are human beings, living on the planet earth, where there are other animals and plants. Questions regarding why the Universe exist may not occupy the minds of the average person whose main concern is how to fend for himself/herself and makes the most out of life, for his/her benefit and others around. While it is true, for instance, that we experience heat from the radiation of the Sun; the nature of the Sun, the nuclear processes within the sun, and its radiation may be well beyond

the concern of the ordinary man. The same position of ignorance may largely be predominant about other natural objects like the moon, stars, and chemical elements like hydrogen, oxygen, helium, silicon, beryllium, e.t.c. Safe for a reading of some literatures in the natural sciences, many people may not know that the presence of other animals and plants and the environment as a whole (biosphere) are absolutely necessary for human existence. All these constitute important aspects of existence and a good level of understanding of the constituents of existence appears a worthy vocation on the part of men.

To situate the discussion here appropriately, it must be borne in mind that the author subscribes to the standard cosmological model of explaining the nature and origin of the universe where concepts like big bang, matter, energy, inflation, etc. are very important. This clarification is important because it is within this scientific outlook that discussions about anthropic coincidences and anthropic principle are appropriate.

One of the areas which do not enjoy widespread attention is the anthropic coincidences. Anthropic coincidences refer to a range of conditions, constants of physics and fundamental properties of nature which must fall within a very narrow limit for the universe to exist as it is and for life to emerge in the universe at some stage in the cosmic history. This implies that a number of conditions have been satisfied for the Universe to exist as it is and for life to appear in the Universe. In order words, we wouldn't have been here (on earth) as life-bearing organism on the planet earth if some initial conditions, laws or constants have not existed or have possessed values which are slightly different from the ones they have.

Robin Collins tagged these conditions or properties of the physical universe as the 'fine-tuning for life' and defines this fine-tuning as the "fact that the laws of nature, the constants of physics, and the initial conditions of the universe are set just right for life to occur" (Collins, 2012, p. 2). The question that comes to mind immediately is what are those coincidences? Some of these include: gravity, the four forces of nature – gravity, electromagnetic force, the weak force and the strong force, the dynamics of the ozone layer, the principle of Pauli exclusion, laws guiding interaction

of elementary particles such as proton and neutron and the mass of these elementary particles, gravitational constant, cosmological constant, e.tc. An indication of how important these coincidences are, as well as having values which fall within very narrow limits was explained by Murray and Rea. They limited this explanation to just three of the anthropic coincidences:

1) *According to the most widely accepted cosmological model, the universe came into existence roughly 14.5 billion years ago at the Big Bang. Very shortly after the Big Bang, the universe underwent a cosmic "inflation" during which it expanded extremely rapidly for a mere fraction of a second. Had the rate of inflation during this period differed by as little as one part in 1060 the universe either would have stopped expanding and collapsed back in on itself due to internal gravitational forces, or it would have expanded so rapidly that elementary particles could not have clustered or coalesced in a way that would allow any matter to form.*

2) *Atoms are made up of a nucleus and one or more electrons which orbit the nucleus. Aside from hydrogen, the nucleus of every atom contains two or more protons which are held together by something scientists call the "strong force." As with the rate of inflation, the strength of the strong nuclear force must be finely balanced for life to be possible. If for example the strong force were only 10 percent weaker than it is, protons could never begin to "clump" together in ways that allow for the formation of atoms other than hydrogen. In such a universe there would be no possibility of forming any complex molecules at all. And such complexity is required for life. If the strong force were as little as 4 percent weaker, something quite different would happen: nuclei could be formed from either pair of neutrons or pairs of protons. In that case, the reactions that take place inside stars would happen very rapidly, rather than over the billions of years it now takes, and this would mean that the universe would lack the sources of heat and light which, as best we can tell, are instrumental to the origin and continuation of life.*

3) *Not only must the strong force be of a certain strength, it also needs to be proportional to another fundamental force of*

nature, the electromagnetic force, within a very narrow range. The reason for this is not hard to see. The electromagnetic force is the force that causes protons to seek to fly apart. This force needs to be balanced by the strong force keeping them together. For example, if the strong force were only one twenty-fifth as strong as it is, half the elements necessary for complex life forms would be unable to exist because the repulsive forces would blow the nucleus of higher elements apart (Murray & Rea, 2008, p. 151).

Another, in the list of coincidences, without which the emergence of intelligent life as we know it would be possible, according to Collins is gravity. Though the ordinary man/woman is impacted on by gravity; he/she experiences stability as a result of this physical force, yet he/she may not understand what gravity is, the source of gravitational force, the nature of gravity and that without gravity, appearance of life on earth would be impossible or may not be the way we know it. Describing the essential nature of three out of the four forces of nature and the pivotal role these forces play in the emergence of life Collins submitted that:

If gravity did not exist, masses would not clump together to form stars or planets; if the electromagnetic force didn't exist, there would be no chemistry; if the strong force didn't exist, protons and neutrons could not bind together and hence no atoms with atomic number greater that hydrogen would exist (Collins, 2012, p. 2).

The functions and necessity of these forces as being fine-tuned for life could be seen in his conclusion that "… if any of these fundamental laws and principles were missing, the existence of complex intelligent life would probably be rendered impossible" (Collins, 2012, p. 2). The use of 'probably' in this quotation definitely does not refer to remarkable degree of uncertainty. Literatures consulted have shown that it is very unlikely to come across physical scientists who express doubt about the reality of the anthropic coincidences. The highly revered theoretical physicist, Paul Davies, aptly pointed out that anthropic coincidences are facts. In a publication of the *Association for the Promotion of the Scientific Endeavour,* Davies submitted

in the opening paragraph of his article that, "For life to emerge, and then to evolve into conscious beings like ourselves, certain conditions have to be satisfied" (Davies, 2013, p. 1)". He went on to list the conditions as : a good supply of chemical elements for biomass, liquid water, energy source and stable environment, which is made possible by the Sun, and that the emergence of life and consciousness necessarily demands a long period within which the necessary conditions must remain benign (Davies, 2013, p. 1). George Ellis, a physicist, mathematician, astronomer and cosmologist, also lend credence to the reality of anthropic coincidences. He demonstrated how easy it is to imagine or construe universes where life could be impossible and implicitly expressed fascination about the narrow requirements that have been satisfied to make intelligent life possible in the universe (Ellis, 1993, pp. 89-90). His summation was:

> The point is that a great deal of 'fine tuning' has taken place in order that life be possible; in particular various fundamental constants need to be highly constrained in their values for life as we know it to exist. There are many relationships embedded in physical laws that are not explained by physics but are required for life to be possible (Ellis, 1993, p. 89).

Victor Stenger was also a physicist of repute whose main point of difference from other natural scientists mentioned above was his embrace of naturalism and a vociferous attitude against using anthropic coincidences as a valid substratum for theism. Though he insisted that a number of coincidences thrown about by scholars do not enjoy the same order of importance and even argued that referring to some of the constants as 'fine-tuned' was borne out of error, he nevertheless submitted that there are anthropic coincidences which he refers to as "connections between physical constants that seem to be necessary for the existence of life in the Universe" and went ahead to give instances of anthropic coincidences (Stenger, 2007, pp. 144-147).

Knowledge of anthropic coincidences is not only demonstrated by scholars in the Western part of the globe alone. F. A. Oladele, demonstrated the inevitableness of anthropic coincidences. While accentuating biblical and scientific evidences for God, in an attempt at exploring the positive interplay between religion and

science, he referred to some natural properties of the universe which he qualified as "amazing blend of smallness, vastness, and precision" (Oladele, 2006, p. 145) in creations. Apart from a highlight of a number of such coincidences, he summed up the description of anthropic coincidences in these words:

> *There is much precision in the universe, as the major forces or elements in the make-up, design and functioning of the universe is fine-tuned, i.e., set accurately to ensure and sustain life on earth. Everything in the universe is in motion and the movement is orderly and predictable, e.g., electrons, atoms, planets, and galaxies* (Oladele, 2006, p. 145).

Anthropic considerations were also given expression in Oyawoye's description of the natural world (Oyawoye, 2006, pp. 3-4&13). The evangelic philosopher of religion, William Lane Craig described anthropic coincidences as a discovery by the scientific community of "how complex and sensitive a nexus of conditions must be in order for the universe to permit the origin and evolution of intelligent life on Earth" (Craig, 1990, p. 127). This description underscores the name of the argument that derives from those "nexus of conditions"- fine-tuning arguments. It is tagged thus because considering the inevitableness of the properties of nature bearing the "conditions" or "values" they bear for life to emerge, it appears as if those "nexus of conditions" were actually fine-tuned for the emergence of life. Murray and Rea, pointing clearly to this and affirming the relative currency of this form of argument submitted thus:

> *Since the second half of the twentieth century, scientists and philosophers have focused increasing attention on another area where we find powerful evidence of apparent design: cosmology. Recent cosmologists have been struck by the fact that the conditions, laws, and constants which govern both the origin of the universe and the activity of the matter it contains seem to be "fine-tuned" in such a way as to allow life to occur* (Murray & Rea, 2008, p. 150).

As such, that humans, as well as many other beings, exist as life-bearing organisms in the habitable planet earth is as a result of the fact that some conditions are just

right for the emergence of life. Emergence of life thus appears as a gift, occasioned by those conditions of the Universe.

As noted above, Victor Stenger argued that some of the coincidences in circulation are either not strictly speaking anthropic coincidences or some misunderstanding. However, that anthropic coincidences are matters of fact is evident in that he itemized five of such coincidences as follows Stenger (2007, pp. 145-147):

1) *The electromagnetic force is 39 orders of magnitude stronger than the gravitational force. If the forces were more comparable in strength, stars would have collapsed long before life had a chance to evolve.*

2) *The vacuum energy density of the universe is at least 120 orders of magnitude lower than some theoretical estimates. If at any time the universe was as large as these calculations suggest, it would have quickly blown apart.*

3) *The electron's mass is less than the difference in the masses of the neutron and proton. Thus, a free neutron can decay into a proton, electron, and antineutrino. If this were not the case, the neutron would be stable and most of the protons and electrons in the early universe would have combined to form neutrons, leaving little hydrogen to act as the main component and fuel of stars.*

4) *The neutron is heavier than the proton, but not so much heavier that neutrons cannot be bound in nuclei, where conservation of energy prevents the neutrons from decaying. Without neutrons we would not have the heavier elements needed for building complex systems such as life.*

5) *The carbon nucleus has an excited energy level at around 7.65 million electron-volts (MeV). Without this state, insufficient carbon would be manufactured in stars to form the basis for life. Using anthropic arguments, astronomer Fred Hoyle predicted this energy level before it was confirmed experimentally*

While there are many other instances of anthropic coincidence as demonstrated by

Davies (2013, p. 1);Ellis (1993, pp. 90-91);Polkinghorne (2007, pp. 67-69); Walker and Ćirković (2006, pp. 292-295); Craig (1990, pp. 128-131); Collins (2012, pp. 2-4), and a host of others, we shall limit ourselves to the ones highlighted above since they seem not contentious even in the opinion of those who kick against the theistic use of anthropic principle.

A point that deserves mentioning in a consideration of anthropic coincidences is the fact that the anthropic values or constants exhibit a remarkable level of precision. This implies that the values of some physical quantities are such that a slight difference from what it is would have rendered life impossible. An indication of the level of precision was illustrated in the fine-tuning of the cosmological constant which according to Robins is "estimated to be at least one part in 10^{53}, that is, one part in one hundred million, billion, billion, billion, billion, billion" (Collins, 2012, p. 3)". Davies expressed this kind of narrow limit precision needed to be met for the emergence of life by adducing to Fred Hoyle's quip that the universe looks like a fix (Davies, 2013, p. 16)(sic). We now turn to the concept of anthropic principle and its use as a form of theistic argument.

2.2. Anthropic Principle

An important clarification that was made above was that the concept of anthropic principle was based on discoveries/observation of anthropic coincidences. This section is devoted to a description of anthropic principle. The phrase - "anthropic principle" was actually a coinage by a physicist, Brandon Carter in a 1973 symposium held in celebrating the 500th anniversary of Copernicus birth at Krakow in Poland. In reference to the reality of anthropic coincidences explained above, Carter was said to have remarked that "although our situation is not necessarily central, it is inevitably privileged to some extent" (Carter, 1974, p. 75). Flemming interpreted this statement to mean that it is evident that there are indications of fine-tuning in the Universe and that this fine-tuning reveals a pattern and not a happenstance (Fleming). The same opinion was demonstrated by Victor Stenger who submitted that "Brandon Carter, introduced the notion of the *anthropic principle* which hypothesized that the anthropic principles are not the result of chance but somehow built into the structure of the universe" (Stenger, 1999). John Polkinghorne describes anthropic principle

as:

> *a collection of scientific insights that indicate that necessity had to take a very specific form if carbon-based life were ever to be a cosmic possibility. In other words, it would not have been enough to have rolled the evolutionary dice a sufficient number of times for life to have developed somewhere in the universe. The physical rules of the cosmic game being played also had to take a very precise form if biology were to be a realizable possibility. The given physical fabric of the world had to be endowed with anthropic potentiality from the start* (Polkinghorne, 2006, p. 246).

Thus, anthropic principle refers to the idea that the universe reveals enormous features; as demonstrated by anthropic coincidences described above, which are not just complex but appear improbable and built up on values and constants of physics. These values and constants exhibit an amazing level of precision. The principle further implies that the observed values and quantities could not have appeared as a result of chance. It is important to note that Carter did not specifically address the question of God while proposing the anthropic principle. He only expressed an insight which was essentially scientific.

Brandon Carter advanced two types of anthropic principle namely, the weak anthropic principle (WAP) and the strong anthropic principle (SAP). Today there are different variants of anthropic principle and this has contributed to the challenge of coming forth with a precise meaning of anthropic principle. Some of the different forms of anthropic principle which appear in literatures include the Final Anthropic Principle (FAP), Participatory Anthropic Principle (PAP) and Design-Centred Anthropic Principle (DCAP) (Corey, 2003, pp. 14-15).

In line with Brandon Carter, John Barrow and Frank Tipler in *The Cosmological Anthropic Principle* offered three variants of anthropic principle, the first two being a rephrasing of Carter's weak anthropic principle (WAP) and strong anthropic principle (SAP), while the third was an introduction of another variant called the final anthropic principle (FAP). In scientific circles, reference is primarily made to the first two variants while the third is sometimes mentioned, but not considered as

a scientific proposal. George Ellis, for instance submitted that, there are two purely scientific approaches to the anthropic issue, the first being the WAP while the second is SAP (Ellis, 1993, p. 92).

This paper shall only offer brief explanation of the two types of anthropic principle.

2.2.1.   The Weak Anthropic Principle (WAP)

The first variant of anthropic principle is referred to as the Weak Anthropic Principle (WAP). This principle simply mean that physical scientists have discovered a chain of physical and cosmological values or what Flemming referred to as "a number of basic laws of nature" (Fleming, nd, p. 2), which necessitate that there exist a location which would at a stage allow for the evolution of observers.
Carter expressed it in these words:

> *We must be prepared to take into account the fact that our location in the universe is necessarily privileged to the extent of being compatible with our existence as observers* (Carter, 1974).

The Weak Anthropic principle was expressed by Barrow and Tipler thus:

> *The observed values of all physical and cosmological quantities are not equally probable, but they take on values restricted by the requirement that there exist sites where carbon-based life can evolve and by the requirement that the Universe be old enough for it to have already done so* (Tipler & Barrow, 1986, p. 16).

The statement of the Weak Anthropic Principle (WAP) above indicates that our location in the universe is favoured because the location is favourable to our existence as observers. That is, if our location had been otherwise, it is very likely that our existence wouldn't have been possible. It further means that the properties or conditions of the earth are favourable for the emergence of life. If this is the case, one could no doubt ask why the conditions and fundamental parameters of the universe are suitable for the emergence of life? This is a question of ultimate causation.

However, there are scholars who believe WAP does not raise the question of ultimate causation. Rather, WAP is taken as a tautology; a restatement of an evident fact. The idea put across by scholars who argue for this position is that we should not be amazed that the conditions of the universe are favourable for the emergence of life because if this had not been the case, we wouldn't be here in the first place. This dismissive attitude to the weak anthropic principle was expressed by Stenger, among others, when he submitted that "the WAP is considered by most physicists and cosmologists to be a simple tautology. Of course, the constants of nature are suitable for our form of life. If they were not, we would not be here to talk about it (Stenger, 1999, p. 7). This idea may sound attractive at first. But if we take cognizance of the fact that those conditions are not equally probable, falls within very narrow range, and there are several them which are unrelated but jointly serve the purpose of ensuring the emergence of life, the view that this situation is not surprising or has happened by chance is not satisfying. Instead, one is likely to think that the whole process could have been designed to lead to the emergence of life. That is, the conditions and fundamental properties and parameters of the physical world were orchestrated to evolve life.

2.2.2.   Strong Anthropic Principle (SAP)

The second variant of anthropic principle is referred to as the Strong Anthropic Principle (SAP). Unlike WAP, the Strong Anthropic Principle (SAP) affirmed in an implicit manner that the coincidences are necessary. Carter's version of the Strong Anthropic Principle (SAP) states that:

> *The Universe (and hence the fundamental parameters on which it depends) must be such as to admit the creation of observers within it at some stage* (Carter, 1974, p. 294).

Barrow and Tipler's rephrasing of SAP reads:

> *The Universe must have those properties which allow life to develop within it at some stage in its history* (Tipler & Barrow, 1986, p. 21).

Unlike the weak anthropic principle, SAP connotes that a careful study of the universe reveals that the fundamental parameters of the universe are such that it would necessarily lead to the emergence of observers within it. SAP puts up a daring challenge since its claim pungently raises the issue of ultimate causation. In the same vein, one could ask why the parameters of the universe are imbued with potentiality for life? Questions of ultimate causation are raised in both SAP and WAP thereby calling for explanation. While WAP and SAP are scientific proposal deriving from anthropic coincidences, the explanation for them may not be appropriately tagged as science. It is one of such explanations that dovetail into debates about the existence of God. To this we now turn.

3. Theism (Design) as Explanation for Anthropic Principle

There are diverse explanations for the fine-tuning of the universe among scholars. The explanations include Walker and Ćirković (2006, p. 295);Ellis (1993, p. 94), Chance, Necessity, High Probability, Mere Appearance, Multiverse, and of course, Design. It is the choice of design as explanation for the anthropic fine-tuning that is being examined as a probable indication of how science can point beyond itself, thereby corroborating the idea that some form of positive interplay is possible between natural science and Christian faith.

Considering the delicate balance of the physical laws and fundamental constants of physics and cosmology, as well as the precise initial conditions of the universe, which must be within a very narrow limit for life to evolve in the history of the universe and particularly on earth, it has been argued that a designing intelligence is a necessary postulate for explaining why the values of the fundamental properties of nature must be the way they are and as such amenable to life. There must be a designer who had the intention of setting forth the laws of physics and other anthropic coincidences which eventually prepare conditions satisfying for the appearance of life. And in view of the exceeding intricateness and sophistication of these features of the universe, the designer must be an intelligent designer.

The suggestion of the possibility of taking design as an explanation for the anthropic principle is evident in the submission of George Ellis, a cosmologist. His opinion was presented thus:

The symmetries and delicate balances we observe require an extraordinary coherence of conditions and cooperation of laws and effects, suggesting that in some sense they have been purposefully designed, (i.e. they give evidence of intention, realised both in the setting of the laws of physics and in the choice of boundary conditions for the Universe (Ellis, 1993, p. 97).

The delicate balance pointed out above is matched with jaw-dropping level of precision; thereby making the inference of a designer more reasonable. The level of precision was described in a long illustration by Stephen Meyer about a cosmic explorer:

Imagine you are a cosmic explorer who has just stumbled into the control room of the whole universe. There you discover an elaborate universe creating machine, with rows and rows of dials each with many possible settings. As you investigate, you learn that each dial represents some particular parameter that has to be calibrated with a precise value in order to create a universe in which life can survive. One dial represents the possible settings for the strong nuclear force, one for the gravitational constant, one for Planck's constant, one for the speed of light, one for the ratio of the neutron mass to the proton mass, one for the strength of electromagnetic attraction, as so on. As you, the cosmic explorer, examine the dials, you find that they can easily be spun to different settings that they could have been set otherwise. Moreover, you determine by careful calculation that even slight alterations in any of the dial settings would cause changes to the architecture of the universe such that life would cease to exist. Yet, for some reason each dial just sits with just the exact value necessary to keep the universe running like a giant safe with multiple combination-locks each of which has been opened. What do you infer about the origin of these finely-tuned dial settings? (Meyer, 1999, p. 9).

The inference that the cosmic explorer is likely to make about the dials; which are just like the anthropic coincidences, is that it is a product of an intention; a design. Meyer presented an example of such indication of astonishing precision as pointed

out by Roger Penrose. He writes:

> *Roger Penrose notes that a single parameter, the original phase-space volume, required such precise fine-tuning that the Creator's aim must have been to an accuracy of one part in 10^{10}(exp 123). Penrose remarks that one could not possibly even write the number down in full, since it would be '1 followed by 10^{123} 0s! more zeroes than the number of elementary particles in the entire universe. Such, he concludes, is the precision needed to set the universe on its course* (Meyer, 1999, p. 11).

The expression of the intuition of design was not only found among advocates of theism and teleology. Eminent scientists, like Paul Davies had expressed the opinion that the universe reveals features which gives the overwhelming impression of design Davies (2004, p. 203), and in consideration of a number of improbabilities in features demonstrated in physics, chemistry and biology, Fred Hoyle quipped that the universe appears to be a fix by a super-intellect instead of attributing it to blind forces (Hoyle, 1982, p. 16).

In recognition of the strength of this intuition and its difference from earlier teleological arguments for the existence of God, theologians, philosophers and scientists alike have argued that the God of theism is the designing intellect behind the complex physical and cosmological laws and the initial conditions of the universe. Hugh Ross was quite affirmative in stating this conclusion after offering descriptions of over two dozen anthropic coincidences and repudiation of chance, a no-explanation-needed interpretation of WAP, and Final Anthropic Principle (FAP) (Ross, 1988). His conclusion in "Design and the Anthropic Principle" was that "An intelligent, transcendent Creator must have brought the universe into existence. An intelligent, transcendent Creator must have designed the universe. An intelligent, transcendent Creator must have designed planet Earth. An intelligent, transcendent Creator must have designed life" (Ross, 1988). A similar position had been expressed in the last decades of the twentieth century when an astronomer, Greenstein, thought that in considering the anthropic principle, some supernatural agencies, or rather Agent, must be involved. He inquired thus: "Is it possible that suddenly, without

intending to, we have stumbled upon scientific proof of the existence of a Supreme Being? Was it God who stepped in and so providentially crafted the cosmos for our benefit?" (Greenstein, 1988, pp. 26-27). While the atheist, agnostic and naturalist may feel pressed for further explanation for anthropic principle, the theist may shrug off such feeling and argue with McGrath that "for the theist, unsurprisingly, these observations point to the inherent potentiality with which the Creator has endowed creation … anthropic phenomena fit easily and naturally into a theistic framework… "(McGrath, 2009, p. 120).

The inference to design and the designer from the fact of anthropic coincidences is no doubt impressive. The immense improbability of these physical and fundamental values and that chance may not be an adequate explanation (as we shall discuss below) even from scientific circles guarantee good grounds for positing a designer. Despite the attractiveness of the argument above, there are objections to the theistic interpretation of anthropic principle. The objections are at times presented as alternative explanations for anthropic principle aside theism. These shall be briefly outlined in what follows and responses to each objection shall be considered.

4. Objections to Theistic Anthropic Principle Argument

One objection to construing anthropic principle as evidence of a Designer or God is the supposition that 'chance' is an alternative explanation for anthropic principle. The idea portrayed by this line of thinking is that improbable precision and complexity observable in the universe was brought about by chance, and as such, there is no need to attribute the anthropic coincidences to the ingenuity of any designer. This position does not deny the fact of the delicate balance expressed in the anthropic principle but attribute this to the operation of a random chance. This current of thought is not new in issues relating to ontology. The same idea has been presented in the debate about evolution, where the mechanism of evolution has been construed to be random chance.

The weakness of this objection is that an appeal to chance does not provide adequate explanation for a nexus of improbable fundamental properties of the universe. The poser raised by anthropic fine-tuning is a question about ultimate causation, and to

appeal to chance as an explanatory construct appear to miss the point since it does not tell us anything. Appeal to chance has been construed appropriately simply as unknown causation. To argue that a natural event occurred by chance (as a first line argument) is to put a veil on lack of explanation for such event. Apart from this, it appears that the appeal to chance is not in tune with the spirit of inquisition in science. Walker and Cirkovic opined that while chance could be taken as explanation in the context of this discussion, resting content with chance as explanation for anthropic principle "would seem a colossal failure of scientific imagination not to at least consider other possible explanations … [and] Given that our universe being hospitable for life is far less likely than having a fair coin land heads a million times in a row, we may not find the mere coincidence hypothesis particularly satisfying" (Walker & Ćirković, 2006, p. 296).

A variant of this idea was the position canvassed by Victor Stenger who argued that the anthropic fine-tuning does not require the postulate of anything beyond the natural. For him, the descriptions of the symmetries and broken symmetries in nature, which were earlier inaccurately conceived as rules governing physical operations do not require any agent (Stenger, 1999, p. 12).

This position is also problematic because of its underlying assumption. It is the assumption that underlies naturalism as an ideology. This ideology tacitly involves the idea that natural things, events, or phenomena cannot require explanations which may not be adequately answered or addressed naturally. It is an ideology that supposes that nothing is possible if it is not natural. The obvious weakness of this idea is the limit of human accomplishment in terms of explaining realities. Science, religion, and other areas of endeavour raise questions about reality, which are beyond the explanatory competences of the disciplines. The improbable complexity and precision demonstrated by features of the universe inspire curiosity and the answers thereto cannot all be rendered.

A second objection to design as an explanation for anthropic principle is the idea that necessity can be adduced as the explanation for anthropic principle. The meaning of this is that the universe must necessarily be the way it is. Postulating some other forms of the universe, in this view, is illusory since the universe must be the way it

is to guarantee coherence and consistency. George Ellis pointed out that there are two forms of this argument. The strong one which is that the unity of the universe necessitates that the features of the universe and the laws underlying them are the way they are. And the weak form which is that "only one kind of physics is consistent with the sort of the world we actually see around us" (Ellis, 1993, p. 95.)

This objection is also confronted by a challenge. This is because, to fend off the possibility of postulating design or an agency for the anthropic fine-tuning exhibited by the universe, there must be a holistic mechanism for explaining the universe – at least from scientific perspectives. Physicists often refer to this as a Grand Unification theory, Final theory, or a Theory of the Everything (Ellis, 1993, p. 95; Morvillo, 2010, pp. 110-111).This sort of theory would be able to provide all needed physical explanations, as well as explanation of why the fundamental features and parameters of the universe and the initial conditions of the universe would inevitably produce intelligent life. With this sort of explanation, the introduction of an Agent or agencies would not be needed since the 'theory of Everything' will provide needed information in this respect. A sort of theory like this will definitely excite physicists and other scientists; particularly those who embrace naturalism. The challenge, however, is that even among scientists, the possibility of evolving such a Grand Unified theory of Everything is remote (Davies, 2013, p. 16; Walker & Ćirković, 2006, p. 302).

Apart from the two objections to design as explanation for anthropic principle discussed above, another objection is the multiverse hypothesis or many-worlds hypothesis. Multiverse refers to the idea that there are multiple worlds or universes instead of one which we refer to as the Universe. It is also referred to as world-ensemble or many-universes theory since it represents multiplicity of worlds. Advocates of the many-universes idea are of the view that there are many universes existing either as independent worlds or varying oscillations of one world with different physical and chemical properties.

As objection to anthropic principle, the idea expressed is that in view of such multiplicity, it is expected that, at least, one of the ensuing universes would have

properties that are amenable to life. Hence, that there is a universe with anthropic properties is not surprising and as such does not call for explanation. It needs to be recalled that the basis for the claim that the universe appears to have been fine tuned for the emergence of intelligent life is the level of precision and improbability of the properties of the physical world which leads to the thinking that a super-intellect intentionally set forth physical processes with the goal of bringing forth life at a stage in the physical evolution.

It is against this backdrop that advocates of the multiverse hypothesis argue that inasmuch as there are many universes, it is reasonable to suppose that, at least, one of the ensuing universes would possess life-bearing parameters and physical properties. Since there are or would be many universes, one of them is likely to support life. As such, there would be no need to invoke the agency of a designer who set forth at the beginning to bring about the emergence of life at some state in the physical evolution.

There is abundant information concerning the multiverse in scientific literatures. But to argue that this point effectively repudiate design as an explanation for the anthropic principle is far from being exact. Even within scientific circles, there are dissenting voices about the status of the multiverse hypothesis as a honest scientific proposal. One important hallmark of scientific proposal, mentioned in the discussion of the nature of science, is the criterion of falsifiability as established by Karl Popper (1992, p. 7) and accepted within scientific circles for ages. This means that for a proposal to be appropriately tagged scientific explanation, the means of falsifying such proposal must be realizable. The multiverse hypothesis does not meet this criterion thus casting doubt on the legitimacy of the hypothesis as a scientific explanation. George Ellis pointed to this in his evaluation of the many-universe idea. In reference to the variants of the multiverse idea he stated that "problems arise with all these approaches: on the one hand in respect of testability so that we have to query the meaningfulness of the proposals as scientific explanations…"(Ellis, 1993, p. 97). The problem that Ellis referred to arose from the fact that we do not and are not likely to have access to these separate worlds and hence could not study them. This problem is pronounced in the case of oscillating universe model where access

to previously formed universe is impossible. Nancy Morvillo also pointed out the challenge in communicating with other universes even with 'current technologies and theories' Morvillo (2010, p. 111) and remarked about the coherence of the scientific outlook if the multiverse is possible, and realism - a prevailing paradigm in science, is embraced (Morvillo, 2010, p. 111).

Instead of erroneously construing the many-universes as a scientific hypothesis, some authors have argued that it is rather a metaphysics. Due to the lack of physical mechanism for the production of universes in the explanatory framework for the multiverse, it has been opined that the multiverse is a metaphysical theory. By this, one could argue that advocates of the multiverse do not take cognizance of the rule of parsimony which is so respected in scientific circles. John Polkinghorne's assessment of the multiverse was quite sententious: "Let us recognise these speculations for what they are. They are not physics but, in the strictest sense, metaphysics. There is no purely scientific reason to believe in an ensemble of universes. By constructions, these other worlds are unknowable to us" (Polkinghorne, 2010, p. 95). Since the multiverse is more appropriately a metaphysics, it definitely cannot pretend to be viable scientific refutation of design as an explanation for anthropic principle.

The import of the above explanation on anthropic principle is that it is possible to formulate arguments for the existence of God using findings of studies in the natural science; in specific terms, constructing theistic arguments on the patterns revealed in anthropic principle. While the arguments are quite persuasive, alternate explanations for anthropic principle in terms of objections to theistic use of anthropic principle have been advanced. However, this paper established that there are remarkable weaknesses in the objections raised about the propriety of advancing theistic anthropic principle argument. The position of this paper is that it is indeed legitimate to deploy anthropic reasoning as an argument for the existence of God. Theistic anthropic principle argument points beyond science for explanation, for the amazingly improbable and precise properties of the natural world. For some theistic philosophers and scientist, that explanation is God. But is this God, the God proclaimed in Christianity? This is an important question, but it is beyond the scope of this paper. A critique of the theistic anthropic principle argument, which is an

important issue, has been addressed in the main thesis, a part of which this paper evolved.

5. Conclusion

The objective of this paper was to argue for the inevitability and propriety of the dialogue between Christian faith and science. To substantiate this argument, the writer explored anthropic principle; a concept that emanated specifically from studies in physics and some other aspects of the natural science, as pivot for establishing the existence of God. Rational attempts at establishing God's existence, as remarked earlier, are tagged theistic arguments and within the context of this discussion, the ensuing argument may be referred to as theistic anthropic principle argument.

The meaning of theistic anthropic principle argument was explored through a basic explanation of theistic argument, a presentation of the meaning of anthropic principle and anthropic coincidences, and explanation of how anthropic principle is used as evidence of design in nature and hence, the postulate of a Designer (God). Objections to theistic use of anthropic coincidences under the themes of chance, necessity and the multiverse were examined, and the weaknesses of the objections were carefully pointed out. The legitimacy of structuring theistic argument along the discoveries in natural science was thereby affirmed. This, no doubt, corroborates the position that dialogue between Christian faith and science is expedient in any wholesome epistemic attempts by humans. It needs to be restated however, that the paper only established the legitimacy of construing anthropic principle as a theistic argument.

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Religiosity and Human Rights: The Consequence of Kavonokya Religious Sect on Education and Healthcare

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Abstract

Religion as understood by religionists is a complete way of life. It not only generates the norms and pre-eminently values that should characterize people's behaviour, but also guides through principles on whose basis they resolutely interact with the society. One of the major antagonisations that has befallen humanity in this 21st Century is the extreme religiosity that has eventuated the clouding of its rationality. The devastating effects of this occurrence is now more than ever pronounced in the Kenyan society. Kenya identifies education and health care as critical areas that need urgent attention and provides the necessary impetus through policy and programs being key human rights. Despite this awareness there are notably widespread setbacks, obstinately championed by warped religious dogmas. This paper seeks to bring to light and increase consciousness on how *kavonokya* as a religious sect incites controversy through practices that militate the infringement of the rights to education and access to health care of its adherents. It examines the religious views against health care access and education in *kavonokya;* whether they constitute religious deviance, a sign of religious degeneracy or a surreptitious violation of human rights on a veiled religionism platform and its implications on the respect for and observance of human rights.

Keywords: *Human rights, Kavonokya, Policy, Religion, Sect*

1. Introduction

The term sect denotes small religious groups often offshoots of established religions. It gained common usage in centuries of Christian history for depicting groups whose teachings were deemed to be heretical. The historical usance of this term in Christendom had disparaging connotations that referred to movements subscribed to teachings and practices considered heretical, having strayed from mainstream groups that were considered orthodox. The heretical schism from orthodox beliefs and practices provides the point of divergence between religious sects and

denominations.

Max Weber and Ernst Troeltsch in their church-sect typology describe religious sects as newly formed religious groups that are formed to protest their parent denomination. These protests are basically anchored on the reprehension of the liberally inclined denominational development and the advocacy for the return to true religion, Weber and Ernst (1912). As sociologists Stark and Bainbridge (1979) assert, sects hold to the claim that theirs is an authentic, and true faith, a variation from the faith which they split. Thus, sects in contrast to churches have a much higher degree of tension with the surrounding society. These tensions can exist in the context of co-religious tensions, or with the whole society and not necessarily with the progenitor church.

2. Discussion and Findings

"Everyone is influenced and persuaded daily in various ways, but the vulnerability to influence varies. The ability to fend off persuaders is reduced when one is rushed, stressed, uncertain, lonely, indifferent, uninformed, distrusted or fatigued..." writes (Margaret, 2011). There has been a significant growth in the number of sects since the late 1960's and the number of their adherents. Poverty and oppression tend to draw people into joining sects as Troeltsch has noted. These people have a feeling that they are deprivileged and believe that they do not get their justful social economic status in the society. Thus, sects in lucid terms, manipulatively offer religious-based explanations for this deprivilege; the theodicy of deprivilege. This theodicy projects the misfortunes as a test of faith, coated with a futuristic promise for rewards for keeping the faith. Though most of adherents do not live within the economic margins, they perceive the world as devoid of morals, emotional and authentic values and this in turn draws them to sects for a sense of community, (Wallis, 1975).

It is not uncommon for the deprived to underscore the Christian claim that it is harder for a rich man to enter heaven than a camel pass through a needles eye. This might not be popular with the affluent but the deprived will want to emphasize it. Religious sects capitalize on this claim. Religious sects are characterized by features that manipulate the vulnerabilities Margaret Singer outlines in *"Group Psychodynamics," in The Merck Manual of Diagnosis and Therapy*. Sects are very

selective in their interpretations of the bible. They employ a cafeteria style where they pick and choose scriptures with minimal or no regard to their context. Through proof-texting, these verses are used to prove a particular doctrinal point that they advocate for, and thus the doctrinal beliefs end up being founded out of segments of the bible. For instance, the *kavonokya* will derive and base their detestation for medicine and access to medical healthcare selectively from the biblical authority given to the eleven disciples: to lay hands on the sick and they will recover. Ignorantly, they therefore eschew the learning and application of the general biblical knowledge for their religious expediency.

Conceived based on their exclusivist view of salvation is a persecution complex that acts as fodder to religious sect's paranoia. To them, they are the only chosen people of God and consequently bear the true message of God. This message is a product of the selective interpretation of the Holy Scriptures; that "Christ is coming only for them!" This mentality creates an "us-against-the-rest" perception based on the imagined idea that they are subjected to some form of persecution because they have the truth and are the custodians of that truth. This therefore puts them in conflict with government policies that appear to them as compromising their beliefs and values Adherents of religious sects categorize other denominations and churches as recreants and consider themselves as the only true representation of the church. They perceive themselves advocates of the re-establishment of the primitive faith of Christianity. This patronizing attitude by the sects towards other religious groupings encourage them to believing that all other churches are wrong but them. There exists a general condescension for education as offered by the society. Majority of the sects' advocate for "self-teachings" with the ultimate authority to decide what is important to study and that which is not important to study. The reluctance for and the consequent lack of formal education leads to heresy owing to the lack of a broad spectrum of education. This lack is necessitated by the bypassing of the cumulative knowledge and wisdom of people in the "secular society" and marks the height of intellectual and religious snobbery.

Religious sects therefore in their consideration of the world and its policies as secular, denies its adherents the opportunity to develop academically and be able

to make sound, and rational decisions which is in itself a loophole that the former exploits to stifle its adherents. This however does not mean that sect's followers are not intelligent, rather they exhibit a dislike for formal education which is considered "worldly". The followers are discouraged to think for themselves and their lives are dominated.

Any form of questioning by the followers is considered disloyalty to the leadership and its decisions which are the guiding principles in the practices of the sects. Discontented followers are viewed as a menace or threat to the 'uniformity' of the religious sects. Blind, uncritical and unquestioned allegiance to the leadership. The decisions by the leadership are followed to the letter to the extent of followers willing to die to show loyalty to the decisions of the leadership. This unwavering loyalty aims at proving that the decisions of the leaders are true and legitimate. The devoted followers will try to justify their beliefs and practices even when they result to costly ends, including probabilities of death. The unfavourable ends are considered a test of faith and serves to strengthen their resolve to upholding what the leadership roots for. Leaders in religious sects will hold claim to having a spiritual connection with God and being the representatives of God. Communications are conveyed by these 'representatives' of God to the followers and they insist that the source is the Holy Ghost. The *Kavonokya* for instance will claim that leaders receive visions on who is fit to marry who and when, when and where to evangelize and which 'team' has been chosen to carry out the task of evangelizing.

2.1 The Kavonokya Sect

The *Kavonokya* sect in Ukambani and Kitui started at around 1914. Its emergence is tied to the coming of a man called Mwololo wa Nzau to Kitui from Masaku, modern day Machakos. The intertwining idea between his coming and the emergence of *kavonokya* was a rampant practice in the traditional Kamba community where they tied events to peculiar happenings in the society i.e. children born during famines would be named after the natural occurrence. The sect was started by a group of people in Mwingi who 'got tired' of the religious confusion from the various religious denominations which interpreted the bible differently to the chagrin of the followers.

There exists little documented history on the *kavonokya* sect as most of its information, practices, and beliefs are passed from one generation of adherents to another in the form of oral traditions. The group of persons who founded the sect based their fundamental religious belief on the biblical idea that God cures and thus believe in the power of healing prayers. *Kavonokya*- loosely translated to that which saves- does not believe and subscribe to modernity: including 'worldly' education and medicine.

Freedom of worship is a basic human right, alongside other rights including rights to education and healthcare. It is therefore quite unfortunate that some religious sects abuse the right to worship based on unclear concerns. By simply looking at the *kavonokya* adherents, they, just like the rest are ordinary looking bible-believing Christians however, they are people living their lives on a knife's edge on the belief that a whimsical god wants their loved ones to die of curable diseases. *Kavonokya* adherents maintain that they live by the faith of the prophets akin to the bible and miracles by Jesus. Followers believe in a supreme being's power to heal through proclamation of faith. In the preceding section on the features of religious sects, one notable feature is the persecution complex that sect's adherents embrace. This siege mentality emboldens their resolve on the basis that they are under intimidation by government to compromise their beliefs. The *Kavonokya* have several practices that are informed by their supposedly strict religious observance. To them, believing is doing, without questioning what the Holy Scriptures say. Citing harassment by the authorities they stand firm that they will abide by their faith come rain or shine, and that the 'persecution' meted out on them by the 'worldly' governments will soon come to an end as divine intervention will bail them out.

2.2 Religious Deviance on Health and Education

In an attempt to find out why the adherents would rather have their members lose lives rather than going to the hospital, Charles (2016) points out that in 2011, eleven children died after measles outbreak and that despite these many uncalled for deaths, the adherents claim that the outbreak was a result of "satanic forces" and that it was okay if God willed them to die. David Mulei says: "We are the chosen few, true believers of God through his son Jesus Christ. God says we pray to Him and He will

heal us from all evils including diseases.

As believers we pray and when it is time for one of us to die, it is revealed to us by the Holy Spirit. Then we accept the God's will" (Charles, 2016). The retrogressive beliefs have had far reaching consequences especially to children, the elderly and women. In discussing health and ignorance Ezra (2003) provides an appealing approach towards ending the outrageous loss of lives originating from ignorant religious beliefs. He opines that if people did some things a little differently, they could be healthier and less suffer from diseases. For instance, if children would be availed for immunization, and women embraced reproductive health, the health statuses would greatly improve. By viewing government's efforts to subject them to healthcare as a way of investing in its citizenry, the *Kavonokya* sect's leadership would play a big role in demystifying the misconceptions, confusion and apathy in its adherents regarding their stand against accessing health care.

Although there are no documented statistics, indications show that hundreds of lives are lost within the confines of rooms for 'healing prayers' where the elderly and children die awaiting healing from the prayers. To save face, Mr. Kiteme a member of the sect says that *Kavonokya* adherents are law abiding citizens except on the issue of medication and medical care. "This issue is pivotal in our doctrine and doctors and other professionals dealing in medicine and drugs are not allowed as members " (Paul, 2012). This situation is dire to the extent that health officials were treated to bizarre sight in Kitui when a mother refused to take back her child after forcefully being immunized against polio. The woman would defend her actions by arguing that the child had been defiled by the modern medication which was against the teachings of her church. While reproductive healthcare aims at reducing infant mortality rate, the sect adherents dismiss it as an attempt to challenge Gods directive and divine work; that of creating and giving live. This is echoed by their insistence of avoiding childbearing in the hands of trained medics. This practice is a violation of reproductive Rights. The new Kenya constitution provides that all people are entitle to the best attainable standard of health including reproductive health (Kibui et al., 2015, p. 130).

These religious challenges have hindered the government's realization of the right to

health as outlined in Article 21 of the Constitution. This tense religiosity exhibited by the sect adherents complicates the implementation of the human-rights based approach to healthcare delivery that integrates human rights norms and practices including human dignity, attention to rights and needs of all with an emphasis on children, the marginalized and the elderly The Republic of Kenya (2010, pp. Article 53-47) and making sure that the healthcare services are rendered to all (Ministry of Health, 2014).

Education as established under the global treaties was formally recognized as a human right consequently establishing a compulsory and free entitlement to education. These conventions provide measures to ensure its accessibility to all children (Article 26, Universal Declaration of Human Rights, 1948). However, the *Kavonokya* view the modern secular education system as exposing their children and adherents to the outside worldly moral decadence and they therefore strive to shun what's 'worldly'. This stance leads them to a collision course with the government authorities. The government is obligated to ensure the right of access to education to all. Amidst the obligations is to ensure respect for the right to education without any discriminations of any form or on any grounds. Every school going child has a right to attend school with providing the accessibility to school as the first step towards fulfilling this right. Even with the accessibility to education provided, there exists social, economic, cultural and religious factors- including religious hindrances that keep children out of school.

The *Kavonokya* is an example of this religious hindrance. The *Kavonokya* adherents are reclusive and a significant number of them do not take their children to school (Charles, 2016). He points out that they had not been taking their children to school prior to the introduction of free primary education in 2002. However, they still oppose, and resist payment of levies charged in schools thus forcing their children in and out of school. This significantly affects their learning process. In extreme cases, some adherents decline to admit their children to school citing that education is an imposition of 'earthly governments' totally locking them out of the education system and by this impeding the children's cognitive growth that equips them to face life challenges. Such situations have eventuated the rise in insecurity in kavonokya dominated areas, increased infant mortality rates and apathy in participating in

important exercises like registration and voting.

3. Conclusion

There is need for a holistic approach to education, healthcare and freedom of worship reflecting universality and indivisibility of all these Human Rights. Religious teachings should not be held for purposes of misleading, molesting or oppressing the adherents to the extent of denying people the right to seek medical care when sick or disallowing school going children the opportunity to gain quality education on religionism pretext. Quality education cannot be achieved without regards to the rights to health and the general well-being of individuals and for this reason the government needs to develop policies and programs such as awareness campaigns that educate the *Kavonokya* on the importance of healthcare and education. This would non-violently resolve the long-standing conflict between the religious sect's beliefs and its non-observance and respect the rights to education and health care of its adherents. A healthy and educated society plays a vital role in the social and economic development of a nation.

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Morphological Characteristics of Silali Basin

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Abstract

The paper focuses on the formation of Silali basin as an Extra-terrestrial Impact Crater (ETIC) and its ETIC related morphological characteristics. The basic shape of an impact structure is a circular or near circular depression with an upraised rim, though other crater details may vary with the crater's diameter. The Silali crater has a near circular shape as shown by the satellite images of the area, the area's topographical maps (not in the paper), the DEM of the basin and the LIDAR image of the study area. Apparently, Silali's near circular shape is a product of remodelling of the original crater shape by various geological processes. These processes include subsidence, plate tectonic movements, erosion and sedimentation. Further, the Silali crater can be classified as a complex crater, because of its hummocky floor, or a basin, because its diameter is above 4 km (it is 5-8 km). The crater floor contains small craters, volcanic cones and ridges besides slumped rock materials. Silali basin does not display a clear peak ring but there is an outline of a peak ring.

Keywords: *Extra-Terrestrial Impact Crater, Geological Processes, Ridges, Silali Basin, Volcanicity, Volcanic Cones.*

1. Introduction

Extra-terrestrial impact cratering is a continuous process that may be going on even this very minute, somewhere in the universe. Consequently, the earth, just like other members of the solar system, is targeted by extra-terrestrial falling objects; that can fall on any place on the earth's surface and can cause utter destruction and death. This research paper brings to light the fact that Kenya, like the rest of the earth, is in the inherent potential danger of being hit by heavenly bodies. In addition, it provides, to a large extent, morphological evidence implicating Silali basin to be a possible ETIC and the possibility of the presence of other ETICs in Kenya.

The principal criteria for determining if a geological feature is an impact structure formed by the hypervelocity impact of a meteorite or comet are outlined below. These are classified as either megascopic (overview – bird's eye/satellite scale) or macroscopic (visible to the naked eye) or microscopic (those that require observation under a microscope).

i) Presence of shatter cones that are on site (macroscopic evidence).

ii) Presence of multiple planner deformation features (PDFs) in minerals within the site lithologies (microscopic evidence).

iii) Presence of high pressure mineral polymorphs within in situ lithologies (microscopic evidence and requiring proof via X-ray diffraction).

iv) The morphometry of the crater: -On other heavenly bodies such as the Moon and Mars, the shape of an impact crater is relied upon to determine its presence and type (simple or complex). This is a megascopic characteristic that can be seen, unaided, by the human eye, though requiring remote sensing and aerial photography for detailed mapping. On the earth, recognizing impact structures, solely by their morphology, is hampered by denudation and tectonic forces which deform the craters. The situation is worsened by certain terrestrial features having a circular shape and appearing like impact craters, for instance volcanic craters, such as Maars, salt diapirs, some glacial features, like cirques and kettle lakes and solution aided craters. This disqualifies the circular form, alone, as a sufficient claim for a structure to be accorded the status of an impact crater. Buried craters that are revealed by geophysical techniques, also require a drill core to reveal macro and microscopic evidence to prove an impact origin.

v) Presence of an impact melt sheet and breccias: - These are generated by hypervelocity impact and are macroscopic. Impact melt has a crustal composition derived from the fusion of target rocks and meteoritic/ impactor's components. The rock may also have some suevite, especially around the center of the crater. Impact melt can be determined by sampling, followed by microscopic observation and geochemical analysis.

vi) Pseudotachylites and breccias: - Pseudotachylite is a rock type generated by faulting at either microscopic or macroscopic scales. Unfortunately, pseudotachylites are also associated with tectonic faulting and are not therefore, exclusively impact generated. However, association of pseudotachylites with the above factors can make them one of the evidence of ETICs.

vii) Presence of unshocked or preserved fragments of the impactor around or within a crater.

As for the reasons why, heavenly bodies fall onto the earth, three hypotheses have been advanced by scientists (www.csienceclarified.com/Ge-He/Gravity-and-Gravitation.html), as follows:

i) The sun has a faint undiscovered companion star that revolves on a highly eccentric orbit with a period of 26 million years. When this star passes close to the sun, it draws a stream of materials from the sun and sets them in motion around the sun. Some of these materials cool down to form new planets and some are attracted by the forces of gravity of other heavenly bodies, causing impacts, as these materials slam into these heavenly bodies.

ii) There is a massive undiscovered planet that orbits beyond Pluto and periodically disturbs an unseen disk of comets in the neighbourhood. These comets, once disturbed, are scattered and some fall onto heavenly bodies, including the earth.

iii) The up and down oscillations of the sun through the massive central plane of the Milky Way, may cause gravity differences between heavenly bodies of the galaxy. Consequently, some of the heavenly bodies may become unstable and vulnerable to the earth's gravitational pull, which attracts them, leading to extra-terrestrial impacts on the earth (Allen, 2014).

Extra-terrestrial impact Craters are divided into three categories according to their morphology, namely:

i) Simple Craters

ii) Complex Craters

iii) Basins

Simple craters are relatively small with a smooth bowl shape. In larger craters, though, gravity causes initially steep crater walls to collapse downward and inward, forming a complex structure with a central peak or peak ring and a shallower depth (Figure 1). The diameter at which craters become complex depends on the surface gravity and the planet. The greater the gravity, the smaller the diameter that will produce a complex crater. On the earth, the transition diameter of a complex crater is 2 to 4 km, depending on the target rock properties *(www.solarviews.com)*. On the moon, where gravity is low, the transition diameter is 15-50 kilometres *(www. solarviews.com).*

The peak ring or the central peak of a complex crater is formed as the initial (transient) deep crater floor rebounds from the compressional shock of impact. Slumping of the rim further modifies and enlarges the final crater. Complex structures on crystalline target rocks will also contain sheets of impact melt rock, atop the shocked and fragmented rocks of the crater floor. On the earth's surface, weathering and erosion of the target rocks, as mentioned earlier, quickly alter the surface appearance of the structure, though in some cases, the resistant rocks will stand out as concentric rings/ peak rings within the crater. On the surface of the moon, complex craters are said to be intact till they are destroyed by subsequent impact events *(www.solarviews.com).*

A basin, on the other hand, is an ETIC whose diameter is large and with the increasing diameter, a ring of peaks appears within it, transiting the complex crater into a basin. A single interior ring can qualify an ETIC into a basin (Therriault, Grieve, & Pillington, 2002).

It must be noted that ETICs can also form in marine environments and the morphology of a marine ETIC is quite distinct. Marine impact structures are characterized by a broad shallow brim, extensive sedimentary infilling and prominent fault blocks on the floor (Tsikalas, Gudlaugsson, & Faleide, 1998).
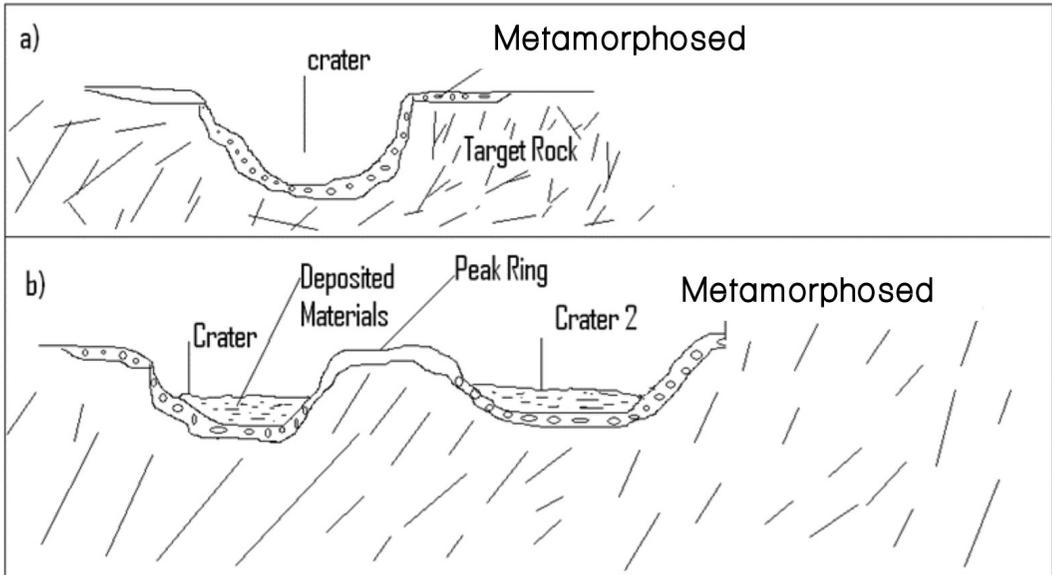
Figure 1: Diagram showing a simple crater (a) and a complex crater (b) with associated features (Author, 2013).

2. Formation of Silali Basin

Silali basin, also known as Silale, is found in East Pokot/Turkana East, within the mid Graben of the Great Rift Valley, 50 km north of L.Baringo and near Kapedo Town. It is located on Latitude $1^0 10$' N and Longitude $36^0 12$' E. The basin or crater is named *Kotong*, by the Pokot community living around it, which means a depression. The Turkana people call it Silali while the Pokot call it Silale. The basin covers an area of about 850 km^2 and has a NNE diameter of about 5 km and an ESE diameter of 8 km. It can be estimated that the impactor's size, could be 0.25-0.4 km in diameter or 42.5 km^2 in area, on the basis of the rule that an impactor's size is 1/20 the crater's size (Beatty, Petersen, & Chaikin, 1999). Consequently, the Silali impact event may have been a great event. According to Dunkley, Smith, Allen, and Darling (1993), Silali volcano was formed around 225ka and the caldera (crater or basin) collapsed around 66-62ka.

Silali basin is a basin within a larger basin (the outer basin) with smaller basins within it. In addition, there seems to have been impacts at different times in the area, the oldest being the one that formed the huge 'outer basin' and probably triggered the formation of a section of the Great Rift Valley, example the mid graben and the many spectacular geological features within and around it.

The 'outer basin' covers the area around the crater walls and it is as near circular as the Silali basin itself, going all around Silali. It is covered by alluvial material and volcanic flows in many places and thus, on Plate 1, it appears as the dark and bright circular area around the Silali basin. This is the basin in which the Suguta gorge, Suguta River and hot water falls, cross bedding slumps, sink holes, the shatter cones of Chemolingot and several breccias occur. Different volcanic rocks, prehistoric caves, some of the mentioned smaller craters, several swamps, hot springs, fumaroles and alluvial deposits are also found in this basin.

Previous studies by some scholars who carried out research in Silali basin indicated that there existed a volcanic shield where the Silali basin is. The shield seems to have been stretching in a north-south direction. According to Smith, Dunkley, Deino, Williams, and McCall (1995), Silali's volcano started forming 400-220ka. This included the formation of a low relief lava shield. Volcanic eruptions in Silali occurred during different times and some of the later ones, according to the authors, resulted in an inward collapse of the shield summit, owing to the lateral drainage of magma from beneath the volcanic shield. According to the scholars, these are the eruptions that led to the formation of the caldera around 66-62ka (Dunkley et al., 1993; Smith et al., 1995). The existence of a volcanic shield in Silali before the ETIC formed is favoured by the following incidences:

i)   The fact that Silali basin's wall is made up of volcanic materials placed in layers;

ii) The non-contemporaneous nature of the wall materials in terms of age and physical characteristics; and

iii) The 'break off' or stepped walls of Silali basin, which may be layers of different volcanic materials, bearing different strengths against denudation.

Other scholars, however, came up with a proposition that there existed an earlier caldera before the present 'volcanic caldera'. According to Dunkley et al. (1993) the 'break off walls' (stepped walls) of Silali basin, mark the traces of an earlier caldera. Not all scholars agree with this and according to Williams, Macdonald, and Chapman (1984), were these features indicative of a bonding within an early caldera, then some mechanism of topographic inversion is required (Williams et al., 1984). This mechanism of topographic inversion can be provided for by an extra-terrestrial impact.

As a volcanic shield, caldera formation by subsidence involving a volcanic pipe is not plausible for Silali basin. This is because subsidence would not be a quiet event and an explosion would most likely occur, pouring out magma onto Silali walls. One would then expect Silali to exhibit magma outpourings from its ring structure onto its flanks. This is not the case. Again, the collapse would not produce a perfectly ring structure unless there was an outline of a ring structure in existence.

Caldera subsidence occurs in various ways, such as through plate / piston subsidence, trap door subsidence, chaotic subsidence and downsag subsidence, among others. Plate or piston subsidence involves the subsidence of a coherent block of rock into a magma chamber that evacuates magma along a ring fault. The caldera floor may be variably faulted but the faults are less active than the ring faults (Geyer Traver, 2007). Trap door subsidence on the other hand, is subsidence that involves multiple collapse centres. It is a piecemeal subsidence. As for chaotic subsidence, wholesale disruption and brecciation of caldera floor rocks is involved. This generates low density materials which cause a caldera to register a low gravity signature. Finally, downsag subsidence occurs when ring faults either do not form or do not penetrate the ground surface so that summit material subsides by bending downwards.

Silali's subsidence may be said to be a plate or piston type of subsidence because the rock layers forming the basin's walls show continuous uniformity in material type and height. This is supported by observations made by Dunkley and team, that; the

caldera has a regular outline and vertical walls suggesting that it was formed by a piston like collapse (Dunkley et al., 1993). Unlike in the case of volcanic calderas, Silali's ring fracture was less active compared to the floor fractures, in magma emission. It is thus the crater floor fractures that evacuated most of the magma that may have been beneath the volcanic shield on which Silali basin was built. The lava flow to the northeast of Silali basin can be evidence of such an event. This is because it appears that the magma jetted off the base of the basin's wall. Notably the floor fractures of the basin extend outwards from the basin and not otherwise. The subsidence can also be termed chaotic because of the presence of brecciated rock on Silali's floor and walls. The lower layers of the north-eastern wall of the caldera, for instance, consist of massive trachyte lithic breccias while the northern wall has up to 10 m of polymict lava lithic rich breccias (Dunkley et al., 1993). Lithic and Polymict breccias are breccias whose particles are cemented in a way that they form a matrix. In fact, lithic breccia is an impact breccia that contains shocked and unshocked clastic material in a clastic matrix.

A more apt subsidence theory for Silali basin is any theory that involves withdrawal of magmatic support hence collapse. Silali's formation, as a volcanic shield or an ETIC, lacks a volcanic cone and a volcanic vent/conduit. According to McCall and Hornung (1972), Silali volcano was built by clustered vents (not a central single vent or a volcanic pipe). For the study on which this paper is based, Silali volcanic shield was built by a single fissure with limited branches, which build the shield's parasitic cones. Again, an extra-terrestrial impact, provides a viable explanation on how Silali developed a crater, via impact and consequent subsidence. The extra-terrestrial impact appears to have blasted a crater at the centre or near centre of the Silali volcanic shield, creating the first crater which later subsided to form the present crater.

Silali's subsidence can be said to be the factor behind the basin's stepped or 'break off' walls, because as subsidence occurred, the more resistant rocks of the basin's wall remained standing while the softer parts collapsed more and later got washed away by denudation. Denudation removed the softer rocks that made up the initial walls of the volcanic shield, forming scalloped areas, while resistant rocks, such

as the young volcanic rocks making up the top most layer of Silali basin's wall, remained intact, forming the wall's protruding parts. There is a lot of evidence along the basin's wall, supporting subsidence and especially block/piston/plate subsidence.

These include;
   i) The layers that make up Silali basin's wall are almost uniform and continuous around the basin and at the same height from the basin's floor (about 300 m for the top most layer).
   ii) The walls appear to have collapsed inwards, towards the basin. There is an appearance of 'turning inwards' on Silali basin's inner walls, which is different from the 'turning outwards' appearance of the basin's outer walls. Slumping has modified the appearance of the basins inner walls, giving the walls a concave appearance.

Subsidence was possible for Silali basin because, after a probable extra-terrestrial impact, fractures formed around the basin, encouraged by pre-existing rock weaknesses, some of which built the Silali volcanic shield (400-200ka). The impact must have also widened the existing rock cracks, triggering the exit of magma from within the shield's magma chamber onto the areas around the basin. This should have formed some amount of emptiness beneath the impact basin, bringing about a collapse that left high stepped walls. There is evidence (in the form of brecciated and metamorphosed rocks on the crater walls) that hot gases and liquids hissed out of the crater chamber through the many fractures surrounding the crater. From the pictures and satellite images of the basin, one can clearly see volcanic cones around the basin. These were built by magma that outpoured from the impact area, forming part of the evidence of subsidence in Silali. The volcanic cones sitting on the basin's walls would be as old as the Silali volcanic shield, being the products of the shield's parasitic fissures.

The following simplified schematic diagrams can explain the formation of Silali basin, especially the volcanic shield and impact stages.
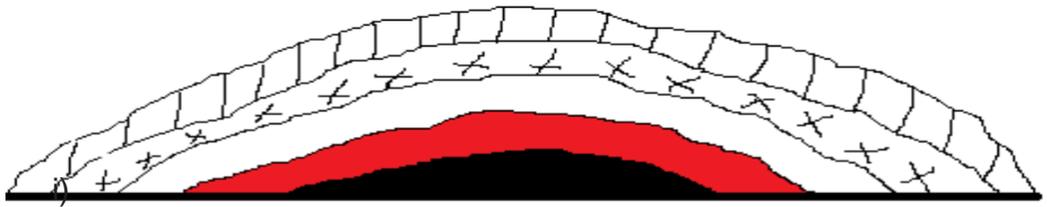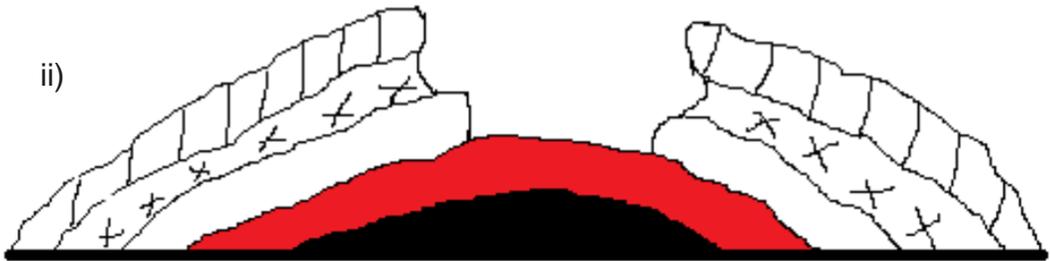
Figure 2: Schematic diagrams showing the formation of the Silali basin. (i) Represents the pre-impact volcanic shield. The shield is made up of different layers of volcanic rock. (ii) Represents the post impact volcanic shield.

Plate 1: A natural colour SPOT satellite image showing the Silali crater, Marigat-Kapedo road (yellow), Suguta River (characterized by whitish sediments) and the outer basin around Silali. (A) is the Silali crater, (B) are the almost circular walls that surround the crater and (C) is the outer basin surrounding the crater. The hot springs feeding the Suguta River can be seen as white patches extending from the base of the basin's wall towards the river, westwards of the basin. Plate 1 was adapted from Google maps.

3. Morphological ETIC Characteristics of Silali Crater

a. The Circular Shape of Silali Basin

As stated earlier, Silali's near circular shape is a product of remodelling of the original crater shape by various geological processes; which include subsidence, plate tectonic movements, erosion and sedimentation. Further, the Silali crater can be classified as a complex crater, because of its hummocky floor, or a basin, because its diameter is above 4 km (it is 5-8 km). Silali's floor is hummocky/ lumpy, as shown by the satellite images of the area. The basin does not also display a clear peak ring but there is an outline of a peak ring as shown by Plate 1. The original peak ring may have been distorted by the basin's collapse, faulting, erosion and volcanicity. Faulting and volcanicity are not uncommon to impact cratering. These processes though, have not only re-shaped the basin but have made its origin quite complex.

Plate 2 also shows the circular shape of the Silali basin. However, in the image, the basin's walls appear to be very steep and five mini craters are clearly visible within the main crater. Also evident are cones that look like volcanoes, within the basin. Ground truthing has placed the number of the mini craters at 5 and 2 cones with summit craters on them. There is a possibility that the cratering that led to the formation of the Silali basin may have triggered a spate of volcanicity within the main crater and around it. There is also another possibility that the area may have been hit more than once by extra-terrestrial bodies, as it happened to Arounga crater in Chad. Multiple impact cratering, in Silali, is favoured by the presence of minor craters within the basin and around it, together with the fact that the Silali basin appears to be a basin formation within another basin (Plate 1).

Plate 2: A natural color SPOT satellite image showing the Silali crater. The image was adapted from Google maps.

Plates 3 and 4, are Landsat satellite images that further show the circular shape of the Silali basin and some of the associated topography and physical features. The same circular shape is seen on the LIDAR image of the area, the area's topographical section and the DEM of the basin.
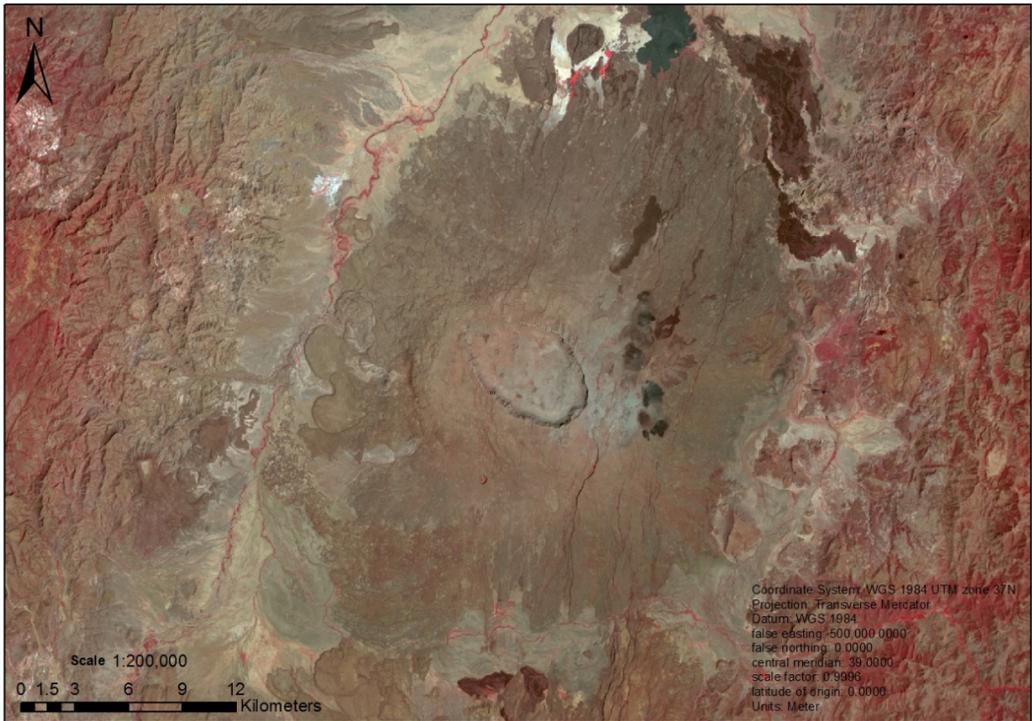
Plate 3: A false colour image of Landsat 8, bands 5 (Red), 4 (Green) and 2 (Blue), showing the Silali basin (courtesy of RCMRD).
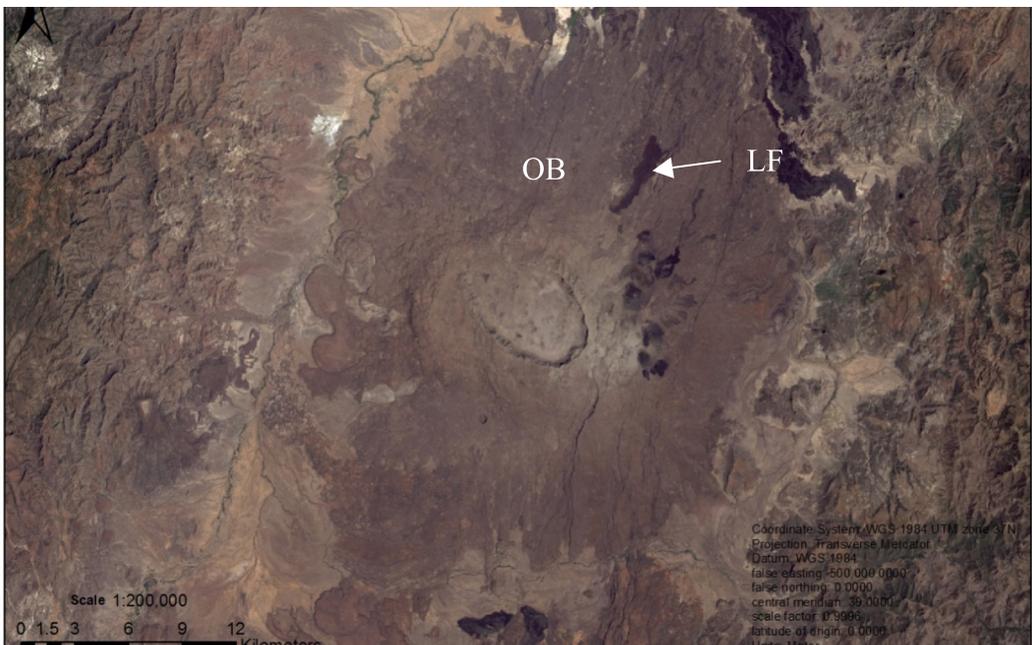
Plate 4: A natural colour image of Landsat 8, bands 4 (Red), 3 (Green) and 2 (Blue), showing the Silali basin (courtesy of RCMRD)

The dark volcanic rock surface of sections of the outer basin (OB), can be seen on Plate 4, as labelled. The young lava flows (LF) to the east of the basin can also be seen from the plate and they appear to start right at the base of the Silali basin's wall. The lava flows within and around Silali basin are rooted in the formation of the basin.

Figure 3 shows a morphological section of Silali basin and the outer basin. The section was drawn using the topographical maps of Kapedo and Nakali, which were acquired from the Survey of Kenya office.

A W-E cross-section of the area between grid reference 720290 and 086290, using the maps of Kapedo (77/3) and Nakali (77/4), Series 731 (D.O.S 423)

(720290)   (086290)
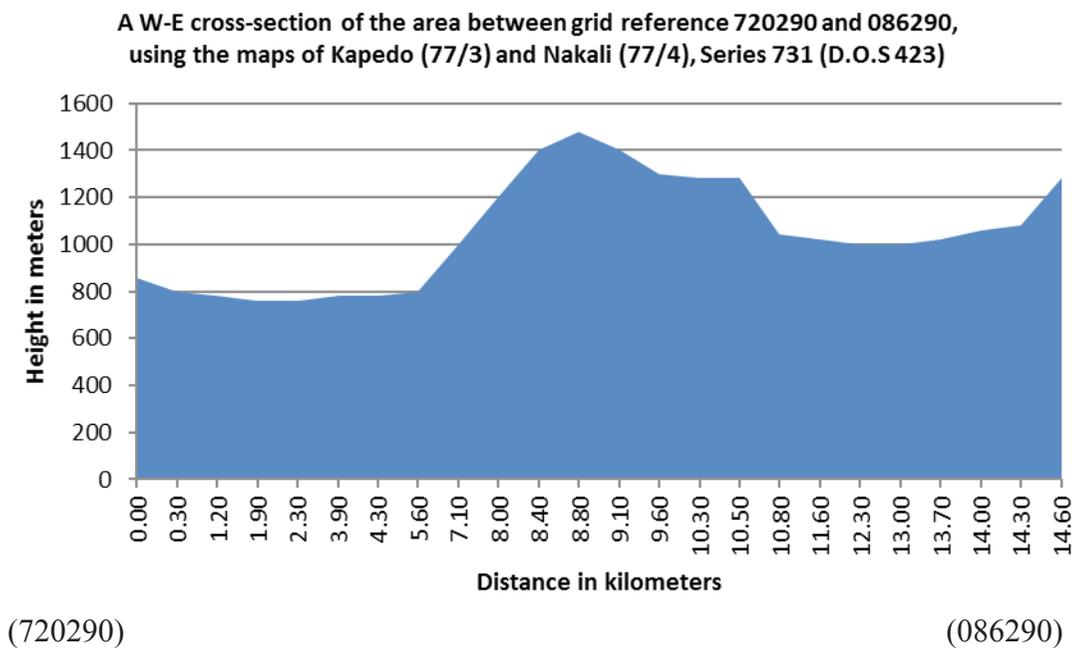
Vertical scale = 1 cm represents 200 m, Horizontal scale = 1 cm represents 2.5 km
Figure 3: A morphological section of the Silali basin and the outer basin (Author, 2015).

From the morphological section, it appears that the outer basin's floor to the east of Silali is higher than the floor to the west of Silali. This is possible because of the recent lava flows covering the area. Much of the magma that exited Silali basin, before subsidence, appears to have poured out more to the east of the basin than to the west. The lava flows are very evident from the satellite images presented in this

paper.

It must be noted that a circular shape, alone, cannot qualify a crater to be an ETIC.
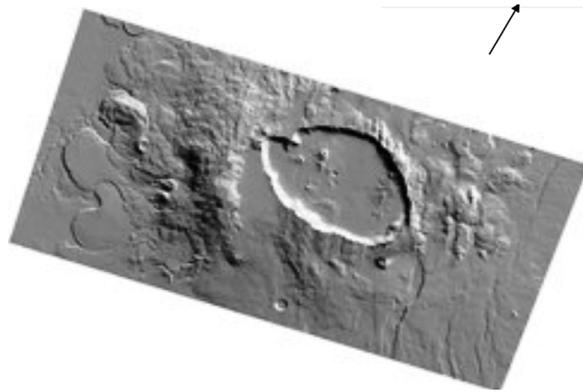
Plate 5: A LIDAR image showing the crater and the fault lines within and around it. (Source: GDC library).
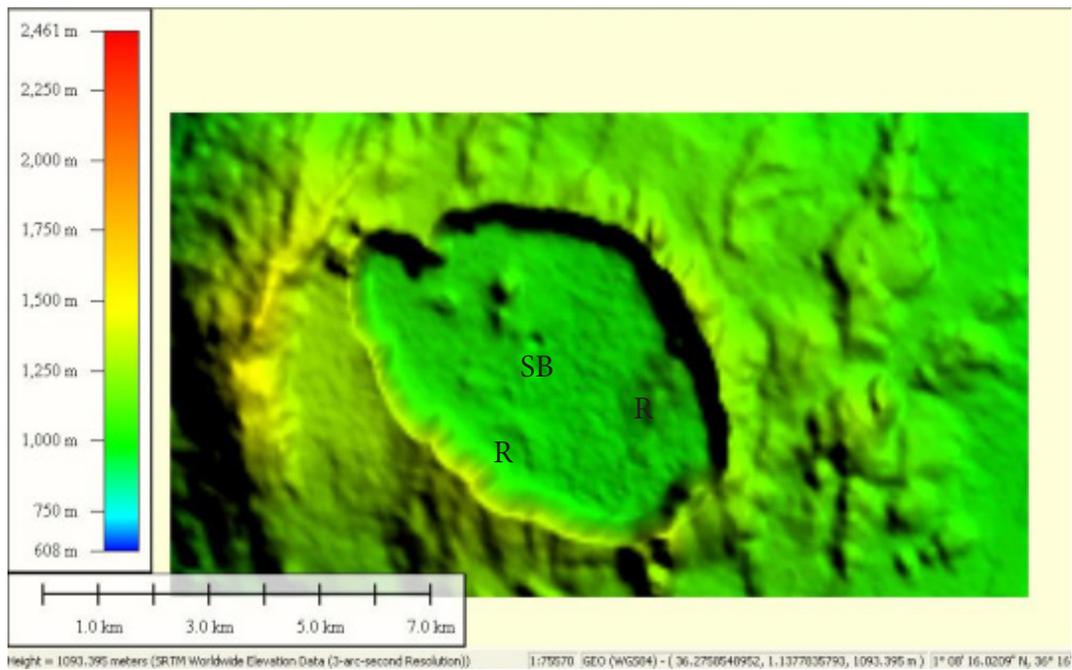

Plate 6 A DEM (with elevations) showing Silali basin's (SB) hummocky terrain and morphology. The DEM also shows the outline of Silali's probable peak ring (R) (Author, 2015).

4. The basin's flat and hummocky floor

Silali basin's floor, like the floor of other Extra-Terrestrial Impact Craters (ETICs), is uniformly flat and hummocky. It is characterised by smaller circular craters, volcanic cones, pseudotachylites, ridges that are remnants of a possible peak ring and heaps of slumped soil and rock material.

Plate 7 shows one of the small craters within the Silali basin and like the Silali basin itself, the small crater has very steep walls and its floor is flat and hummocky. Plate 8 shows one of the most prominent volcanic cones within the basin.
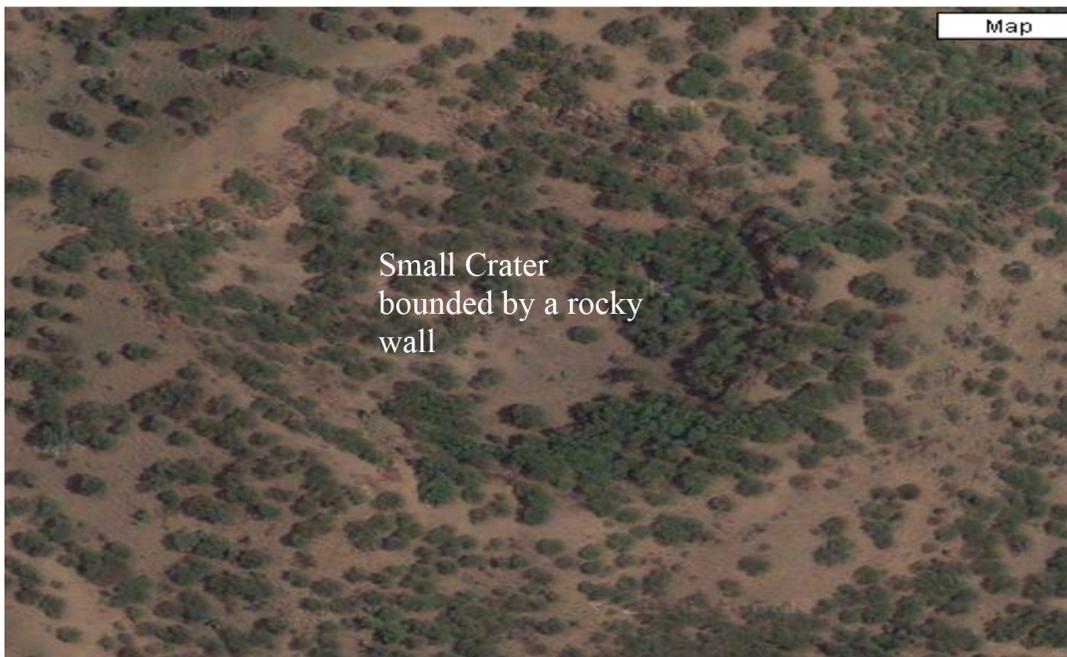
Plate 7: A SPOT satellite image showing one of the smaller craters (mini craters) found within the Silali basin, adapted from Google Earth maps.
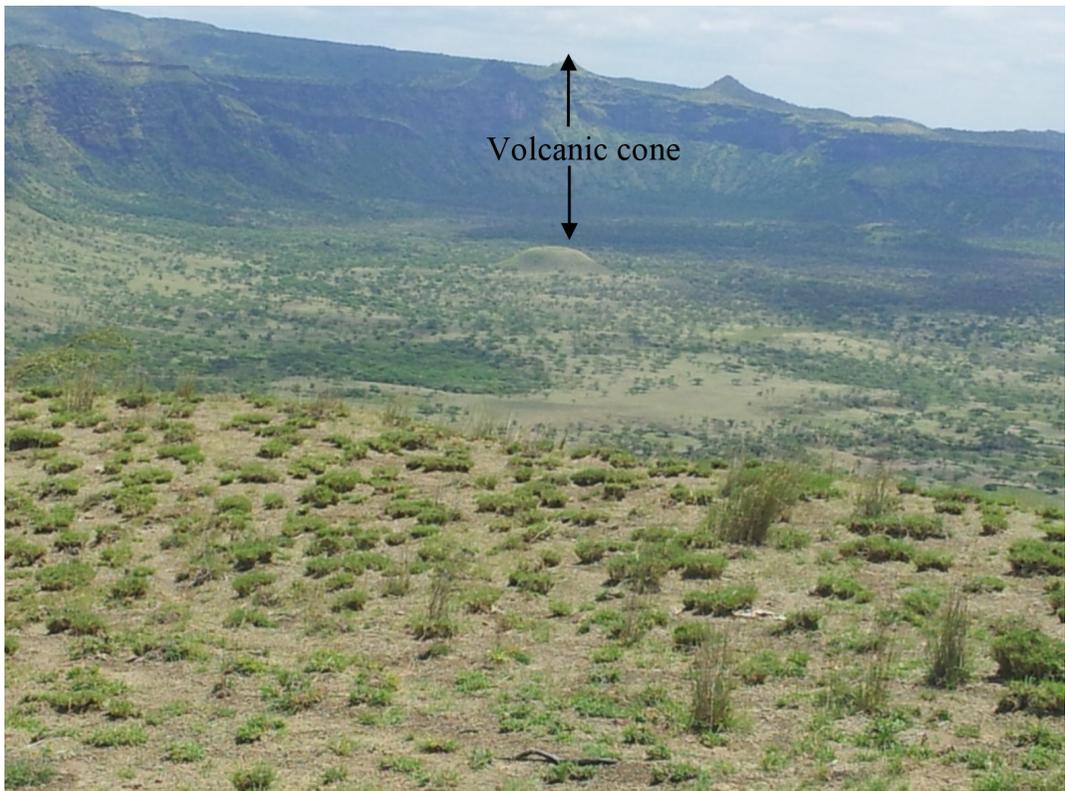
Plate 8: A picture showing one of the cones found on the Silali basin's floor (Author, 2015).

5. Silali's ring fracture structure

Subsidence does not completely explain the circular shape of Silali basin, especially if it is a product of a fissure eruption and not a vent type eruption. Fissures mainly build up volcanic shields and elongated domes, which in most cases do not have craters, let alone the 5-8 km wide crater formation of the Silali basin. The question that arises here is how the fissures that are responsible for the building of the Silali basin occurred in a concentric formation culminating into the formation of a near circular depression. Additionally, how these developed lithologically into a ring-like structure. The map below (Figure 4) of Silali area provides evidence of fractures all around the basin that appear concentric in formation.

RIFT MARGIN
Mio-Pliocene lavas and pyroclastic rocks

SILALI
Recent basalts
Black Hills Trachyte lavas and intra-caldera lavas
Upper pyroclastic deposits
Katenmening basalts and trachytes

Flank Fissure basalts
Summit Trachytes
Arzett Tuffs
Kapedo Tuffs
Discoid Trachytes
Lower Trachytes

Alluvium
Pyroclastic cone
Crater
Fault
Caldera ring fracture
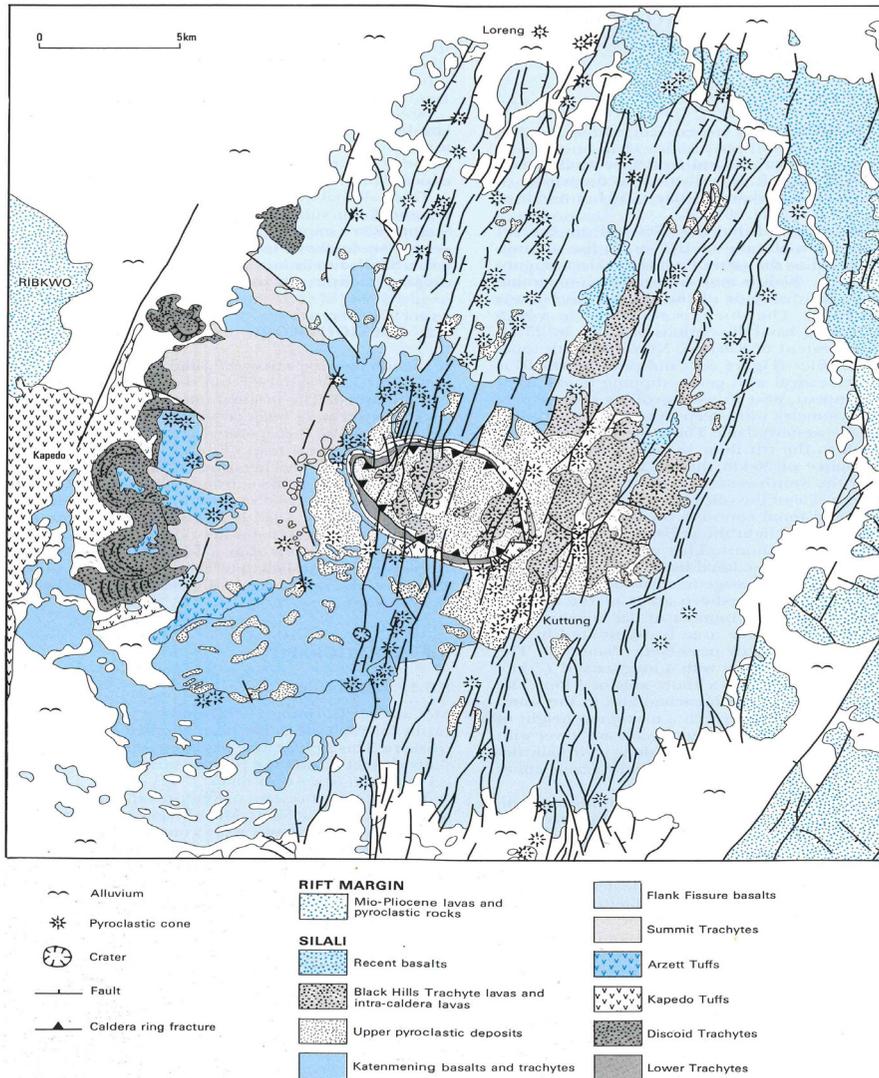
Figure 4: Simplified geological map of Silali basin, showing the basin's ring like structure and the fault lines cutting across the basin (adapted from Dunkley et al. (1993).

Although in some cases, caldera subsidence can cause ring structures similar to those found in Silali basin, due to doming effects, the caldera must be associated with a volcanic pipe/vent. Silali's ring fracture structure could be the product of an extra-terrestrial impact because; when a heavenly body falls on an area, it causes the area rock to fracture in a concentric manner. The fractures are the result of hypervelocity

shock waves, which usually radiate outwards from the impact point at speeds of 10 km/s or more (Therriault et al., 2002). Further outward pressure can produce distinctive shock deformation effects (shattering and fracturing) in large volumes of unmelted target rock (Melosh, 1989). Figure 5 illustrates how an extra-terrestrial impact results in concentric fracturing of rocks.
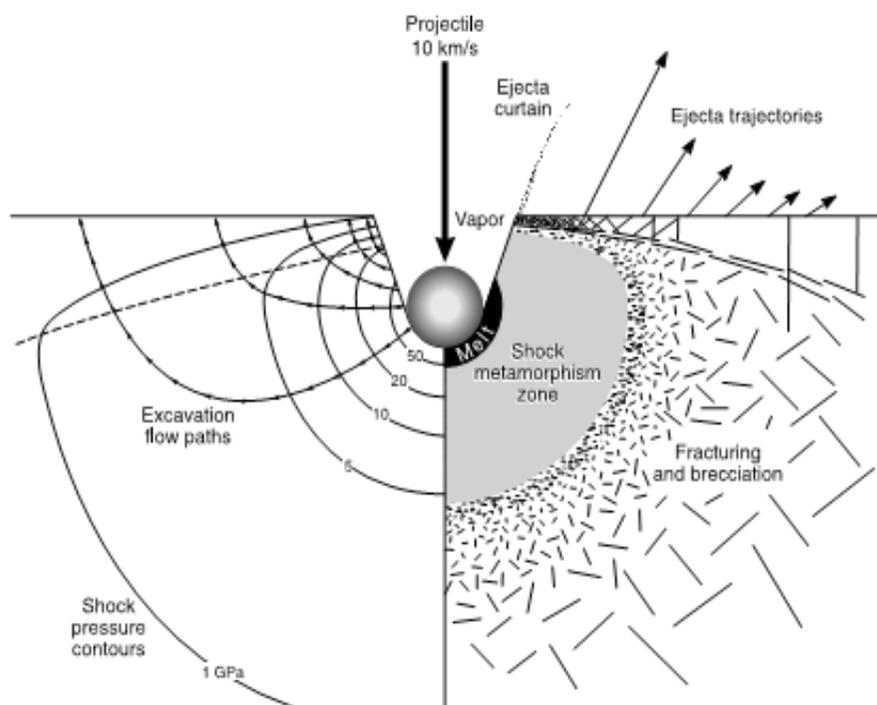

Figure 5: A cross section of an ETIC showing the effects of shockwaves on target rocks (shattering and fracturing). The figure was adopted from *www.lpi.usra.edu/publications.*

6. Silali Basin's upraised rim and Peak Ring

ETICs have upraised rims that mostly consist of proximal impact ejecta. The rim of an ETIC defines the circular shape of the ETIC and encloses the ETIC's wall. Notably, the walls of ETICs vary in height from the floor of the ETICs. Plate 9 shows Silali basin's raised walls, the small craters, the ridge and the volcanic cones found inside the basin. For Silali basin, however, subsidence and slumping has raised the crater's rim, creating a steep wall that is about 300 m below the crater rim. In

some instances, as the slumping material converges inwards, a central peak or hill is produced, that rises above the general floor of the crater as in the case of Silali basin and Tenoumer crater, Mauritania (French, Hartung, Short, & Dietz, 1970). A crude outline of Silali's peak ring feature can also be seen from Plate 9, at a close look. Plate 11 shows the peak ring more clearly. It consists of a ridge ring that is broken in places.

Plate 9: A natural color SPOT satellite image showing the Silali crater. The image was adapted from Google maps.
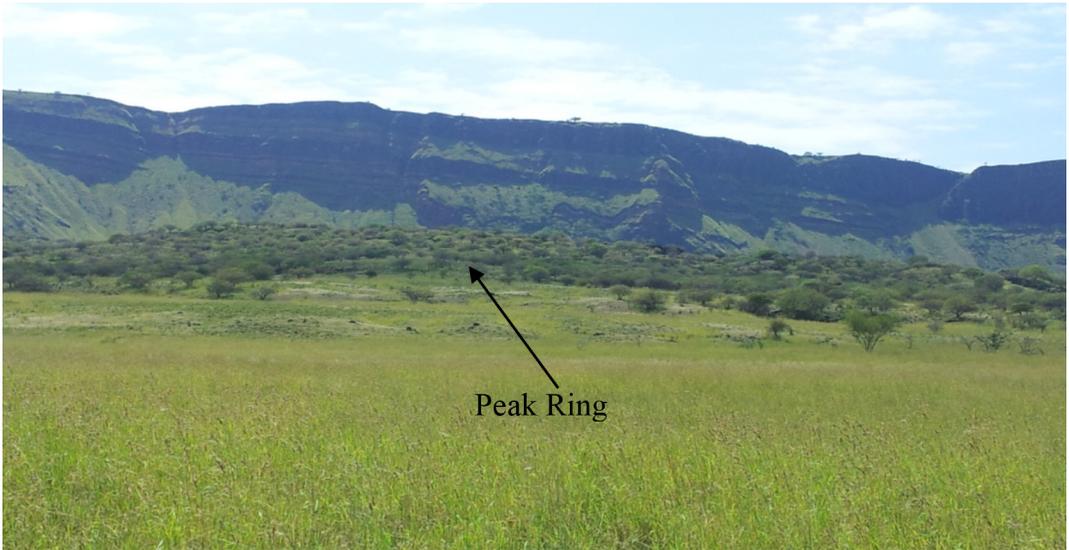
Plate 10: A picture showing Silali basin's peak ring (Author 2015).

Plate 11: A SPOT image showing Silali basin's crude peak ring (PR) (image modified from Google maps).

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As stated earlier, the peak ring or the central peak of a complex crater can also be formed as the initial (transient) deep crater floor rebounds from the compressional shock of impact.

7. The basin's steep slumped and stepped walls

ETICs are generally circular and their outer walls are rough with an overflow of proximal and distal ejecta. The immediate inner walls are steep, especially on the upper parts, due to slumping of materials and later denudation. The lower inner walls are gently sloping upwards (conically) due to melt material lining up the inner walls and the slumped or eroded materials that cover the melt.

Large ETIC walls collapse/slump more spectacularly giving rise to wall terraces (Melosh, 1989). According to Heiken and a team of other researchers, true complex craters contain terraces on their interior walls, a flat floor and a single peak or group of peaks in the centre of the crater floor (Heiken, Vaniman, & French, 1991)). For them, the interior wall terraces are products of landslides as evident in one of the craters on the moon called Copernicus (Heiken et al., 1991). Silali basin's walls could thus be products of subsidence, slumping and erosion. Plate 12 shows the basin's slumped walls while Plate 13 shows a slumped section of the basin's wall.

Plate 12: A section of Silali basin's wall that is both stepped and slumped (Author, 2015).

Plate 12 shows the height of the basin's wall against an average human height. The slumping of the basin's walls may be an indication that the basin may still be in the process of subsiding, especially following the release of hot gases and steam from the basin's magma chamber. From ground truthing, Silali basin's wall is stepped all around, though irregularly and this is ingrained in the basin's formation, as explained earlier. The basin's wall is also slumped all around, as can be seen in the ground pictures and satellite images presented in this paper.

Though slumped walls are associated with faulting, even in the rift valley where Silali basin is located, the slumping in Silali basin defines a circular basin and enhances the basin's circular morphology.

It is advisable that anyone desiring to climb down into and out of the Silali basin should do so with the help of a helicopter, especially if one has a heart or a breathing

problem. This is because temperatures within the basin are high and the basin's walls are not only extremely steep but very rugged, making it possible for human exhaustion to easily turn fatal. Some of the rocks on the basin's wall are also loose and movable.

Plate 13: A picture showing a section of Silali's steep and slumped walls (Author, 2015).
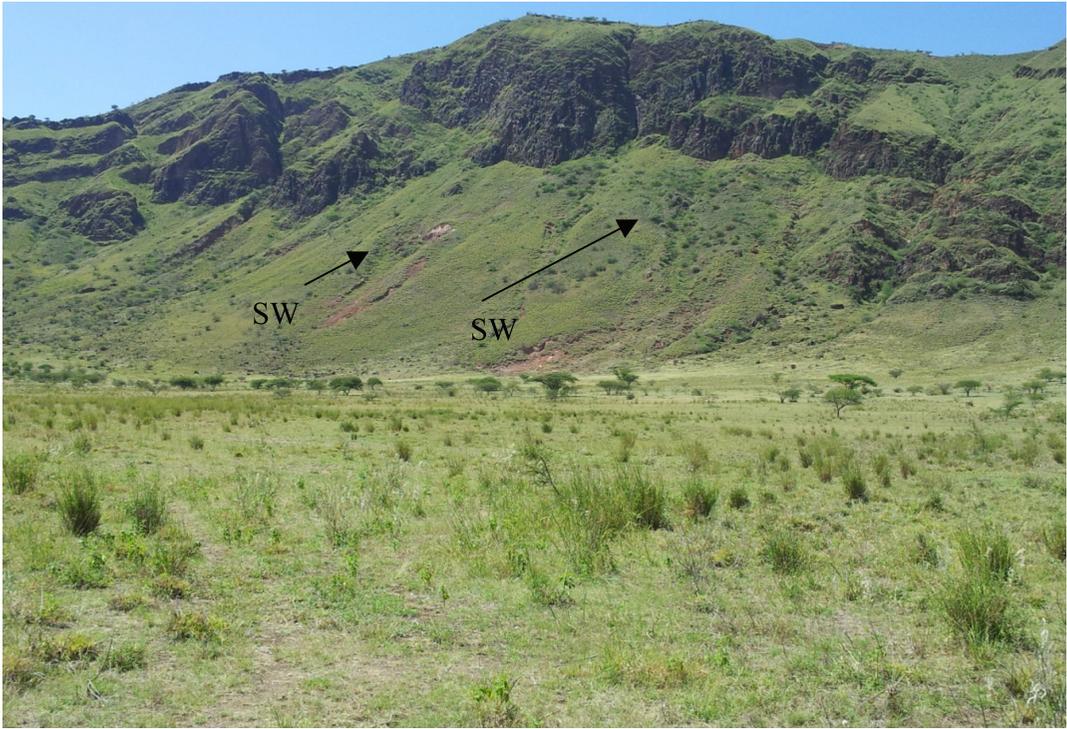
Plate 14: A picture showing more of Silali basin's slumped inner walls (SW) (Author 2015).

8. The basin's butterfly pattern of ejecta

Lichoro (2013) observed that there is absence of massive lava deposition on the flanks of Silali basin. There are no visible lava deposits on the basin's floor either and according to the book on the geology of the Maralal area 'the caldera walls have inner vertical drops of about 300 m; they remain unbreached and the caldera is not infilled by a lava pool' (Government of Kenya, 1987). As it is, the basin is surrounded by an 'apron of alluvium' which is considered to be proximal ejecta or allochthonous materials in the study that bore this paper. Indeed, an explosive volcanic eruption is capable of depositing lots of dust around a crater and Silali basin's ejecta are similar to volcanic ash because they consist of pulverized rock minerals and volcanic glass. This would suggest that the dust on the flanks of Silali basin is pyroclastic material erupted from the Silali shield. However, this is not

the case because the dust does not have recent lava deposits on it. It is just loose dust, of non-specified shape, broken by huge rock blocks (hummocky ejecta and allochthonous material) in places. Volcanic ash also has vesicles and the ash particles display some distinctive shape in their looseness, such as being blocky, convoluted, vesicular and spherical or plate like *(http://en.wikipedia.org/wiki/volcanic_ash).* Interestingly, the ejeta on Silali basin displays the butterfly pattern of spread that is common in some ETICs (https://en.m.wikipedia.org/wiki/ejecta). Plate 15, below, shows this butterfly pattern of ejecta spread.

Plate 15: A SPOT satellite image showing terrace like features (T) on a part of the Silali basin's eastern wall, a portion of the basin (SB), butterfly pattern (BP) of ejecta spread and slumped walls (SW). Image was adapted from Google maps.

9. Conclusion

Before the study: *Identification of an Extra-Terrestrial Impact Crater (ETIC); A Case Study of Silali Crater, Kenya*, Silali basin was considered a volcanic crater by all previous studies. This is not unique to Silali basin because Tenoumer crater, in Mauritania, was also known as a volcanic crater for twenty years until PDFs were found in its rocks in 1970 (Dunkley et al., 1993). Today, Silali basin can be said to be a probable ETIC that is rich in volcanic features. Old and recent volcanicity has created many volcanic features in the basin to an extent that the basin can easily pass for a volcano. However, Silali crater may not be considered a volcano because it is not found at the top of a volcanic edifice the way summit craters are found at the top of volcanic cones, such as the nearby Mt. Paka. The lack of a cone shape in the raised area surrounding the basin is clearly visible, even from the side of the basin captured by Plate 16.

Plate 16: A picture showing the outside western walls of the Silali basin, in the background, at a distance (Author, 2015).

Besides the basin's ETIC morphological characteristics, Silali basin has many other ETIC characteristics that include; the basin's ETIC related geology and rock chemistry, the basin's geophysics and the many geomorphological features that are associated with the basin. In Conclusion, Silali basin seems to have formed, as an ETIC, not only on an area of volcanic rock but on a volcanic shield; through an extra-terrestrial impact and later, subsidence. The basin also bears the morphological classic hallmarks of an impact crater, which include: slumped walls inside the rim, rough irregular crater floor, stepped walls, a circular morphology and hummocky deposits (ejecta) outside the basin- among other features that have been mentioned in the paper.

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Livelihood Improvement of Forest Adjacent Communities for Sustainable Management of Mau Forest Complex, Kenya: Harnessing Potential Opportunities

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Abstract

The Mau Forest Complex (MFC) and its watershed form a fragile and complex ecosystem which is the largest closed-canopy forest water tower in Kenya. The MFC covers the single most important catchment in Rift Valley and western Kenya. It forms the upper catchment of all, but one rives that drain west of the Rift Valley, including lakes Baringo, Nakuru, Naivasha, Natron and Turkana. The MFC is also rich in flora and fauna. Despite its critical importance for sustaining current and future economic development, the MFC has been adversely been degraded which has been occasioned by anthropogenic activities mainly: encroachment, logging for commercial timber, ill-planned settlements, as well as unsustainable extraction of forest resources, grazing of livestock and cultivation. Consequently, there is an urgent need to propose and implement sound and feasible conservation strategies to mitigate against these threats. There is need to secure and sustainably manage Mau Forest Complex in collaboration with stakeholders by supporting livelihood improvement options for forest-adjacent communities. The overall purpose of the paper is to propose interventions that would increase tree cover, enhance on-farm tree resources and related income generating enterprises for sustainable forest management (SFM). One key intervention is to adopt agroforestry practices and technologies that include Plantation Establishment and Livelihood Scheme (PELIS), also known as Shamba System and farm forestry, high value woodlots, buffer zone agroforestry, plantation-crop combination, apiforestry, aquaforestry, entomoforestry and agroforestry in watershed management. Agroforestry is a panacea for myriad of services and products viz: amelioration of emerging global change in climate, conservation of water catchments, support of biodiversity and medicine. Further agroforestry will enable forest-adjacent communities to improve their livelihoods through value addition to wood processing, ecotourism, charcoal and traditional medicine extraction, honey harvesting, carbon credit market and payment of environmental services. Studies have revealed that communities surrounding

the forests by practising PELIS have contributed to tree seedling survival and thus increased forest cover in a cost effective way, improved water flow from the catchment areas, increased food production and improvement in living standards of the communities living adjacent to these forests (Kagombe, 2014; Odwori, Nyangweso, & Odhiambo, 2013). MFC offer an array of ecosystem indigenous and cultural services for SFM and these include spiritual, knowledge systems, recreation and aesthetic values. In conclusion, multistakeholder participation with shared vision, through Community Forest Associations (CFAs), rehabilitating the degraded areas by adopting agroforestry, promoting non-extractive uses of indigenous forest will improve livelihoods of communities thus form the action plan that will save MFC.

Keywords: *Agroforestry, Community Forest Associations, Mau Forest Complex, Plantation Establishment and Livelihood Scheme, Sustainable Forest Management.*

1. Introduction

The Mau Forest Complex (MFC) and its watershed forms the largest the largest closed-canopy forest ecosystem in East Africa. The MFC covers over 400,000 hectares. Its forests provide critical ecological services to the country, in terms of water storage; river flow regulation; reduced soil erosion and siltation, water purification; flood mitigation; recharge of groundwater; conservation of biodiversity and amelioration of microclimate. Through these ecological services, the MFC support key economic sectors in the country that include agriculture, tourism, energy and industries. Several ecosystems in Kenya, including the Maasai Mara National Reserve and neighbouring Tanzania depend on water originating from the Complex. It also contributes water to lakes Baringo, Nakuru, Naivasha, Natron, Turkana and the River Nile Basin water resources. In addition the MFC is the source of water supply to several urban centres and supports livelihoods of many communities living adjacent to the forest (Government of Kenya, 2009).

Despite its critical importance for sustaining current and future economic development, the MFC has been adversely been degraded which has been occasioned by anthropogenic activities mainly: encroachment, logging for commercial timber, ill-planned settlements, as well as unsustainable extraction of forest resources, grazing of livestock and cultivation. Consequently, there is an urgent need to propose

and implement sound and feasible conservation strategies to mitigate against these threats. There is need to secure and sustainably manage Mau Forest Complex in a win-win situation by also by supporting livelihood improvement options for forest-adjacent communities. The overall purpose of the paper is to propose interventions that would increase tree cover, enhance on-farm tree resources, generate income from enterprises and thus address livelihoods of forest-adjacent communities for sustainable and holistic management of MFC for future generations.

2. Proposed Interventions to Conserve Mau Forest Complex Sustainably: Harnessing of Potential Opportunities for Improved Livelihoods of the Forest Adjacent Communities

One key intervention to conserve MFC, is to adopt agroforestry practices and technologies that include: Plantation Establishment and Livelihood Scheme (PELIS), also known as Shamba System and farm forestry, high value woodlots, buffer zone agroforestry, plantation-crop combination, apiforestry, aquaforestry, entomoforestry and agroforestry in watershed management. Agroforestry is a panacea for myriad of services and products viz: amelioration of emerging global change in climate, conservation of water catchments, support of biodiversity and provision of various products include that medicine. Further agroforestry will enable forest-adjacent communities to improve their livelihoods through value addition to wood processing, ecotourism, charcoal and traditional medicine extraction, honey harvesting, carbon credit market and payment of environmental services. Studies have revealed that communities surrounding the forests by practising PELIS have contributed to tree seedling survival and thus increased forest cover in a cost effective way, improved water flow from the catchment areas, increased food production and improvement in living standards of the communities living adjacent to these forests (Kagombe, 2014; Odwori et al., 2013). MFC offer an array of ecosystem indigenous and cultural services for SFM and these include spiritual, knowledge systems, recreation and aesthetic values. Multistakeholder participation with shared vision, through Community Forest Associations (CFAs), rehabilitating the degraded areas by adopting agroforestry, promoting non-extractive uses of indigenous forest will improve livelihoods of communities thus form the action plan that will save MFC.

2.1   Embracing Plantation Establishment and Livelihood Improvement Scheme by Forest Adjacent Community

Plantation establishment and livelihood improvement scheme (PELIS), is a system of establishing plantations, whereby Kenya Forest Service (KFS) allows forest adjacent community, through their community forest associations the right to cultivate agricultural crops during the early stages of forest plantation establishment as stipulated in the Forest Act 2005, Article 47 (2) (h). Cultivation is often allowed to continue for 3 to 4 years on the same site until tree canopy closes (Kagombe, 2014). The system allows the communities living adjacent to these forests to benefit from planting annual crops on the forestland while permitting KFS to reduce the cost of establishing forest plantations. This leads to a win-win scenario because PELIS ultimately becomes a solution to poverty alleviation while ensuring increased tree cover, improved water flow, sustained food production and thus improvement in standard of living of the communities. It has been used to establish forest plantations in Kenya since the year 2007 (Kagombe, 2014). The communities who live next to forest plantations in Nyandarua, Kericho, Londiani, Kaptagat, Kinale and Molo in Kenya will attest that using these forests to grow annual crops is a significant input towards improving their livelihoods. A study carried out in OL Bolossat Forest Station, Nyandarua County in PELIS indicated that *Cupressus lusitanica* and *Pinus patula* had high survival rate and the trees did not significantly ($p > 0.05$) affect crop yield (Omam (2016) (Table 1).

Table 1*: * Plantation establishment through PELIS in OL Bolossat forest from 2007-2014.

Years	2007	2008	2009	2010	2011	2012	2013	2014
Area planted	140.1ha	64.2ha	189.1ha	219.5ha	279.0ha	130.0ha	141.0ha	73.4%
Percentage survival	70%	80%	85%	40%	80%	75%	70%	60%

Source: KFS, 2014.

The results demonstrated that there was a high survival rate of planted trees under PELIS. Data in the forest station's compartment register indicate that low survival

of trees in the year 2010 was due to inadequate rainfall experienced that year. More than 50% of the OL Bolossat Forest adjacent community members depend on the forest for cultivation, fuel wood collection and grazing. OL Bolossat forest does not only offer grazing area for the immediate adjacent forest community but offers the same to communities living as far as Laikipia County during dry periods.

2.1.2 Crop Yield and Average Income from Major Crops Grown Under PELIS at Ol Bolossat Forest Station

The results of the study of PELIS indicated that potato farmers earned Kshs170 day^{-1}, Kshs 510 month^{-1} and Kshs 61200 year$^{-1,}$ implying that they live above poverty index (1 US dollar earning day^{-1}. Maize farmer earned Kshs 61 day^{-1}, Kshs1833 month^{-1} and Kshs 22000 year^{-1}. Peas farmer earns Kshs 50day^{-1}, Kshs1500 month^{-1} and Kshs18000 year^{-1} (Table 2).

Table 2: Crop yield and average income from major crops grown at OL Bolossat Forest Station in 2016

Crop	Average Wt/bag (Kg)	Average price/bag (Kshs)	No. of farmers interviewed	Average yield by each farmer No. of bags Yr^{-1}	Average income/farmer/ Yr^{-1}	Total income from potatoes/ Yr^{-1} (all famers)
Potato	120Kg.	1800/=	238	34	61,200	14,565,600
Maize	90Kg.	2000/=	81	11	22,000	1,782,000
Peas	90Kg.	18000/=	5	1	18,000	90,000

Although maize and peas average daily income is less than a dollar, there were also other extra daily income from other forest activities like grazing, and fuel wood. These if valued can add up to more than 1 US dollar a day^{-1}. It is clear from results that earnings from these crops, grown under PELIS reduce poverty by improving the general income for the concerned farmers.

2.1.3 Benefits of PELIS in Kenya

PELIS has economic benefits to both Kenya Forest Service and the farmers. Kenya Forest Service benefits from low plantation establishment cost, and high seedlings survival in planted areas. According to Walubengo (2007), the cost of establishing

a forest plantation is Ksh15300 Ha^{-1}, while the cost of maintaining the same area is Ksh8500 Yr^{-1}. This adds to Ksh40800 for three years. Under PELIS, the cost of establishing the same plantation comes down to Ksh1700 Ha^{-1} while maintenance is free, as the cultivators weed the trees as they look after their crops. In addition, KFS collects annual *Shamba* rent from the cultivators.

The farmers benefit from locally available fertile forest land. According to Kagombe (2014), cost-benefit analyses have shown that farmers benefit from PELIS with a net present value for four years at Ksh.1, 272,573 Ha^{-1}. Raising plantation under PELIS is cost effective, and contribution of PELIS to the economy is in the range of Ksh.1.4 billion per year. According to Odwori et al. (2013), Nyandarua County where Ol Bolossat Forest Station is situated, gave the highest hectarage of arable land to CFAs; 4489 Ha between the year 2008 to 2012. And the food contribution of PELIS in the same county was 67258.8 bags of potatoes, 36906.9 bags of maize, 29059.9 bags of cabbage, 66245.4 bags of peas, during the same period. It will not be factual to believe that it is all well with those living adjacent to gazette forests, there are also negative externalities. These include, for example, crop damage from forest wildlife and forest dwelling pests, such as the tsetse fly that harms cattle (Standing and Gachanja, 2014). Some community members, in the process of *Shamba* preparation, burn the crop remnants and bushes which in some cases cause forest fires. Some of the crops grown under PELIS at times affect the growing trees positively or negatively as may be seen on the health and survival of the same trees (William, 2016).

2.2 Empowerment of Communities: Strengthening Capacity in Community Involvement in Forest Conservation

The introduction of Participatory Forest Management (PFM) in Kenya from 1997 and the implementation of Forest Act (2007), led to formation of community based organizations (which came to be referred to as Community Forest Associations – CFAs) and Forest Conservation Committees (FCC). These reforms were envisaged to become important mechanisms for sustainable forest management (SFM) .Decentralization in forest sector in many parts of the world has taken many forms rangng from (Participatory Forest Management (PFM), Joint Forest Management

(JFM), Community Forest Management (CFM) and Community Based Forest Management (CBFM) (Mogoi, Obonyo, Ongugo, Oeba, & Mwangi, 2012). The roles of CFAs have changed since implementation of the Forest Act (2007), from being directly conrolled by Kenya Forest Service (KFS), to a more decentralized system, where they are more involved in decision making. They have further exanded their roles from lobbying to conflict management, fund raising, negotiating with KFS and forest devloment activities. These new trends have also led to the formation of splinter groups due to power and leadership wrangles.

One challenge facing CFAs is the fact that decentralization process has not been implemented fully. The situation is further aggravated by the fact that some officers in KFS feel that some of their roles have taken over by the CFAs. This has weakened their position and denied them their right to participate in some activties (Koech, Ongugo, Mbuvi, & Maua, 2009). For the communities (through CFAs) to participate fully in forest management, they need to get benefits from doing so. The CFAs should be supported fully to actively participate in conservation of Mau Forest Complex. Capacity needs to be strengthened in community involvement in forest conservation, especially through Community Forest Associations (CFAs).

2.3 Payment of Ecosystem Services and Benefit Sharing Amongst the Adjacent Communities Involved in Conservation

To restore and conserve MFC, benefits accruing from the forest should shared amongst the adjacent communities involved in conservation. However, the questions to ask is: (i) Has there been adequate incentives created ? (ii) Has there been clear mechanisms for sharing benefits? (iii) Has there been payment of environmental services in form of carbon credits, tourism levy, water levy payments in catchment areas? However, the common response amongst CFAs is ''No''. Perhaps communities may have access to free grazing and concession in timber permits.

Communities neighbouring forests have been the main complainants, especially regarding direct values, such as extraction of timber. Sharing of benefits has been well

benefit cost sharing mechanisms in place to provide guidance. Local communities have so far not benefited adequately from timber industry, as most benefits goes either to National Government or County Government. Lack or inadequate tangible benefits has therefore contributed to forest destruction in Mau Forest Complex (Langat, 2016).

According to Koech et al. (2009), there has been no clear concept on benefit sharing in Kenya with respect to PFM. The already existing PFM plans on benefit sharing are rather weak. A clear concept needs to be developed on benefit sharing in PFM in Kenya, especially with respect to plantation forests. There have been conflicting views on where PFM should be applied on state forest plantations or indigenous forests or both. This is an area that needs to be clarified. In the case of state plantations, KFS will have to deal with benefit sharing either in form of community management of plantations or by introducing "social contracts" in concessions and timber licensing.

Another way to creating incentives in PFM is to focus more on commercialization of products that can be sustainably extracted from forests such as honey, medicine, grass and other products.

Sustainable financial resources for conservation of the forest should also be generated based on the payment for service principle (*e.g.* carbon credit, water, tourism and electricity levy). Benefits arising from payment for environmental services should accrue to the adjacent communities involved in consrvation. Socio-economic mechanisms should be estblished to assist wrangling and conficts arising from communities and key stakeholders in resource sharing and management. Payment for Environmental Services (PES) evolved on the idea that sound forest management practices generate a number of environmental services that consumers may be willing to pay for their sustainable generation. The services are: watershed protection, carbon sequstration, biodiverity conservation and landscape beauty.

2.4 Payment of Water, Irrigation and Hydroelectric Power Services

Sound management of water in the upper MFC catchment can provide adequate water at national, regonal and local levels. Markets for PES are therfore expected to be at internationl, regional, national and local levels. International market-based funding systems have emerged. People in urban areas are in most cases the main beneficiaries of water services and can compensate for watershed, management through their county governments in order to avoid negative consequences of bad management of forests in the upper catchment areas. Kericho Water and Sanitation Company (Kewasco) since it gets its water from MFC water catchment, should support the conservation of the forest by providing incentives to the communities who directly conserve the forest.   For example, New York City, which gets 1.4 billion gallons of water per day from the Deleware and other watersheds invest about 6 billion US dollars to support watershed programmes, that include technical assistnce to farmers to develop comprehensive Farm Plans (Zahabu, Malimbwi, & Ngaga, 2005). Tanzania faces frequent hydroelectric power and water shortages by urban users and waterborne diseases such as typhoid and cholera periodically break out, because of poor management of catchment areas. Although funding opportunites are available from international conservation agents, concerted county and national interventions are required to support local arrangements between communties in the forest catchment and users such as the county government, hydroelctricity companies and irrigation schemes downstream to set up levies charges that can be used manage the forest so as to continue to enjoy ecosytem services in perpetuity by the people of Kenyan and the neighbouring countries, lest it will lead to untold suffering, for which history will judge the present generation harshly.

2.5 Carbon Sequestration and Trading: Potential of Reducing Emissions From Deforestation and Forest Degradation (Redd) Initiative in Mau Forest Complex

Sequestring carbon is a panancea to mitigating global warming. International forest carbon system is developing fast through Clean development Mechanism, (CDM)

of the Kyoto protocol of the United Nations Framework Convention on Climate Change (UNFCCC), signed in 1997. The CDM provides market mechanism for the sale of carbon credits whereby the developed countries are required to meet their grrenhouse gases reduction committments and get Certified Emission Reduction Credits (CERs), by supporting carbon sink projects elsewhere to compensate for their carbon production (Jindal, Swallow and Kerr, 2008). This can done through afforestation and reforestation (carbon sinks), emission trading and sponsoring carbon reducing projects, for example in MFC. In addition to being a party to FCCC and the Kyoto protocol, Kenya has filed its report with FCCC to demonstrte committment to fulfill its obligation under the convention.

Carbon credit schemes in Kenya fall under CDM and voluntary carbon market. The CDM projects in Kenya are registered with a CDM registry, a standardized electronic database that ensures accurate of the issuance, holding and acquisition of CERs. They are currently nineteen registered CDM projects in Kenya that range from wind, hydro, biogas power projects, small scale afforestation and reforesttion programmes, amongst others. The majority of voluntary projects in Kenya are in the forest sector and currently, there are nine such projects that include Aberdare Range/Mt Kenya Small Scale Reforestation inititive, the Forest Again Kakamega Forest, the Chyulu Hills REDD+ Carbon Credit Programme (Sena, 2015). These projects are at various stages of development in terms of validation, verification and isssuance of credits.

The scheme provides employment to the local communties, a move that will raise their standard of living. Once properly conceived the scheme will provide revenue to the community through payments of sequestered carbon. Given the poverty levels in Africa, such projects could help alleviate poverty and reduce the attendant reliance on forest material to survive, thus eventually promotes the restoration of MFC. It is clear that REDD projects have potential in ecosystems like MFC and therefore it is important develop and implement national it in partnership with civil society, research and other government agencies.What needs to be done is to build capacity by laying strong initial foundations to establish the institutional environment for a REDD project, baselines and monitoring procedures. However, such a project cannot be successful as a standalone project. An integrated rural development approach

reducing deforestation pressure and providing alternative income generation for the youth is required to implement such a project. A REDD strategy with additional revenue streams and benefits from eco-tourism, biodiversity offsets and water services are required. A REDD project will strengthen the awareness at the political level to support forest conservation in a multi-sectoral approach in MFC.

2.6 Ecotourism and Biodiversity Investment Opportunities in Mau Forest Complex

The Forest Act, 2005 provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development of the country. Immense identified and unidentified flora and fuana (watching birds, butterflies, snakes, colobus monkeys, civet cats, elephants and sport fishing amongt many others) species and scenic beauty of Mau forest provide a calm haven for tourists. These avail opprotunities for the development of ecotourism, which is important and critical element for conservation and rational utilization of the forest resources for socio-economic development of the forest adjacent communities and the county at large but largely untapped. There is need to empower the local community through cretion of job opportunities and financial gains through the development of eco-tourism in our forests. The potenial for growth in this sector is immense. Ecotourism is crucial to the tourism industry as it not only strengthen but also conserve the local community culture, forest areas, flora and fauna and a chance to to be restored. It also creates an opportunity for the tourists to enjoy completely unique wilderness experience offered by natural pristine forests. The key area of forest management where ecotourism will have a positive impact is creating an important revenue stream for the national and county governments and or importantly the forest adjacent communes in investing by developing ecotourism facilities that dovetails into management plans for the conservation of the forested areas of the ecosystems.

Forest sites in Kenya that have rolled out ecotourism include Sacred Lake Camp (Aberdare Forest), Ragati Fishing Camp (Mt Kenya Forest), Nature trails and tree platforms (Arabuko Sokoke Forest) Simba lodge (Secret Valley, Nanyuki Forest),

Ornitological guides (Kakamega Forest) and Ngare Ndare Forest and Ecotourism Facilites (Ngare Ndare Forest), amongst others (KFS, 2009). Mau Forest Compex, however, has even bigger potential to operate ecotourism, noting that the closed canopy forest is expansive buffered by the tea plantations and a sanctuary to diverse flora and fauna. To fast track ecotourism development in the forest the local community need to collaborate with KFS to develop Management Plans, float Expression of Interest (EOI), so that eligible operators and interested investors can be awarded license and concession management and operation agreement by KFS to develop, operate and manage ecotourism facilities under contract terms in the various MFC ecosystem sites. The revenue generated, unlike in the past when it was entirely utilized by the government or operators, ecotourism should in future benefit and improve the welfare of the forest-adjacent communities.

2.7 Farm Forestry and Agroforestry Prospects in Reducing Degradation Of Mfc

Deforestation and degradation are serious threats to the sustainability of MFC. Over reliance on gazetted forest reserves with limited attention on agroforestry, farm forestry and potential of Non-Timber Forest Products (NTFPs) , compounded by povery syndrome has been some of the underlying root cause to threats of MFC. Farm forestry and agroforestry provide products and services that will improve the livelhooods of communities. In addition these systems also act as buffer zone to enncroachment to MFC. The multinational tea companies (Unilever, Finlays and Williamson tea company), Nyayo Tea Zone and tea planted by small scale tea farmers have contributed as buffer zones to MFC and these intervention should be sustained at all costs. The major challenges that confronted agroforestry, farm forestry and NTFPs are lack of incentives to support commercial production of wood, support and training of stakeholders on investment, efficient utilization and processing (Government of Kenya, 2005). For example lack of organized market for on farm tree products, treatment of timber and credit for cottage industries has been a disincentive for tree growers. The Forest Act 2005 clearly offers some of these incentives, including provision for technical support by KFS and development loans. Value addition to forest products should be promoted. In addition access to

forest product markets should be developed to promote farm forestry, agroforestry and reduce dependency on forest resources in gazetted forests. The revenue accruing from sale of treated timber and other tree products such as poles, wood will significantly reduce the pressure on MFC.

2.8 Embracing Other Emerging Income Generating Activities: Apiforestry, Aquaforestry and Entomoforestry in Mau Forest Complex

Poverty has been recorded as one of the main contributors to forest degradation in MFC. However, there are opportunities in the forest that can be used to generate revenue for the communities and at the same time conserve the forest. The opportunities revolve around non-wood products that apart from ecotourism development, include apiforestry (bee keeping), aquaforestry (on farm fish farming), entomoforestry (silk production), medicine and charcoal for the forest adjacent communities. Revenue for the communities can be boosted by adding value to the products from these enterprises.

2.9 The Cultural and Symbolic Importance of Forest Resources

Mau Forest Complex offer an array of ecosystem indigenous and cultural services for SFM and these include spiritual, knowledge systems, recreation and aesthetic values, which is not possible to quantify in monetary terms. MFC provide a venue for religious and social ceremonies for the Kipsigis people. Rituals and ceremonies in Mt Blackett (Tulwab Kipsigis) within South West Mau Forest Complex, often link the Kipsigis people with their cultural heritage, as well their ancestral past. The forest surrounding the mountain has over decades been conserved and currently Mt Blackett forest is gazetted as a national monument. Such sacred forests are normally managed sustainably because of tradition knowledge of indigenous and local people.

2.10 Provsion of Incentives and Conflict Resolution Mechanism to Communities For Sustainble Management of Mfc

Local communities have so far not benefited adequately from timber industry, as most benefits goes either to National or County Government according to studies by Langat (2015). This has been a challenge in that financial proceeds especially from logging have not been reinvested in the concerned area. Sharing of proceeds from the forest should be ploughed back to the local community not only to improve the local infrastructure but also for conservation efforts. Provision of alternative sources of energy other than fuel wood, for example, solar, wind and biogas and establishing stall feeding for livestock will reduce pressure on the dependence on forest resources eniterly.Communities need to be sensitized an educated on environmental issues in order to change their attitude towards utilizing the forests as prmary source of products to that of a resource that is necessary for future generation in terms of food security, health and other social services (Langat, 2015). CFAs and other stakeholders have to trained and sensitized on their widen mandate to be make informed decisions and assist in conflict resolution arising from forest management and resource sharing.

3. Conclusions and Charting the way Forward

1) There are no clear benefit costs sharing mechanisms in place to provide guidance. Local communities have so far not benefited adequately from timber industry as most benefits goes either to National Government or County Government.

2) Locals need to be involved in sharing of benefits accruing from forest conservation to improve livelihoods and thus get encouraged them to sustain forest conservation.

3) Sustainable financial resources for conservation of the forest should also be generated based on the payment for service principle (e.g. carbon credit, water, tourism and electricity levy).

4) Benefits arising from payment for environmental services should accrue to

the adjacent communities involved in consrvation.

5) Socio-economic mechanisms should be estblished to assist wrangling and conficts arising from communities and key stakeholders in resource sharing and management.

6) Value addition to forest products should be promoted. In addition access to forest product markets should be developed to promote on farm forestry and reduce dependency on forest resources.

7) Multistakeholder participation with shared vision, through Community Forest Associations (CFAs) should rehabilitating the degraded areas by adopting agroforestry, promoting non-extractive uses of indigenous forest will improve livelihoods of communities thus form the action plan that will save MFC.

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Interplay Between Religion and Science: Level of Inclusion and Relevance in Religious Studies in Nigeria

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Abstract

From the point of view of the scientific sceptics, scriptural literalists, and anyone who eschew some form of fundamentalism or religious conservatism, religion and science are two different human endeavours, which do not have anything in common and as such hold no prospect for mutual interaction or any form of rapprochement. It is not impossible to also find great men and women of science, religion and philosophy with undeniable touch of most current pattern of reasoning falling into this category. This worldview is predicated on the thinking that the respective internal logic and metaphysics of science and religion are such that bringing them into dialogue will, on the one hand, lead to conflation, and consequently, conflict; and on the other hand, a corrosion of the truth and integrity of religious faith. A conceptual analysis approach was adopted to analyse the nature of both science and religion with the aim of laying bare the underlying assumptions that tend to vitiate the nature of these frameworks thereby significantly affecting how relationship between them can be construed. We argue in this paper that such conclusion in respect to the relationship between religion and science is inappropriate and premised on erroneous assumptions. Rather, we submitted that an apprehension of reality, devoid of unnecessary naivety, demands that we employ insights from both modes of experiencing and analysing reality to attain wholesome human self-understanding and that of the entire universe. We also pointed out that in view of the relevance of religion-science debate, deliberate efforts should be made to further inculcate this interdisciplinary approach in the enunciation of religion in Nigeria and other parts of Africa; particularly in the study of religion.

Keywords: *Inclusion, Debate, Nigeria, Religion, Relevance, Science.*

1. Introduction

The dialectical relationship between religious and moral dictates, and adoption of scientific or more specifically technological procedure; as it is, for example, in bioethics is just a side of the coin. Quite considerable, on the other hand, is exploring the nexus between science and religious faith; not in terms of moral acceptability or otherwise, but also in terms of understanding reality and coming forth with intelligible description and explanation of reality. Such exploration is at the heart of the subset of comparative religious studies and philosophy of religion commonly referred to as religion-science debate. It is a critical attempt at examining the rational boundaries of religion and science Marcum (2003, p. 213) with the goal of establishing the possibility or otherwise of bringing the two distinct endeavours (religion and science) into a form of rapprochement or dialogue. The objective of such dialogue is to discern whether religion and science are complete strange bed-fellows, with no prospect of dialogue as held by scholars like Weinberg (1992, p. 245); Denneth (1991); Dawkins (1993), or they are not mutually exclusive, thereby rendering rapprochements possible as opined by eminent scholars such as Barbour (1998); Peacocke (2001, pp. xiii – xviii); Polkinghorne (1997); Williams and Patterson (1996, pp. 147-153); Ade Dopamu (2003); Ogunade (2003, pp. 408-418); Imam (2007); Isiramen (2010); Asojo and Olusanya (2008) and many others.

The outcome of the respective attitudes outlined above is either to, on the one hand, jettison such dialogue as unnecessary adventure or, on the other hand, make good estimations of reciprocal implications of knowledge of the natural world in the natural science and the understanding of the supernatural dimension of reality in religious faith. The possibility of the latter appears to be in no doubt in view of landmark academic achievements and resources available in this field in the Western part of the globe. Brooke, in affirming this, opined that there are "bourgeoning literature" in this relatively novel field of religion and science (Brooke, 2003). The picture in Nigeria and some other African countries in this respect is not totally a gloomy one. There have been pockets of academic engagements in the field in terms of seminars, conferences and scholarly publications.

With this scenario serving as background, it is not out of place to examine the relevance of pursuing an interdisciplinary approach to understanding reality that has been put in place in the religion-science debate, which currently is making some waves in Nigeria. Also, important, is attempting to ascertain the level of inclusion and depth of the religion-science debate in Religious Studies in Nigeria. These, in addition to a further examination of the possibility and otherwise of bringing apparently different frameworks (religion and science) into dialogue, form the focus of this paper.

2. Quest for the Possibility of Dialogue

Giving serious consideration to the possibility of bringing religion and science into any form of relationship should be prior to thinking about such rapprochement in terms of relevance and utility. It becomes necessary therefore to first inquire into that possibility. Religion and science, both areas of human endeavour though, appears to have some levels of incongruity when it comes to placing them side by side; an opinion which was also espoused by Akanmidu and on the basis of which he argued that theology is not a science (Akanmidu, 2003, pp. 45-47).

When one thinks of religion, what comes to mind, perhaps, is a complex flurry of emotions fixated on a reality(ies) other than that which is immediately accessible to us. Far from this somewhat pejorative description however, religion has to do with, relationship with, dependence on, and trust in what Otto (1958, p. 17) referred to as the "Numinous"; the experience of which inspire what is referred to in Christian theology as the "Wholly Other". Within this context, it is presupposed in religion that there is more than one dimension of reality: one material and the other non-material. The "Wholly Other" (non-material or supernatural) of most religions is however, not merely an impression of the mind with no external referent as non-realists would hold. Rather, this "Wholly Other", either conceived in personal or impersonal terms, is adjudged to have independent existence irrespective of the perception of the mind. Meister captured this submission in his view that "most religious adherents hold that their beliefs are about what really exists independent of the human beings who are having those beliefs (Meister, 2009, p. 15). In prophetic religions particularly, this Ultimate Being is understood as the ground of all there is, having brought all to be

as a mark of its Omnipotence. This Being, commonly referred to as God is loved, honoured, worshipped, adored and paid homage to by adherents of various religions. That humanity (adherents) depend on God for many things is rendered evident in religious perspectives, an instance of which was expressed in the view that "it would be difficult to speak of humanity and philanthropy, i.e. benevolence, practical sympathy, love of mankind, justice, equity, equality, fraternity, unity, wisdom and knowledge without religion (God) as their source" (Orjinta, 2001, p. 115).

Central to religion is the exercise of faith. It is described in the Christian scripture as the evidence of things not seen (Heb. 11:1). In Islam it is referred to as "Iman" Raji (1995, pp. 19-30) and the precepts of "Iman" as well as other "Five Pillars" Raji (1995, pp. 19-30), just as it is with Christian dogmas, are not susceptible to doubt once there are clear provisions from the sources of the religion. At the heart of faith to a considerable extent is the description attributed to Kierkegaard as "a leap" (Blackham, 1959, pp. 4-5&17). Tillich, aptly described it as, "the apprehension of the unconditional of both the ground of the theoretical and the practical" Tillich (1969, p. 76), thereby evincing an evidence-free attitude. This attitude of trust in defiance of cogency, at times availability and use of evidence (the type required in scientific knowledge) is needed in religion, since the non-material sphere of existence is not immediately accessible. This however does not imply that reason and evidence do not have any place at all in matters of faith. The Middle Ages, particularly as exemplified by Thomas Aquinas revealed the locus of reason in, at least, natural theology (Wippel, 1995, pp. 29-34). Faith is also needed in an embrace of the goal of virtually all religions, which is, salvation. Salvation is used here in the generic sense since its appropriation in different religion varies remarkably. It is also instructive to note that not all religions admit the propriety of construing this Being in personal terms as indicated to some extent above. This serves to point out the complexity of that pervading cultural phenomenon known as religion.

The seeming incongruity between religion and science can be deciphered in the goal of science which is different from religion. In science, the goal is the understanding of nature and its constituents. Scientific quests are investigations that are carried out with the intent of describing what constitutes reality or what reality is made

up of. This attempt at description in science involves measuring the relationship between observable phenomena. Unlike the case in religion, science is rigorously evidence-bound, and this is clearly expressed in the submission that "science involves the exploration, description, explanation, and prediction of occurrences in the natural world which can be checked and supported by empirical evidence" (Oloyede, 2006b, p. 148). Scientific quests deal with the universe and its properties, and by virtue of its systematized method exclude the non-physical realm. While some scientists would acquiesce to the reality of the non-physical or non-material aspect of the world, others employ both methodological and metaphysical attitude to nature that clearly render the non-material or non-physical simply non-existent. Carl Sagan is one example of scientists in the second category and demonstrated such understanding of science in his book, *Cosmos* (Sagan, 1980, p. 4). The exclusion of the non-material sphere from the world of science is clearly exemplified in Oloyede's description of it as a "systematic study of nature and behaviour of materials of the physical universe based on observations, experiments and measurements" (Oloyede, 2006a, p. 410). Nonetheless, it needs stating that Oloyede, whose opinion we quoted above, belongs to the category of scientists who grant the reality and inevitability of the non-material realm of being.

In science, attempts are also made to minimize to the barest minimum any form of interference with the object of study - nature. It is this spirit that aids the highly criticized objectivity of science. As such science is construed not as an endeavour that creates meaning. Rather, it is, in the words of Oyawoye "a discovering endeavour in which we seek to find the true properties of matter through experimentation" (Oyawoye, 2006, p. 4). It is noteworthy that, apart from understanding and describing phenomena, attempts in science are also geared towards making the world more comfortable for humans. This feature of science is made possible through prediction and controlling phenomena.

The goals in religious pursuits are provision of meaning, reassurance, guidance in moral principles, channelling the course of salvation or liberation from material and non-material realities and the enjoyment of the beatific vision with God at the consummation of eschatological mission, while in scientific undertakings, the goal

is acquisition of knowledge through an expansion of human understanding of reality via descriptions of natural world and its processes. The methodology in science is one of evidence-bound attempts, following painstaking laid down procedural guidelines, where there are no givens, no absolutes, no dogma, no revelation on a mountaintop! In fact, for a description to enjoy the status of a scientific theory, it must be falsifiable. It has even been argued by some that the present structure of scientific procedures necessarily exempts any supra-natural or supra-material reality because it is a methodology that reflects naturalism (Forrest, 2000, pp. 7-29; Kurtz, 1998). Hence, there is no possibility of bringing within the narrow limits of science anything that is super-natural.

However, in religion and the academic enunciation of religious beliefs referred to as theology, while there is possibility for speculation, such speculation needs to be guided by the light of faith so as not to falter or slide into heresy. Here, the concept of revelation is uncompromisingly central; and the concept of revelation does not stop at human attempts to comprehend the natural and super-natural. Rather, and much more important is the view that, revelation involves the self-disclosure of the object of religion. The role of personal experience in the articulation of faith is also important in religion; and perhaps one of the notable reasons for scepticism about the truth of religion in view of lack of objective standard of evaluation (Omoregbe, 1993, pp. 17-20).

From this brief submission, it appears an honest interpretation to declare that religion and science belong to *non-overlapping magisterial* Gould (1999, p. 6) as Stephen Jay Gould called it and put an end to the exercise! It is however the same interpretive intuition that would render inadmissible such peripheral undertaking in taking decisive, revealing, transparently honest and more ennobling attempt at determining the real relationship between religion and science. In what follows, we shall endeavour to argue in about five ways that *conflict, non-overlapping* or *strange bed-fellows* models of interaction between religion and science is not only inaccurate but also inappropriate. Themes under which we attempt to show the inappropriateness are: human advancement, epistemic commitments, restrictive methodology, mutual implications and complex historical relations. These do not in

any way exhaust possible avenues of arguing for necessary rapprochement between religion and science.

3. Human Advancement

Central to human life is the quest for advancement. Human beings always seek to rise above the present situations. They strive to attain stages of life that are far more desirable than the present. Humans passionately long for what is referred to as 'self-actualization' or 'self-realization' by pulling down natural and artificial barriers, which could impede such attempts. As humans, we seek understanding; conquer our environment and ourselves to reach the goals we desire. Humans have been using the medium of scientific enterprise, not only in terms of seeking understanding of the natural world but also in using technology, to make life more meaningful. Oyayowe chronicles the deployment of science for meaningful existence when he discussed the invention of gunpowder and guns, the discovery of compass in the 12th century with its attendant impact on voyages around the world, discovery of the steam engine by James Watts and related discovery which pioneered the industrial revolution, the computer, the unravelling of the "secrets of life" – DNA by Francis Crick and James Watson in the 20th century, discovery of laws that have helped in "launching artificial satellites" which has revolutionized the process communication, as well as many other feats through science (Oyawoye, 2006, pp. 4-9). These are just a few of what humans have achieved in the quest for self-development, using the instrumentality of science. Revolutions in modes of transportation, health and Medicare, human enhancement via molecular biology, space science, and satellite technology abound in varieties. The list seems endless, and there are both positive and negative outcomes of the use of science.

But that alone is not the entire picture! Science is powerful indeed. But it still lies outside the scope of science to confidently make submission on some other dimensions of human advancement like provision of meaning of existence and intricacies of personality and consciousness. Understanding basic questions of life such as, whether it is not much more at the instance of purpose than it is by chance that while some organisms are single-celled some are multicellular, while some organism are self-replicating, others need the opposite sex to reproduce, still lie

far away ahead of science. Also, several researchers have linked religiosity with good health and longevity (Idler, 2008, pp. 1-5; Koenig & Larson, 2001, pp. 67-78). This definitely is an indication that religion can also contribute in some ways to human advancement and the exact point of relationship is still shrouded. It is apparent, therefore, that the yearning for human advancement can be satisfied with the deployment of science. Science, no doubt, contributes significantly to the attainment of human advancement. Indeed, one can argue that without science, and its handmaid, technology, humans' advancement in terms discussed above would be greatly hampered. To hold however, that science can provide all the indices of human advancement and can do that all alone, without input from other spheres of the human life and reality is tantamount to a contemptible quirk.

4. Epistemic Commitments

Apart from the above, another important aspect of human advancement noted above is the quest for understanding. Human beings are always willing to probe to gain understanding thereby enabling them to describe and/or interpret the knowledge they have gained. Considering its ubiquity, it appears the quest for understanding is one which human beings do not have control over. An adequate description given to this impulse by Oyawoye is "special compulsive inquisitiveness" (Oyawoye, 2006, p. 3). This epistemic commitment covers the whole spectrum of human experience, which is not restricted to the physical dimension of existence alone. Our submission earlier revealed that science deals with that which is observable or measurable. And it is only with regard to that which is observable or measurable that science can pontificate in terms of epistemic achievement. If epistemic commitments are directed only at things which scientific quests enable us to unravel, it means that we shall be neglecting a vast dimension of human existence within the religious, spiritual, or non-material realm. Such epistemic preoccupation with reality becomes unduly naïve. Wholesome human epistemic concerns necessitate admissibility of probable or real epistemic-prone data of experience for the purpose of gaining further understanding, whether these have to do with things physical, observable or material, or aspects of living that are immaterial, unobservable or non-physical. Attempts at concentrating on epistemic commitments only from the perspective of science, or that of religion inevitably jeopardize our quest for robust understanding of reality.

5. Restrictive Methodology

It is doubtful that an artisan can expressly perform feats inherently limited by the potency of his/her tools. This brings us to the methodological import in religion and science. By nature of their respective construct or structure, there are aspects of reality which will not yield to scientific quests or religious musings. No amount of preoccupation with religion or theological reflection, for instance, could yield knowledge of the mathematical equations for measuring the distance of a planet from the Sun; knowledge of the number of atoms in the nucleus of an electron; or yield research outcome on chemical component of a vaccine that could inhibit the progression of deadly diseases. Haught struck the nail on its head in respect to religion. In his opinion, "religion has no special insights to dish out about particle physics or the genetic code. Its confirmation of science in no way involves any conflation or fusion with particular scientific hypotheses or theories" (Haught, 1995, pp. 21-25).

In the same vein, it is not possible for the scientist to invent meter for objectively measuring the standard at which telling lies becomes acceptable, say, in saving a life or determining the acceptability or otherwise of positions on many other issues in ethics. Human experience of the consciousness, powers, forces, or influence beyond the immediate level of experience, which is pronounced in some parts of the globe, notably Africa, is another case in point when considering methodological adequacy in science. Of note here is that no amount of voyage of doubt, like that of Descartes Mayer (1951, pp. 111-112), should make us consign such experience(s) as belonging to a category of phenomena that do not appropriately constitute part of or instances of human experience. Yet, they [still] remain impervious to the knowledge-unravelling power of science. The implication of this is that the very nature of science, as well as theology, imposes limits on what could be expected from the ingenuous activities geared towards unravelling reality in science and religion; both in epistemic and existential concerns. Sitting tight in their respective domains with no prospect of crossing each other's threshold only inspires abundant ignorance about vital aspects of human existence.

6. Mutual Implications

Scholars who advocate conflicting mode of relationship between religion and science cite the undeniable fact that the two frameworks are essentially different from each other, as good grounds for rejecting any rapprochement between religion and science. In fact, scholars who see the need for a sort of dialogue or integration Barbour (1998, pp. 90-103), contact or confirmation Haught (1995, pp. 17-25), constructive consonance Dress (2003, pp. 113-127), or hypothetical consonance Ted Peters (1998, pp. 18-19), and other positive mode of relationship between religion and science do agree that they are quite different. Dress, for instance, argued that religion and science differ in respect to intellectual standings, scope, achievements, explanatory functions and nature. Yet he went further to establish the need for humans to undertake a quest for consonance between the two frameworks. This could not be far-fetched from his perceptive insight into the inevitable mutual relationship between religion and science in terms of influence and implications of preoccupations in one on the other (Williams & Patterson, 1996, pp. 113-127).

Results of undertakings in science do have bearings on religion, and submissions in religions could elicit some reactions and even provoke further investigation in science. In the words of Meister, it is "apparent that the practice of science has, on occasion at least, implications for religious faith and religious belief isn't always devoid of scientific reasoning" (Meister, 2009, p. 3). Theories, for example, in science such as the big bang, anthropic coincidences, and evolution have implications for religious understanding of origin of the universe as well as its temporality, nature of the universe in terms of being [intelligently] designed, and questions of the direction of the universe in terms of purpose. Also, the search for (divine?) origin of religion has led neurologists to the reasonable adventure to find out whether the divine origin thesis is acceptable or scientific research could yield results of physical origin of religiosity in the human brain (Newberg & d'Aquili, 2008, p. 8). The true picture of religion and science is a symbiotic one, and where there is necessarily a symbiosis, it is difficult for one part to be completely enveloped and still upholds the needed integrity to effectively function within the whole system. The fact of mutual influence and implications necessitate the need for rapprochement between religion and science, as preoccupation in one can lead to a better and vast understanding of the other.

7. Complex Historical Relations

Not the least in areas of interdependence between religion and science is the fact of complex relationship between religion and science in human history. Quite contrary to what is assumed in the posture of conflict, the relationship between religion and science in human history has been a complex one; rather than one of conflict only. While it is the case that there were factual tensions in the relationship between the two as demonstrated in books by Draper (1875) and White (1896) it is also the case that the development of science took place almost exclusively within religious circles. The preservation of ancient scientific writings in monasteries at the dark period of Roman history and the accompanying decline in learning at the time, translations of pagan and Arabic scientific writings into Latin, and the Medievalist undeniable role as a hotbed of development of science, are cases that underscore positive relationship between religion and science at some points in history. Arguments for the significant contribution of the Medieval era to the rise of science were put forth by Barbour (1998, p. 4); Lindberg (2010b); McGrath (1999) among many others. An instance is Lindberg's submission that there were what one could refer to as cutting-edge-researches in the Medieval era which can be incorporated into the landmark achievements of the sixteenth and seventeenth centuries (Lindberg, 2010a, p. 31). Portraying this complexity, Lindberg concluded his evaluation of the relationship thus:

> *The first millennium and a half of the Christian era saw episodes of both opposition and acceptance between two powerful traditions, Christianity and the natural sciences, each with its history, institutions, intellectual or spiritual traditions, clientele and inclination to defend itself. On occasion they locked horns, attempting to occupy the same intellectual ground. But in the end, combatants (in most cases) preferred peace to warfare and found means of accommodation, compromise, satisfactory working arrangements and ultimately peaceful co-existence* (Lindberg, 2010a, p. 33).

All these are points to tell us that speaking about a relationship between religion and science is not out of place and an exercise in this direction is necessary in the human attempt to relate and understand with his/her immediate environment and the world at large.

8. Relevance of the Debate in Nigeria

Granted that human experiences are indicative of an inevitable need for construing religion and science as playing complementary roles in the life of humans as argued above, an important quest is to inquire into the degree of relevance of pursuing this debate in Religious Studies in Nigeria particularly, and perhaps other African countries in general. In other words, to what extent would it amount to an underachievement, if we do not pursue the religion-science debate vigorously?

A justification for pursuing the religion-science debate in Nigeria is that such exercise is capable of enabling us to review our religious heritage in view of expanding frontiers of human knowledge; particularly in the sciences. The successful mapping of the human genome Francis (1994) has opened vast possibilities in molecular biology raising questions, for example, about our role as human beings. When we tinker with the human gene as is done in procedures involved in cloning and regenerative medicine, the question that comes to the fore is, are we "playing God" or just performing our responsibilities as "created co-creators"? (Ted Peters, 1989, pp. 211-234). If indeed the Universe is expanding as a result of a Big Bang that occurred about 15 billion years ago, questions of the goal and direction in terms of purpose of such expansion need to be raised.

The concept of evolution raises many issues concerning the agency involved in the appearance of life on earth – Is the agent chance or an intelligent being? Is it just the case of a guided evolution by the theistic God using natural mechanisms? The gaps in the evolutionary ladder also expose evolutionists to criticism thereby begging for answers to fill the epistemic gaps. What about the implication of the physical conditions that appears to have been fine-tuned for the emergence of life on our earth? Even if answers to many or most questions are not yet forthcoming, that would not be a good reason to beg the questions or pretend as if findings in the sciences do not challenge our beliefs; Christian beliefs, or as if science has been able to effectively respond meaningfully to its inadequacies or to fundamental issues that are raised in religion.

Also important is that engaging in religion-science debate enables us to recognize that though they differ remarkably, rapprochement between the two models is still possible. It is such exercise that will lay bare to us the limitations of each framework and thereby rendering evident, where insights from one may become fruitful for understanding reality using the other. Instead of ground standing, religion and science should be engaged in dialogue to "form a continuum in which the insights, methods and discoveries of each can be shared fruitfully with the other, without threatening their separate foundations and central beliefs about the world" (Russell, nd).

Engaging in the dialogue in Nigeria will not only bring us at par with other Religious Studies scholars in other parts of the globe but will deepen our attempt at understanding religion in view of contending evidence(s). It is when this is done, and a realistic vision of religion emerges, which is not contradictory to established facts that we can claim to be constructively engaged with the religions and/or spiritual dimensions of living; a vision of religion that is continually evolving, and which seeks to maintain the integrity of faith in view of current knowledge, which would not necessitate that we drop our brains at the doorposts of religious worship centers whenever we need to practice religion.

9. To What Extent are We Involved?

Inferences from what is observable in some Departments of Religious Studies in Nigeria, and even in the society at large, are indicative that the debate on the relationship between religion and science is beginning to attract attention in the Nigerian society. Within religious circles, the awareness of the need for the dialogue can be inferred. This is why it is not surprising that the 2nd session of the Twelfth Synod of the Ijebu Anglican Diocese has as its theme: Science and God (Ijebu Anglican Diocese, 2011). The story is not different in the academia. There are seminars and conferences on the debate, formation of professional associations dedicated to this exercise, two of which are the Nigerian Association for the Study and Teaching of Religion and Natural Science (NASTRENS) and the Association for the Study of Interplay between Religion and Science (ASIRS), and scholarly publications in this promising field of intellectual engagement.

Modest efforts are made to teach the interplay of religion and science in some Departments of Religious Studies in Nigeria, while some, an instance of which is Olabisi Onabanjo University in Ogun State, actually offer the debate as an area of specialization Department of Religious Studies (2004) for students who are willing. Apart from this, courses in science and religion are offered at both undergraduate and postgraduate levels in the Department of Religions, University of Ilorin, Olabisi Onabanjo University, Lagos State University and University of Uyo, on the basis of which Raymond Ogunade, Theresa Asojo, M. A. Muhibbu-Din, Khalid Adekoya, and Waheed Azeez have all been awarded winners of the Centre for Theology and Natural Science (CTNS) for courses in religion and science (The Centre for Theology and the Natural Sciences, 2001, 2002). One could therefore be tempted to argue that religion-science dialogue is taking place in Nigeria. There is, however, a need for robust quantitative studies to provide adequate and reliable database on the level of inclusion of religion-science debates in curricula of Religious Studies in Universities in Nigeria, which can serve as good grounds for making informed generalizations and inferences in this respect.

While the realities about the debate in Nigeria pointed above are commendable, it should be noted, as rightly pointed out by Dopamu that the spate of development in this area is still very shaky and slow (Ade Dopamu, 2003, pp. xi − x). An indication of the insufficiency of commitments in this respect as noted above by Dopamu is that, there is no deliberate effort at the national level of policy formulation to ensure that religion-science debates forms one of the central themes of teaching and study of religion. This is indicated in the fact that the recent Benchmark Minimum Academic Standard released by the Nigerian National Universities Commission National Universities Commission (2007), did not include religion-science debate at all in the courses and course contents of Religious Studies' Departments. In situation such as this, handlers of the courses in Religious Studies may jettison its consideration, and where efforts are made, it may translate to making only passing remarks or peripheral considerations about the debate without conscious effort at engaging in the richness of this interdisciplinary approach to human understanding of religion and science dialogue. This clearly shows that religion and science debate is yet to be institutionalized as an area of study in the academic study of religion. Leaving

the teaching and learning of religion-science debate at the level of discretionary practice of academics and/or students is capable of mitigating against standards in handling the debate since there are no prescriptions by the regulating body which could guide handlers of the course. In fact, there could be hiccups in the departments which are offering the religion-science debate at discretional level when considering accreditation of courses by the National Universities Commission since the relations between religion and science was not covered in the benchmark document of the regulating body.

It needs to be stated that this is not an underachievement on the part of the regulatory body. The onus is on professional associations in Religious Studies in Nigeria to make case for the inclusion of religion and science debate in the academic benchmark for the teaching and study of religion. Academic bodies such as the Nigerian Association for the Study and Teaching of Religion and Natural Science (NASTRENS) and the Association for the Study of Interplay between Religion and Science (ASIRS) can also initiate procedures for providing benchmark for religion and science and submit same to the National Universities Commission for consideration. With such inclusion, standards would be set, and the religion-science debate would be institutionalized, like other areas of study in religion. It is when this is done that the appreciation of relevance of the interface between religion and science would be brought to the limelight.

10. Conclusion

In the foregoing, we have argued that the conflict posture between religion and science is inaccurate and premised on the mistaken idea that religion and science can be kept in their respective domains, without any disservice to human quests. In most cases, the limitations of one can spell great underachievement, thereby limiting our capacity to understand ourselves as humans, our conditions and experiences in the universe, as well as what we can understand about nature. It is in view of these that we discussed areas of human life where science and religion appear to be incapable of satisfying human needs without mutual interactions in terms of inputs from each other. While not exhaustive, the areas we explored are; human advancement, epistemic commitments, restrictive methodologies, areas of mutual

implications, and the complex nature of the history of religion and science itself. This paper reveals that there is need for a symbiotic relationship between religion and science although they differ remarkably in terms of goals and methods. While we briefly outline the relevance of pursuing interdisciplinary attitude to religion and science, we concluded that needed attention has not been devoted to the inclusion of the interplay between religion and science in Nigeria, particularly in the academic study of religion.

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Barriers to and Opportunities for the Provision and Dissemination of Information on Careers to Rural Secondary School Girls in Kenya

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Abstract

Girls in rural areas choose careers that are generally poorly paid because they are in keeping with the socio-cultural norms. Neither do they endeavor to break the glass ceiling that keeps them from promotions to policy decision making job positions in this country. The gender gap is still great in all levels of education in Kenya, with girls being disadvantaged. Adolescence pregnancies especially at the exit year of Form 4 are fifty to sixty percent. Girls especially in the rural areas need to be provided with career information as part of their secondary school education because most rural schools have no access to sources of career information. Therefore, their choice of careers is based on socio-cultural attitudes and socio-economic-status. The school is best placed to provide career information. This study explored barriers to and opportunities for provision and dissemination of career information to rural secondary school girls in Kenya. Specifically, the objectives of the study were: identify barriers to provision and dissemination of career information and to propose solutions to overcoming the barriers to provision and accessibility of information on careers. This study was done in private schools and public schools in Laikipia County. Quantitative and qualitative methods of research were applied. Samples of both Form 3 and 4 students answered the questionnaires. Career teachers also gave information. All teachers in charge of guidance and counseling department in schools responded to a semi structured interview. Government officers in charge of guidance and counseling units at the headquarters responded to a semi structured interview. This study offered insights into career guidance and counseling to teachers, parents, policy makers, publishers and other stakeholders in the education sector. It was found that there is need for career information for teachers, parents and students because the existing career program is inadequate for efficient dissemination of career information for the students to be able to make wise career decisions. It was recommended that all stakeholders should collaborate and work as a team for effective and efficient dissemination of career information to students.

1. Introduction

In Kenya, 51% of the population are women. Rural women account for 76% (17.442m) of all the women. (Kenya Demographics Profile, 2014). Sustainable development which the government strives to achieve can only be realized when girls and women, who form over half of the Kenyan population are facilitated to play their part in development as per their abilities and natural endowments and thus break the glass ceiling that keeps them from promotions to policy decision making job positions in this country. Women have been at the periphery in the decision-making process. To have progress in challenging areas, we need women in these positions. Generally, 1/5th of government positions were taken by women since 2006 against a target of 1/3rd (Rwenji, 2010).

Despite the government's commitment to Education for All (EFA), the gender gap is still great in all levels of education in Kenya, with girls being the disadvantaged. This is because of several reasons. One of them being drop-out rate due to adolescence pregnancies especially at the exit year of Form 4. Fifty to 60% of girls have their first child before the age of 20 (Njau and Wamahiu, 1995). Population Reference Bureau (2009) survey states that 28% of girls in sub Saharan Africa had given birth by age 18. It is the government's policy on education and training that equity issues such as equal opportunities for all, access, retention and completion should be ensured (MoEST, 2005). Career information guidance and counseling would play a role in keeping a girl focused on the career she is aiming for and other pursuits would take second seat especially if they threaten the achievement of her goal. This would result in reduction of drop-out rate. Secondly, career information would help the girl to understand what grade she should aim for and, therefore, her academic standards are bound to go higher. In this way, provision and access to career information would play a role in ensuring education for all by getting the girl to stay in school, by keeping her focused on a career and good grade which the career the girl has chosen demands. Chances are that the girl will not get pregnant and drop out. Results of a study by Lapan, Gysbers and Petroski (2001) aver that

career guidance may be Kenya's way of solving the problem of drop-out and poor performance among others for they state that "… the results do suggest that school counselors' implementation of comprehensive guidance and counseling programs can be a consistently positive piece of the puzzle that needs to be assembled if we are to make a genuine effort to help all our nation's children achieve academically and attain a desired future. Full implementation of such school counseling programs is a sustainable cost effective national strategy for assisting all students to feel safer and be more successful in school".

The Kenyan population comprises of 60% of those in the age group of 20years and below. (Government of Kenya, 1996). Most girls in secondary school are in this age group. It is a big percentage of Kenyans. This group should be guided by being provided with information for them to move from high school to higher education and finally to working life This is especially important because the world and careers change very fast. Girls should be provided with information to cope with this change. Salami, (2008) stated that most secondary school students are young and as such they may not see the need to take the matter of career decision making seriously. It is therefore important that secondary school girls are guided into making the right career choices. One of the sustainable development goals is gender equality and it is traceable to inadequate career education. Enhancing career education in rural high schools can bring about achievement of sustainable development.

1.1 Statement of the Problem

Girls in secondary schools in rural areas choose careers that are in keeping with the socio-cultural norms. The careers they choose are the culturally feminine careers such as teaching, nursing, secretarial, catering, hair dressing, law, commerce which are not as well paying as medicine, engineering and accountancy, which are culturally masculine (Obando, 2003; Osoro, Amundson and Borgen, 2000). Kenya is committed to ensure women participate in the economy. Providing career information to girls in high school would go a long way in facilitating girls to choose careers which are in tandem with their natural gifting.

Many Kenyans are in careers they do not like because they are out of sync with their

natural gifting (Senelwa, 2003; Sinha 2003; Kasomo 2007; Makabila 2007; Kirui 2007). This is because they lacked guidance in secondary school which is the bed rock of career choice. Being in such a job has led to frustration and low standard productivity and eventually poor self esteem. To ensure that this does not happen, counseling and guidance should be done in secondary school. Rural school girls ought to have provision of career information because such media as television, radio and newspapers are almost nonexistent. Libraries both school and public are poorly equipped. The culture that dictates that some careers are feminine and others masculine is strongest in Kenya's rural areas.

Most parents are peasant farmers and their level of education is low. The students therefore are largely influenced by their parents who are their role models. Generally, the level of education of the parents influences the level of education and career choice of children. Gitonga (2009) stated that studies have shown that parents have over 80% influence on careers chosen by their children. This is the case especially for the educated parents. Salami (2008), reported that in Nigeria, the traditional or cultural practice is that family or the parents or the elders know the best and as such family or the parents dictate the type of occupation that the children will choose regardless of the children's abilities and interests. This statement is true for parents in Kenya.

Girls also are less likely than boys to access information on careers because of parents' objections to their daughters going to the library, visiting relatives, friends, role models or organizations. Parents fear for their daughters' insecurity which would expose them to sexual harassment, incest, rape and other forms of violence. Parents might also fear to release their daughter to go to people and places seeking career information due to fear of losing her input in the household chores and the farm. The parents short term cost benefit analysis is certainly right (Bellamy, 2004; Rukwaro and Khayesi, 2004). The Children's Act (2002) provides for equal opportunities for boys and girls. Girls should therefore be given an equal opportunity to access career information.

Considering what has been discussed above, the study is undertaken to find out the

barriers to and opportunities for provision and dissemination of carrier information to rural secondary school girls in Kenya. Specifically, the study endeavored to:

- Identify barriers to provision and dissemination of career information.

- Propose solutions to overcoming the barriers to provision and access to career information.

1.2 Scope and Limitation of the Study

This study was done in private and public secondary schools in Laikipia County. It focuses on form 3 and 4 girls. The reason being that at this stage major decisions and reflections are made on careers and this translates later into gender inequality in favor of men. Girls have unique needs in terms of cultural orientation and this bars them from making choices that are in-keeping with their abilities.

2. Review of Related Literature

2.1 Sources of Career Information

Secondary school girls need a variety of information sources to access career information. Maddy-Bernstein, 2000 observed that comprehensive career development program should not be the total responsibility of the counsellor, in reality most of the school counsellors have limited time to be the sole providers of career assistance, given the number of students they must serve. Kirui, (2007) concurs and reiterates that career teachers are given equal duties with other teachers and are also called upon to be the discipline master/mistress.

In view of the above, Hughes and Karp, (2004) aver that in United States of America:

> *Guidance programmes are generally equipped with tools students can use on their own. The vast majority of schools' stock computerised and non-computerised career information sources and college catalogues, as well as conduct testing for career planning. The availability of computerised and non-computerized sources enhances and keeps students focused on career guidance and counselling.*

In China, the internet provides a window for Chinese to learn different perspectives on life and cultural values, which produce critical needs for a career guidance programme for the young generation to understand themselves and the world around them to fit in appropriately. (Zhang, Hu and Pope, 2002).

Literature on career information reveal it is possible to integrate career information with the subject teacher role. Methods can be devised where the career counsellor coordinates the subject teachers to fulfil many of the career education needs. (O'leary, 1990 as quoted by Oyaziwo, 2007). Students benefit from career guides which are issued at school and from advice by parents, relatives and friends (Kithyo and Petrina, 2005). Career guides from the MoE were the commonest sources of information. However, they are criticized by teachers as being outdated, lacking important current information and not regularly sent to schools (Osoro, Amundson & Borgen, 2000).

In towns, exhibitions by Universities and TIVETS are also important sources of career information (Makabila, 2007). Radio and the television are also important sources of career information (University of Manitoba: Student Affairs). Other sources of career information are:

- Daily newspapers which have information on jobs, their specific qualifications, duties, salary, allowances, among others. Colleges and Universities programs, their entry requirements and fee structure.

- Magazines – A few magazines are dedicated to a specific profession, for example, The Accountant. This magazine gives details to would be accountants on training opportunities and job opportunities among others.

- Government publications which emanate from various ministries. For example, The Ministry of Education (2007) Careers guide book for schools.

- Bulletins and catalogues on career entry requirements, institutions that offer the courses, duration of study and fee structure, among others. An example of this is university catalogues.

- Consultancies that advice secondary school students and learners on training opportunities.

Sources of career information are varied but it is possible that rural secondary school girls do not get access to most of them due to the price involved in accessing the information sources in terms of money, time and effort. Secondly, the information in the sources of information might not be very comprehensive. Tindi and Silsil, (2008) stressing on the dearth of career resources state, "this development, where the HoDs handling guidance and counseling were required in every school, a policy which came into force in 1999 has not been backed by corresponding training or provision of necessary reference materials … salient needs – reading books, experiential excursions, requisite training etc were passed on to the back burner."

2.2 Barriers to Career Information Provision and Access

The Ministry of Education (MoE) policy document points out that career guidance and counseling should be part of the Guidance and Counseling Support Services provided to learners. The MoE has periodically produced career books to support learners in the career development process (MoE, 2007). The MoE books do not offer guidelines of the programs that should be in all secondary schools as is done, for example, in United States of America where National Career Development Guidelines (NCDG) have been endorsed by several National Professional Associations and adopted in more than 46 states. These guidelines have provided states and schools with a solid foundation from which to develop their own career counseling program. Nigeria, according to Oyaziwo (2007), regards guidance and counseling service "as a fringe benefit instead of being directly linked with students learning". In agreement Salami (2008) discusses that there is a conspicuous lack of career education either at elementary or secondary school level. This omission of career education or career preparation limits the occupational experience of the youth. Related to this is that students rarely go on field trips for career exploration. There are no career conferences or observational learning which would expose students to different kinds of work and situations that could aid students in their choice of occupations. Rather choice of occupation is determined by students' best school subjects.

Career teachers in Kenya do not have the time or facilities to provide any career or psychological guidance to students. This is because career teachers have normal teaching loads. At times also, they are called upon to be discipline teachers. (Kithyo and Petrina, 2005; Kirui, 2007). Secondly, very few schools have career teachers and those that do have no training on career counseling. (Wango and Mungai, 2007; Lutomia and Sikolia, 2002).

Resources/tools that students can use to supplement what they get from the career teacher are inadequate. There are, may be, few booklets, newspapers, catalogues, or electronic information systems such as the internet (Rukwaro and Khayesi, 2004; Kirui, 2007; Kithiyo and Petrina, 2005). In United States of America, Hughes and Karp, 2004 aver that:

> *Guidance programs are generally equipped with tools students can use on their own. The vast majority of schools' stock computerized and non-computerized career information sources and college catalogues, as well as conduct testing for career planning.*

Gender issues affect girls when they are choosing careers. Some careers are seen as befitting girls and women. For example, girls choose commerce, law, catering, secretarial, hair dressing, teaching; but boys choose accountancy, engineering, medicine, motor vehicle mechanic, among others. In some cultures, the only career open to girls is marriage. (Assistant Secretary for Public Information – United Nations, 1995; Osoro, Amundson and Borgen, 2000; Mutie and Ndambuki, 1999; Bellamy, 2000; Obando, 2003; Kithyo,1999)

There is little coordination of all career education stakeholders – the MoE, teachers, parents, students, career consultancies, NGOs, publishers', industries and organisations. The career teacher is left to do his/her best, at times, all alone. Maddy-Bernstein (2000) observes:

> *Clearly the delivery of a comprehensive career development program in secondary schools should not and probably, cannot be the total responsibility of the counselor.*

Salami (2008) suggests that because the roles of parents are important in career decision making and development in the Nigerian society, the counselor should

mount workshops where the students and their parents could interact on matters regarding their career decision making difficulties and their influence on their different life stage tasks. Within such a forum, the students could be assisted in striking a balance between being dependent on and independent of their parents in matters dealing with careers and relationships.

Girls experience the problem of access of career information because parents do not allow them to go away from home because they fear for their security and, the loss of labour that a girl provides on the farm and house (Bellamy, 2000; Rukwaro and Khayesi, 2004). The parents themselves may not be knowledgeable on career trends. (Kithyo and Petrina 2005; Osoro, Amudson & Borgen, 2000). Other sources such as exhibitions that universities and TIVETs hold are only in towns. Effective role models also live and work in towns. 80% of Kenyan people reside in rural regions and therefore have no access.

It is clear from the literature review that there is little understanding in Kenya of what career guidance and counseling entails. This is evidenced by the fact that there is little written on it even by the Ministry of Education. Again, several NGOs are emerging to fill in the vacuum left by the MoE by advertising on mass media holiday motivational activities that will change students' academic grades, study habits, attitudes and understanding of themselves for the better. Gaps in training of career guidance and counseling teachers have been made evident through reviewed literature. The teachers are also overloaded and there are no rooms to conduct career guidance and counseling, which should be confidential. There are no enforced policies governing career guidance and counseling and the career teacher must use his/her ingenuity in the provision of career information to girls. Normally the career teacher has only one career guide book by the MoE to use as a resource text, and this is normally outdated.

2.3   Evaluation of Career Information Sources

It was found out that career information sources were few, not diverse and incomprehensive. The workload of the teachers was heavy making it hard for the teachers to meet students for career guidance. Guidance on careers is not time

tabled in the school. Therefore, teachers must make time to meet students when he/she is free. This makes it difficult for such meetings to take place. However, Hughes and Karp, (2004) said that in United States of America:

> *Guidance programmes are generally equipped with tools students can use on their own. The vast majority of schools stocked computerized and non-computerized career information sources and college catalogues, as well as conduct testing for career planning. The availability of computerized and non-computerized sources enhances and keeps students focused on career guidance and counseling.*

This is what Kenya should aspire towards for students to supplement the information they get from the career teacher with computerized and non-computerized career information sources, especially because electronic information has gained popularity among the youth and mobile phones are internet enabled and at affordable rates. Maddy – Bernstein, (2000) observed that comprehensive career development program should not be the total responsibility of the counselor, most of the school counselors have limited time to be the sole providers of career assistance, given the number of students they must serve.

Parents, too, need career information to guide their daughters appropriately for some students and career teachers felt that their guidance was not useful because they are not informed. In the United Kingdom, McNicol (2005) found that family especially parents and older siblings, were one of the most important reference points for students because they were trusted. However outside speakers were also highly regarded for their first-hand knowledge of working or educational environments. Students felt that hearing information from people was more interesting than reading a book or computer screen. The fact that students trust information and advice from parents and other relatives should be capitalized on. However, McNicol (2005) stated that the danger of such individuals giving ill informed or biased advice also needed to be avoided. This meant that providing appropriate information about career and education choices for parents was crucial.

Career information sources targeting students, career teachers and parents should be published and regularly updated to keep pace with the rapidly changing educational and job trends. In agreement with this, the MoE (2007) stated that: "there has been rapid expansion and diversification of training opportunities in Kenya. This is characterized by many upcoming education and training institutions and many programs in already existing institutions." It is therefore imperative that the MoE should publish annual career and institutional updates by commissioning authors to do this. Salami (2008), reported that in Nigeria, the traditional or cultural practice is that family or the parents or the elders know the best and as such family or the parents dictate the type of occupation that the children will choose regardless of the children's abilities and interests. This statement is true for parents in Kenya. Therefore, they should be equipped with career information to be able to effectively guide their children on career decision making. The study found that due to these rapid changes in the education system and global employment trends and opportunities, diverse and up to date information resources should be published through the MoE initiative to ensure that girls access quality and adequate career information.

Activities such as career tours and visits by professionals which would give girls a chance to understand the realities of various professions, the challenges and the social skills like emotional maturity, time management and confidence among others were found to be inadequate in this study. In their study Lugulu and Kipkoech (2011) found that these activities – career tours, career days and visits by professionals were mostly organized on yearly basis which was quite inadequate, and the researchers recommended that they should be organized more regularly. In this study girls gave this as one of the solutions to ensuring better provision of career information.

3. Responses in the Study

When girls themselves answered questions on barriers experienced in accessing information on careers, they responded in the following scale umber one (1) being highest cited hence most acute problem and number five (5) being least cited hence the lowest acute problem.

1) Unavailability of career education teacher

Contrary to the students' responses, 73% of the schools had a career guidance teacher.

All the schools except two had career teachers. However, the students felt that they lacked career guidance teachers because the career teacher hardly impacted on the students. Some met students in Form 2 third term when choosing/electing subjects and in Form 4 when the students filled in the university forms. The students' needs on subject combinations and clusters for various careers, what programs to pursue and sources of finances among others were left unattended throughout the student's life despite the school having a career teacher. The career teachers regarded career guidance as periphery duty to be done when and if there is time.

2) Lack of career activities

The main two activities that students were involved in were careers educational/ academic day/clinic for 70% of the students and professional speakers for 30% of the students. Students were not engaged in any other activity. The professional speakers' visits were irregular and infrequent. The students felt that what they were engaged in was hardly enough to help them in career decision making.

3) Unavailability and brochures on career education

Most of the schools, 78% had only one resource – Career Guidebook for Schools, 2007 given by the MoE. In all cases there was only one copy to be shared. Any other resource was the career teacher's personal books or newspapers. The students felt that there was a dire need of career guidance resources.

4) Rare guidance by the principal

The career guides' responses on how they involve the Principal in career guidance and counseling stated that for 64% of the career teacher, the Principal assists in management of career services and activities. This means that the Principal rarely was seen guiding and counseling students directly hence the response by students that the principal rarely guided them.

5) Lack of relating what is taught by subject teachers to careers

Students when asked how helpful subject teachers were to their understanding of careers, 51% stated that they were very helpful. Forty five percent stated that they were helpful and 4% stated that they were not helpful. Subject teachers should consciously and explicitly relate the subject(s) taught to careers.

Career guides when listing the problems encountered in Career education the following, challenges were cited. The Number one (1) was repeatedly cited as greatest challenge whereas number five (5) was rarest cited as the least challenge.

1) Inadequate and outdated Information

Most teachers responded that the resources were inadequate for the students needs, because they were few and not diverse. They also lack in subject depth. In most of the schools, they only had the Career Guidebook for Schools, 2007 from the MoE. Other resources were teachers' personal books and newspapers.

2) Inadequate time owing to teachers' crowded timetable and students' tight schedule

The career teachers had the regular teacher's workload and the added duty of career guidance. In many high schools, career education was not timetabled, therefore, teachers had to compete with other activities to meet the students for career guidance.

3) Inadequate funds to facilitate career guidance

Money is always an issue, and unless a need is prioritized, the money may not be available for it. Career guidance according to some teachers, is not taken seriously. Consequently, little or no funds are allocated for it.

4) Disinterest by teachers' in career education

Teachers are de-motivated due to lack of inadequate and outdated information, the heavy workload, lack of funds for career guidance services and activities. Career teachers also are not trained in career guidance and counseling even in the face of the rapid changes in education and employment trends. Consequently, the career teacher finds career guidance and counseling an uphill task.

5) Disinterest by learners in career education since they have a negative attitude that career education is useless to them being very poor academically

Career guidance in most schools consisted of meeting students during the academic/ educational days/clinics, choosing of subjects that would lead to a career and this done in Form 2 third term, filling in of university forms in Form 4 and occasional

professionals coming in to give a motivational talk. For most students, Form 4 examination is the terminal stage of their academic pursuits. However, career guidance points the way for those mainly going to university. There is also no mention of TIVETS. The career guidance offered in most schools does not address their needs at all hence the disinterest**.**

The above were quoted by national officer in charge of career education unit. She reported that there was lack of adequate information sources. She also added that career guides lacked skills in career education. Officers in the headquarters expressed need to reconsider career education in high schools to facilitate building infrastructure for effective operationalization of career guidance. The government officers responded that they have been involved in the writing of policy documents which impact on career guidance and counseling. Examples given of such documents are:

a) Government of Kenya, (1976) which encouraged the provision of vocational guidance and counseling to the youth to enhance decision making skills for smooth transition from school-to-work.

b) Government of Kenya, (1988) which recommended schools to establish guidance and counseling programs and senior teachers to be in charge. These programs, it was stated should assist pupils to appreciate their role as workers and to develop the right attitude towards discipline and management of time. It also recommended that guidance and counseling be decentralized to district levels.

c) Government of Kenya, (1999) stated that guidance and counseling remains a very weak component at all levels of education system. Even where it exists, it is undertaken in a haphazard manner because the teachers identified for this purpose have not been trained and so have no professional competence in guidance and counseling. In 2005, MoEST stated that students critically need career information and yet many teachers lack career guidance and counseling skills.

d) MoEST, (2005) recommended the development of career guidance booklet and training of teachers. This gave birth to MoE Career Guidebook for Schools, 2007. However, only about 6,000 guidance and counseling teachers have been

trained this far which is a small number compared to all schools in Kenya. (Siele and Wanja, 2009).

These policies, the government officers reported, do not seem to be well interpreted and implemented in schools. The problem, the government officers pointed out is that teachers are "only interested in making a mean grade." The District Quality Assurance Schools Officer (DQASO) also stated that teachers are appointed to be career teachers without considering whether they have a heart and qualities for career guiding and counseling. Some teachers also stated that they were unaware of the schools counseling unit in the headquarters. Those who were aware of it said they had only received the Career Guidebook for Schools 2007 and no other communication at all.

4. Envisaged Solutions to the Barriers above

Suggestions from respondents on access to career education fell into 2 broad categories: Students oftenly asked:

a) For sources of career information and activities:

i)   They asked for educational trips to corporations, firms and institutions.
ii)   Workshops, professional talks, seminars;
iii) Availing of room with career information sources;
iv)   Availing of a career information teacher specifically to guide and counsel them on this.
v)   The world wide web, among others.

b) Students stated the need for allocation of more time for career education and for time tabling of this time

The career guides responded to the challenges encountered in career education with the following solutions:

i)   The main solution to problems encountered in career information provision that was repeatedly given was that sources of information on careers such as world wide web, books that guide on careers should be availed by the ministry of education.
ii)   The second solution that most teachers repeatedly gave was that career

education ought to be time tabled.

iii) Thirdly, they pointed out that they were overloaded, and this should be reduced for them to be able to adequately give quality career education.

iv) Career teachers pointed out that they were de-motivated and suggested that provision of resources to effectively give career guidance and counseling. Provision of resources, allocation of career time in the timetable and consideration when being given the regular teachers timetable so that they are given time to do career guidance and counseling would motivate the career guide.

v) Increase of financial resources would facilitate career guides to organize activities, services etc for students.

vi) Career teachers felt that the involvement of all stakeholders in career guidance and counseling was needed.

vii) Progressive career guidance from nursery to university would facilitate discovery of student's abilities, talents and weaknesses throughout the education radar.

National officers at the headquarters concurred that in deed career education should start from primary to university progressively. Secondly, they suggested that peer education counselors should be recruited thus easing career education workload. Career guides skills should be enhanced by further training so that they get an extra level of capacity building and empowerment from what they got in career education in their college and university education. Sources of career information such as brochures, flyers among others should be written to complement what already exists. Government officer in the national headquarters stated that there should be workshops to communicate, interpret and operationalize government policies. In this way ministry of education headquarters and teachers would be working tandem rather than the stand alone working system of the MoE on one hand and the career teachers in schools on the other, which has led to breakdown of communication.

5. Conclusion

Career information made available to students was reported as adequate to assist them in choosing a good course or career; yet the students stated that the information

was not comprehensive and specific; and the resources were few and out of date. They went on to say that professionals were not invited to speak to them and the career education is not timetabled. The researcher concluded that in the absence of adequate career resources and activities, the girls could not possibly be having adequate career information. This contradiction is even made more glaring by their choice to go on to university for 87% of the girls and further choosing courses which require high grades for admission. In Kenya, only 50% of students make it to university (Amundson, Osoro & Borgen, 2000). Career information provision is perceived by teachers, students and government officers as very vital in the success of students for it helps them to get focused, work hard and understand the careers they would like to join. However, career information provision is not well provided because the students seemed to rely on career teachers, newspapers, magazines, brochures, professionals in that field, parents' relatives and friends. These resources were described by career teachers, students and government officers as inadequate. It was concluded that provision of career information to secondary school girls needs to be strategically reorganized in order for girls to have their career information needs met.

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Parental Styles and Teenage Pregnancy

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Abstract

Statistics in Kenya show an increasing sexual activity among teenage girls. The age at which girls are becoming sexually active continues to come down as time goes. One consequence of this activity is teenage pregnancy, which has without doubt been blamed for the rising number of abortions, psychological trauma and related consequences among young women in Kenya. As everyone seems to be puzzled by the turn of events a question arises whether there are any chances that these teenagers will delay sex, pregnancy, and parenthood up to a time when they can make right choices. The Christian parent is faced with the task of formulating a workable plan to reverse this tragedy that has hit Kenya and seemingly the world at large. Programs designed to prevent teen pregnancy are increasingly recognizing the value of involving parents. This is partly because of the great influence that parents have on their children and since teenage girls need a lot of help from adults to become mature and be independent while keeping the right morals. For many parents to know that they still matter to their children may be good news, quite welcome and a reason not to give up on their teenagers. Even though the parents are influential, they still need guidance on how to use their influence in meaningful ways so that it gains the required result in the lives of the growing teenage girls. This paper seeks to describe the different parenting styles for teenagers, find out how Christian parents have failed in their responsibility to teenage girls in the past leading to increased teenage pregnancies .The paper also aims to find out what Christian parents can do in response to the challenge of teenage pregnancies facing Kenyans young girls in an effort therefore reduce the ever increasing cases of teenage pregnancies in Kenya.

Keywords: *Christian Parents, Parental Styles, Teenage Girls, Teenage Pregnancies in Kenya.*

1. Introduction

1.1 Parenting Styles

According to a research done in America, parents contribute on average 47% of

influence in making decisions about sex, peers about 18% and the much talked about media about 3% of the same (Rice, 1998, p. 69). This study has shown that throughout adolescence, young people (and therefore girls as well) continue to look upon their parents for guidance on sexual and moral issues. In Kenya where most teenagers have limited access to media especially the internet, parental influence is expected to be much higher. The parenting styles used with respect to teenagers my increase or decrease the influence of a parent to decisions about sex that a teenager makes. It is therefore important that the various parenting styles, their strengths and weaknesses be known as an attempt is made to know the link between teenage pregnancies and parenting. Santrock (2005, p. 318), identified four parenting styles that are associated with different aspects of teenagers' behaviour: authoritarian, authoritative, neglectful and indulgent.

1.2 Authoritarian Parenting

Authoritarian parenting is a restrictive, punitive style in which parents force the teenagers to follow specific directions and directives they set for them. The authoritarian parent places limits and controls on the teenager and allows little dialogue. The teenagers whose parents are authoritarian are often anxious, slow to initiate any activity on their own as well as have poor communication skills. This parenting style is associated with teenagers' socially incompetent behaviour.

1.3 Authoritative Parenting

Authoritative parenting encourages teenagers to be independent but still places limits on their actions. Extensive dialogue is allowed, and parents are warm towards their teenagers. The authoritative parents correct their teenagers with love and talk with them about how they could avoid mistakes in future. Unlike the authoritarian style, this parenting style is associated with teenagers' socially competent behaviour. The teenagers of authoritative parents are therefore self-reliant and socially responsible. They can be trusted to make sound decisions when confronted with situations that demand so.

1.4 Neglectful Parenting

Neglectful parenting is a style in which parents are to a large extend uninvolved in their teenagers' lives. The neglectful parents are not concerned with the decisions that their teenagers make. The teenagers of neglectful parents are likely to have socially incompetent behaviour especially lack of self-control. The same teenagers do not handle independence well. Neglectful parents are also linked to lack of parental monitoring. Jacobson and Crockett (2000, p. 82), link parental monitoring with lower sexual activity, higher grades and less depression in teenagers. Teenagers of neglectful parents are expected to be more sexually active, obtain lower grades and have higher levels of depression.

1.5 Indulgent Parenting

Indulgent parenting on the other hand is a style in which parents are highly involved with their teenager but place few demands or controls on them. The teenagers can do what they want, and the result is that they never learn to control their behaviour. Some parents who rear their teenagers in this way do so because they mistakenly believe that their being warm to them with few restraints will produce a confident teenager. On the contrary, indulgent parenting is associated with producing teenagers who are socially incompetent, not able to follow any rules and regulations. It is shocking to hear the blame of such a situation being turned from one person to another with no one being ready to accept responsibility. Parents would occasionally blame the media and peer pressure for the decisions that their teens make pertaining to sexual behaviour.

2. Parental Contribution to Teenage Pregnancy

There has been evident neglect on the side of Christian parent towards their teenage daughters. A critical observation of the role of Christian parents to their children would expose some of these failures that have cost the teenage girls physical, emotional and spiritual losses.

2.1 Lack of Information on Sex

It is true that all parents carry great fears about their children's sexuality. Sex

is a mystery which is surrounded by many questions in the minds of a growing teenager. Many of these teenagers want answers to their questions but receive mixed responses from the society (Dobson, 1978, p. 80). The responsibility of bringing up children in a godly way and answering these questions first rests on the parents. It is the duty of every good Christian parent to let their children learn about sex and not just discover about it. Many parents pretend that sex issue never existed and simply decide to keep quiet on it. Others merely refer to sex talk as bad manners. Parents are very keen in informing their children about good use of facilities like gas in the house, electricity, refrigerators and other things that the parents consider could put their children in danger. Information about sex which could be a matter of life and death is in most cases ignored. The consequence of lack of this information, especially to the teenage girls has been very detrimental, often resulting to unexpected pregnancies that come as a shock to many parents. Many naïve teenage girls who have become pregnant in this manner confess that they did not expect it to happen.

2.2 Stress Leading to Early Maturity

Scientists have shown exposure of young girls to stress can trigger early maturity in them. The younger a girl is when she reaches puberty, the higher the likelihood that she will experience depression, breast cancer, take to drugs or risky sexual behaviour, or suffer teenage pregnancies (Obbo 2007). Girls who experience a lot of family stress perhaps from drunken father who returns in the night and does not pay rent on time, will mature faster than their counterparts who do not experience such stress. "If a girl grows in a tough environment and, therefore senses that the future will be tough, her body adopts an accelerated reproductive strategy which in our ordinary world is like buying insurance," (ibid). This may therefore include early arrival of puberty, menarche as well as early pregnancy. By early maturity, maybe she hopes to become pregnant, and get the father of the child to give her support she does not have at home. The hormones in the body of a girl who is born in a caring environment, on the other hand, gets the signal that it can afford to wait, finish schooling and not get pregnant early. This, it does due to the support at home and therefore matures much later. Parents who do not create an environment which is conducive for their daughters may unknowingly be contributing to their involving

in sexual activity and consequently unwanted pregnancy.

2.3 Absence of Role Models

Christian parents are expected to be good role models. It is known that human beings learn more from seeing than from hearing. Teenagers need to see their parents read the bible for what it is worth, live by God's rules, love unconditionally, forgive genuinely, exercise faith unsparingly and solve whatever problems they may have biblically (Fryling & Robert, 1991, p. 116). The examples of the parents will stir up a teenage girl to live for God more than mere verbal instructions and admonition. The scripture admonishes all Christians to be the light of this world. Consequently, "each parent is a model that her children can pattern themselves after," (Munyere, 2006, p. 23). This implies that the Christian parents of today have an obligation to be good examples to their teenage girls.

Ashley (2007, p. 24), observe that, a teenage girl who grows up seeing abuse, hatred between parents, unforgiveness and lack of moral principles may end up not seeing anything worth emulating or listening to from her parents. The consequences to a teenage girl who is surrounded by numerous pulls such as her peers, media and body changes can be disastrous. It is therefore easy that teenage girls who lack role models at home and fail to get other strong complimenting model figures may find themselves trapped in the snare of teenage pregnancy. This can be attributed to lack of a role model at home which places the teenager prey for any group seemingly offering any form of enviable lifestyle.

2.4 Failure to Talk to The Boys

The thousands of teenage girls who get pregnant each year in Kenya do it in partnership. Boys and young men are involved. A common mistake that parents make is to totally blame the teenage girl while leaving the boy responsible for the pregnancy feel like a hero. It seems to be a bigger problem than many can see since teachers and other authorities seem to have come to terms with the same. It has been a common phenomenon in Kenya that the girls who get pregnant while at school quit learning but the boys responsible remain in class and continue teasing and abusing other young girls. According to a research done in Kenya it was concluded that "Most parents don't talk about sex to their boys" (Gichanu, 2006). Talking merely

to girls about consequences of premarital sex, responsibility, love and other virtues is a job half done. Christian parents who neglect their boys are not only doing a disservice to their sons but also to other people's daughters.

2.5 Parent –Teenager Conflict

A common belief is that there is a huge gulf that separates parents and teenagers that many scholars refer to as generation gap. This is said to be a time when the values of the teenager become increasingly distant from those of the parents. With respect to objectives of living, this generation gap is mainly a stereotype (Santrock, 2005, p. 322). Most adolescents share similar beliefs about the value of hard work, achievement and career aspirations. This does not mean that there does not exist any conflict between parents and their teens. Most of the conflict that exists involves the everyday events of life such as dressing neatly, keeping a bed room clean and so on. Many parents base their argument on these unavoidable strains to neglect their teenage daughters. They often brand their daughters as rebellious. A teenage girl who is continuously called rebellious is more likely to become sexually active at an earlier age that one whose parents understand. Parents who do not understand that the source of conflict with their teenagers is not based on many occasions upon moral values may end up destroying teenage girls instead of correcting them in wisdom when they error.

3. Parental Contributions to Preventing Teenage Pregnancies

According to Isoka (1999, p. 18) Christian parents should realize that they have a great responsibility their teenagers. The simple escape root of imagining that somebody else would take the responsibility has proven futile. It is time parents took up their responsibility to bridge the gap that exists between them and their teenagers. Many scholars support simple common-sense ways to help teens delay becoming sexually active.

3.1 Parental Supervision

Christian parents should strive to establish rules, curfews, and standards of expected behaviour, preferably through an open process of family discussion and respectful communication for their teenagers. If children get out of school at 3 pm and the parents don't get home from work until 6 pm, it would be wise to know the one

responsible for making certain that they are not only safe during those hours, but also are engaged in useful activities. Supervising and monitoring one's teenagers' whereabouts appropriately is important for a parent. One suggested way of supervising teenagers is by being aware of the friends they have and keep since friends have a strong influence on each other. Christian parents should help their children and teenagers become friends with kids whose families share Christian values. Parents of teens can even arrange to meet with the parents of their children's friends to establish common rules and expectations. It is easier to enforce a curfew that one's teenager and his friends share rather than one that makes him or her different. Wise parents can also welcome friends of their teenagers into their home and talk to them openly. This would all ensure that to the best of the parents' knowledge, they can reduce the influence that comes from bad company thereby reducing the chances of teenage pregnancies.

3.2 Knowing More About Teenagers

It is indeed very important that Christian parents recognize that their children go through the two important transitions of life. Brubaker and Robert (1981, p. 59), cites these transitions as ones from childhood activities to adolescence and from adolescence to adulthood. Collins (1988, p. 167) suggests three overlapping periods of adolescence: spans early, middle, and late adolescence. The first two tend to be within the ages of from eleven to eighteen years while the late adolescence is between eighteen to early twenties. This could make the Christian parents of today to understand their teenagers are indeed in adolescence which is characterized by rapid changes in the body, establishing independence, achieving a sense of self identity and generally asserting oneself. Collins comments on this important area that all parents ought to know that:

> *"...adolescents are going through a significant change period, characterised first by the need to adjust to a variety of physical changes, second by the influence of great social pressures, and third by the challenge of making life determining decisions about values, beliefs, careers, lifestyles, and relationships with others, including those of the opposite sex,"* (Collins, 1988, p. 167).

Ultimately, "Research has repeatedly shown the strong correlation between healthy family ties and positive social behaviour in teenagers," (Devries, 1994, p. 80). This may partly be attributed to the fact that, "the bridge to adulthood is a relational bridge and teenagers need parents and other adults to help them cross well," (Rice 1987, 85). It is therefore the responsibility of Christian parents to learn as much as they can about their teenagers. This will help them understand them and treat them as they ought. Consequently, as well, the complications that come in a family due to misunderstanding of teenage girls will be reduced. When girls listen to their parents who understand them, feel appreciated by them, the chances are that this will reduce teenage pregnancies.

3.3 Knowing What Children Read, Listen to and Watch

The media which include television, radio, movies, music videos, magazines, the Internet are chock full of material sending the wrong messages to our teenagers. In most media stations, Sex is casual, unplanned pregnancy seldom happens, and few people having sex ever seem to be married or even committed to anyone. The question that arises here is whether this is consistent with the expectations and values of any Christian parent. If not, it is important that a parent talks with their children about what the media portray and ask for their opinion about it. Programs or movies that offend a parent should be made known to the children and an explanation given as to why the parents do not feel comfortable with them. Christian parents should strive as much as possible to be aware of "media literate". This will help them to think about what they and their families are watching and reading. They should also encourage their kids to think critically by asking them to ask them what they think about the programs they watch and the music they listen to. "Parents can always turn the TV off, cancel subscriptions, and place certain movies off limits," (Troccoli, 2006, p. 25). It may not be possible to fully control what children see and hear, but Christian parents and indeed all parents can certainly make their views known and control the own home environment while encouraging the kids to be responsible in choosing what they see or watch out of the supervision of the parents.

3.4 Parental Counselling

Peter Kariuki Njoroge in his book Kariuki (1981, p. 71), affirms that Kids and more so teenagers have lots of questions about sex, and they often say that the source they would most like to go to for answers is their parents. Good Christian parents should take the initiative to start the conversation, and make sure that it is honest, open, and respectful. It is hard to think of how to start the discussion, bearing in mind that talking about sex is a taboo in most African communities, Kenya not being exempt. A parent may consider using situations shown on television or in movies as conversation starters. In such a situation, a parent may start off by telling a teenager candidly and confidently what he thinks and why he takes these positions. Occasionally there are situations or issues that the parent may not be sure about. A good Christian parent should be careful not to just dismiss them or approve them, instead he should be open to learn as well as do research about them. Above all, parents should endeavour to have a two-way conversation and not a one-way lecture. Asking teenagers what they think and what they know can help parents to correct misconceptions.

Age-appropriate conversations about relationships and intimacy should begin early in a child's life and continue through adolescence. As Karen Troccoli (2006, p. 24), suggests, parents should resist the idea that there should be just one conversation about all this - you know, "the talk." Parents and kids should be talking about sex and love openly all along. This should apply to sons and daughters, mothers and fathers. All kids need a lot of communication, guidance, and information about these issues, even if they sometimes don't appear to be interested in what parents have to say. One advantage of having regular conversations is that parents do not worry so much about making a mistake or saying something not quite right, because they will always be able to talk again.

Teenagers need as much help in understanding the meaning of sex as they do in understanding how all the body parts work. For any willing Christian parent, apart from the bible, there are many inexpensive books and videos available to help with any detailed information they might need. Nevertheless, lack of technical information should not make a parent shy. Often teenagers will confuse love and sex. Telling

them about the two, and what the difference is could help. On the other hand, one should always remember to talk about the reasons that kids find sex interesting and enticing. When a parent discusses only the 'horror' of unplanned pregnancy and disease he misses many of the issues on teenagers' minds. Teenagers should as well grow expecting after having lived well to enjoy the gift of sex the right time in marriage.

3.5 Helping Create a Bright Future for the Teenagers

According to the National Campaign to Prevent Teen Pregnancy statistics show that the chances that teenagers will delay sex, pregnancy, and parenthood are significantly increased if their futures appear bright (Troccoli, 2006, p. 22). This means helping them set meaningful goals for the future, talking to them about what it takes to make future come true, and helping them reach their goals. A parent can for example tell a teenager that if they want to be a teacher, they will need to stay in school to earn a degree and pass certain exams. It also means teaching them to use their free time in a constructive way, such as setting aside certain times to complete homework assignments. Parents should explain how becoming pregnant-or causing pregnancy-can derail the best of plans. A simple illustration could be how child care expenses can make it almost impossible to afford fees for higher education. All in all, the point is that creating an impression of a bright future that can help reduce teenage pregnancies.

3.6 Clarity on Sexual Values

Parents who communicate with their children about sex, love, and relationships are often more successful because they are certain in their own mind about these issues. To help clarify the parent's attitudes and values, it is appropriate that the parents come out clearly on what they think about teenagers being sexually active. Since many young men imagine it is the responsibly of girls to say no to any sexual advances, issues such as who is to be responsible for setting sexual limits should be discussed early in advance by the parents. It is the duty of Christian parents as well to speak what they feel about the use of contraceptives. Sometimes it may help if parents would come out clearly to admit that as teenagers they went through similar circumstances that their daughters go through. A discussion on how some of these

things were handled could be of help. Above all, it is very important that parents express Christian virtues as those that require abstinence not for the simple reason of preventing unwanted pregnancies but for the very central reason for which all live people- to please God. On the overall, "parents should work closely with pastors of their teenagers," (Warren 1987, 87). Such a link would establish what morals the pastors have taught in their lessons therefore ensuring that the teenager gets the right message without parents assuming the pastor has done it.

4. Conclusion

While many people believe there is no such thing as excellent parenting, authoritative parenting is likely the most effective style. This is because it establishes an appropriate balance between control and autonomy, giving teenage girls opportunities to develop independence. It also allows teenagers to express their views. This type of environment is likely to help teenagers delay the onset of sexual activity. Today's Christian parent should seek to express love and affection to their teenage girls. Telling them that they matter and praising their accomplishments should be done on all possible occasions. On the same note they should seek to spend time with them so that they share experiences and help the growing teenage girl. On all occasions, listening is a skill that all parents should develop and cultivate in themselves. Being supportive and interested in what interests' teenage girls would open them to discussions about sex. Courtesy and respect to teenage girls and their friends by parents is normally reciprocated. Parent – teen relationships that are warm and in tone, firm in discipline, and rich in communication are likely to bear much fruit in the fight against teen pregnancies. These close relationships should be built from an early age and not during teenage years. In this relationship, a parent should seek to listen carefully to the teenager, be a good role model, talk together to establish family rules and be good counsellors. This if implemented can reduce teenage pregnancies in Kenya.

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Assessing the Effect of Air Pollution and Heat Stress on Health in Nairobi City: A Geohealth Project (Kenya)

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Abstract

The environmental and occupational burden of disease is ravaging the global economies, with the combined burden of disease and DALYs constituting at least 25%. This has reached alarming levels in developing countries, with over 60% of this burden borne by the Sub-Saharan Africa. To partly address these concerns, the Global Environmental and occupational health (GEOHealth) Eastern African Hub has been established. The five-year research, training and capacity building Hub runs from Sept 2015 till August 2020, with an aim of building capacity, training and conducting research to generate evidence for policy in air pollution, climate change and occupational health. The specific objectives are to: (i) assess the effect of ambient air pollution on cause-specific hospitalization and mortality; (ii) assess the effect of ambient and indoor air quality on child pulmonary function in Nairobi; and (iii) to assess the effect of heat stress on workers engaged in flower green houses in the neighbourhoods of Nairobi city. Multiple study designs will be used to meet the above objectives of the Nairobi based research as follows: (i) continuous measurement of the level of ambient air pollution ($PM_{2.5}$) prospectively in a central site in the city in parallel with collecting secondary data on hospital admission and discharge in 6 hospitals; (ii) nephelometric measurement of micro-catchment air pollution around 10 schools, to be related to the spirometry tests of one thousand 10 year old pupils; and temperature and Relative humidity measurements to determine heat stress in occupational settings. Data will be collected using different equipment such as: air quality measuring instruments (Beta Attenuation Monitor and Nephelometer); Spirometer for pulmonary function test (PFT); and Easy Log RH / Temp Data loggers for Occupational Health stress. In addition, questionnaires will be used for background data, and data acquisition checklist for secondary data. Data will be entered and cleaned using Epi Info Ver 3.5.1, and the analysis done using SPSS V 20.0. Summary statistics, multivariate regression using Ors with 95% CI, exposure modelling will be utilized to describe the study subjects and exposure levels to air pollution. The Hub activities in Kenya are already ongoing, with progress made in many fronts. Ethical clearance and permission for data collection will be

1. Introduction: About GEOHealth

The Global Environmental and Occupational Health (GEOHealth) project is global network, with a local East Africa HUB (chapter), and is expected to be operational for 5 years, effective October 2015. The focus of the network is collaborative regional capacity building / training, research, and policy and institutional development in climate change for health, air pollution (indoor and outdoor), and occupational health. It's led by the universities, but draw a wide range of stakeholders from government, NGOs, CBOs, multi-lateral agencies, research bodies and policy institutions so that there is relevant research and appropriate training whose products are directly consumable by the participating organizations. So far twelve universities (two from Kenya, one from Uganda, 4 from USA and 5 from Ethiopia) are involved, with 2 primary institutions being University of Southern California (USC) and Addis Ababa University (AAU). Kenya is represented by University of Kabianga (UoK) and Great Lakes University of Kisumu (GLUK).

The GEOHealth program supports paired consortium led by a Low middle-income country institution (LMIC) and a U.S. institution to plan research, research training and curriculum development activities that address and inform priority national and regional environmental and occupational health policy issues. A GEOHealth hub for Eastern Africa was proposed since 2012 when it competed and won a planning grant for its established. This was under the auspices of the AAU and USC in 2012. Since 2013, the effort was made to initially spread the network to other Eastern African countries such as Kenya, Rwanda, and Uganda. It was expected that in the future, more countries will be included to cover the entire eastern Africa region, including Burundi, Somali and Tanzania. The choice of East African Region was because it was facing multiple challenges, including: Malnutrition, Poverty, Infectious, diseases and threat of non-communicable diseases (NCDs) emerging. The Burden of disease from environmental and occupational hazards is a growing concern. In addition,

there is lack of data and limited human capacity in key areas, justifying a need for a comprehensive systematic review and strategic action. The GOEHealth Eastern Africa Hub thematic areas for the Hub are: (i) Occupational Safety and Health; (ii) Climate Change for health; and (iii) Air Pollution (indoor and outdoor). These are to be assessed and strengthened in terms of collaborating training, research, policy advocacy and institutional development through a full HUB expected to run for 5 years. Collaborating research is expected to generate actionable policy from the empirical research evidence. However, before the Full hub establishment in 2015, there were planning activities in the region between 2012 and 2015, which culminated in the publishing of situational analysis and needs assessment (SANA) report from each of the four countries. Kenya published its SANA report, with key findings highlighted below.

2. The Kenya SANA (2012-2015)

The country specific situation analysis and needs assessments were done in all four countries between 2-12 and 2014, with the results shared in a workshop in Addis Ababa, Ethiopia. The SANA Kenya found serious training, institutional, research and policy gaps in universities, research, policy institutions especially in their dealings with occupational health, indoor air pollution, outdoor air pollution and climate change for health. After signing the MOU, letter of commitment and willingness to support the HUB activities were written by the agencies, after which the team expanded to cover the themes, and plan of action developed. The SANA report was finalized and submitted in August 2014 and published in 2015.

2.1. Key Highlights of the Results of the Kenya SANA

I. Courses and research in all the four themes are conducted by Universities, private and public institutions of higher learning;

II. Most courses are repeated with none standing out to deliberately help break from the past; most are generic, with newly established universities literally carrying some of the curricular of their mother / mentoring institutions to start them off; they wake up a few years later to start their own.

III. It takes new universities up to 2-4 years before they fully embark on establishing their own new independent programs aiming at creating a niche.

This includes the period they are university colleges, to post charter issue.

IV.   Courses are chosen and done for prestige, employment and peer / societal pressure, and not necessarily to make a change or out of passion. As a result, only very few progress in work and research in their line of training. Due to availability of bank clerical jobs, it has become one major outlet for fresh environmental graduates. This leaves the areas with limited number of capable professionals to push the agenda forward.

V.   Researchers are done in a wide range of thematic areas, but are, like the training/ education, rather generic. There are repeats and inconsistencies, resulting largely from lack of reliable database to guide any new upcoming researchers to avoid repeats, and acknowledge past relevant researches.

VI.   For the climate change, indoor and outdoor air pollution, occupational health, there is hardly any data to rely on. There is a conspicuous lack of capacity in terms of human and physical (infrastructural and equipment); It's even worse when the dimension of establishing a link with health is concerned, because of lack of basic technical data. Most researches have gone for the KAP about climate change, which are largely subjective and based on own feeling of comfort or otherwise at the time.

VII. Most local researches never have a use / life beyond the thesis defence stage and graduation of the researcher with a MSc or PhD degree. A small percentage of the research theses are only available in the parent universities and research institutions and only a few universities avail a limited amount of the content (abstract) online. The body largely remains available to only those who can get physical access. Because of local long protocol to access the documents in the reserved section of the libraries, they largely remain unused and un-cited in published literature. As such they literally rot and collect dust. For the less than 1% published, its done on the average 5-15 years after the graduation, rendering the age of the key references to be at least 10 years at the time of publication. This makes the publication data near stale, and not useful in policy.

VIII. Due to both the weaknesses of the research and data thereof, it has been difficult to generate policy from independent local research. Most policies are generated from international research, or those funded by international and foreign bodies. At least 90% of the policies are not home-grown. This renders one-off researches rather tricky, because they hardly leave any data

behind for local use. As such, there are serious 'research study gaps' on the thematic areas.

IX. Because most policies originate from outside the region, their local implementation is not easy, resulting in much policy implementation gaps.

X. It's rather difficult to both write a new curriculum and change the structure of an existing university curriculum in large, established public universities; it's much easier in smaller universities. However, even in the latter, there are key capacity gaps in specialised areas.

XI. Due to this advantage, the small institutions are taking lead in diversifying their programs by creating new ones and / or reviewing the existing ones for the current and proposed programs;

XII. There are many policies on the four thematic areas already developed by the government of Kenya in collaboration with line ministries.

XIII. In the Kenyan cities, both indoor and outdoor air pollution are beyond the threshold, rendering them key sources of exposure to city dwellers and the household members.

XIV. The outdoor exposure is closely associated with occupation (e.g. traffic police, outdoor service providers such as hawkers and small traders, etc) while the indoor exposure is faced more by smaller children, women etc in rural households in hot seasons, while both rural and urban residents in informal settlements face the wrath of indoor air pollution especially in June-August when they use a wood fuel means to warm the houses.

XV. Whereas studies have been done in all the thematic areas, very few scientifically consistently link them to health, unless they are social (KAP) studies which largely assess perceptions, rendering them rather subjective.

The Eastern African GEOHealth Hub submitted its grant application in late 2014 and won in Sept 2015. This SANA gave rise to the current study in the Hub. Since Oct 2015, a series of administrative and capacity building activities have taken place to actualize the hub. The offices have been established in all the four countries.

3. The current Geohealth hub studies 2016-2020

3.1. Introduction

Many African economies have been traditionally heavily dependent on Agriculture. However, in the last two decades, the African countries significantly shifted to industrialization and urbanization. In Kenya, this is enshrined in the constitution 2010 and Vision 2030. As such, with flagship projects to help it achieve the targets, Kenya, has made great effort to overcome the low economic growth experienced after the post-election violence in 2007/8 period. Believing that the economy growth is sustainable if it maintains our environment clean and safe, the various policy documents have mainstreamed environmental quality as a right. However, development and improved living conditions are expected to produce pollutants which are hazardous to human health and the environment. The greatest burden of diseases in Kenya are already attributed to environmental and occupational burdens associated with air and water pollution, occupational hazards, pesticides, and attributes of climate changes. However, there is insufficient reliable data to help plan the future, rendering environmental and occupational hazards the greatest possible danger to human health in the country as urbanization and industrialization continue. It's evident a paradigm shift is inevitable, as Kenya grapples with the increasing burden associated with non-communicable conditions. Given this growing concern, there is a need to generate scientific evidence that relates environmental issues with health outcome. This is the essence of the GEOHealth Kenya research.

Purpose of the project is to assess the effect of exposure to air pollution on children's health and daily mortality/morbidity; and effect of heat stress on worker's health. The GEOHealth Research Project involves three main themes.

Theme 1: Children's' health study (CHS) related to exposure to ambient air pollution
Theme 2: Daily Hospital based Morbidity and Mortality related to exposure to ambient air pollution
Theme 3: Heat stress among green house workers

3.2. The specific objectives under each theme are indicated as follows.

1. Children's health study: to determine the chronic effects of ambient $PM_{2.5}$ and black carbon on childhood lung function and respiratory symptoms in Nairobi

1.1 To measure and define temporal and spatial variation in outdoor and indoor levels of $PM_{2.5}$ and black carbon in Nairobi

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1.2 To characterize household level exposure $PM_{2.5}$ and black carbon

1.3 To determine the chronic effects of ambient $PM_{2.5}$ and black carbon on childhood lung function and respiratory symptoms in Nairobi

2. Study on daily morbidity and mortality: To assess and compare the short-term effects of temporal fluctuations in ambient PM2.5 on overall and cause-specific hospitalization and mortality in Nairobi

2.1 To measure daily levels of ambient PM2.5

2.2 To ascertain overall and cause-specific hospitalization and mortality

3 Heat stress among workers: to determine the levels of current occupational heat stress among workers in key industries (e.g., flower greenhouses) and to examine the validity of models to predict future heat stress among workers.

4. Methods

Multiple types of study designs will be used to meet the above purpose. The measurement of air pollution around 10 schools will be related to the lung function tests and respiratory health of 10 years aged school children. The sample size for children's respiratory health study is 1000, with 100 sampled from each sub-county / school. Data will be collected using different tools and instruments: air quality measuring instruments (the nephelometer), questionnaire for background data, spirometer, and data acquisition checklist for secondary data. Data will be entered and cleaned using Epi Info Ver 3.5.1, and the analysis in SPSS V 20.0. Summary statistics, multivariate regression using Ors with 95% CI, exposure modeling will be utilized to describe the study subjects and exposure levels to air pollution. Ethical clearance and permission for data collection will be sought from appropriate institutions. Consent and assent will be obtained from guardians and study subjects.

5. Study design by respective objectives

SN	Objective	Study design/ methods
1	To measure and define temporal and spatial variation in outdoor levels of $PM_{2.5}$ and black carbon in Nairobi, Kenya	Continuous central site monitoring for $PM_{2.5}$ both at city and sub city levels
2	To assess and compare the short-term effects of temporal fluctuations in ambient $PM_{2.5}$ on overall and cause-specific hospitalization and mortality in Nairobi	Time series study of counts of patients of morbidity and mortality
3	To measure daily levels of ambient $PM_{2.5}$	Central site monitor using real time BAM 1022 equipment
4	To ascertain overall and cause-specific hospitalization and mortality	Hospital based electronic medical records
5	To characterize household level exposure $PM_{2.5}$ and black carbon	Household air pollution assessment using nephelometers
6	To determine the chronic effects of ambient $PM_{2.5}$ and black carbon on childhood lung function and respiratory symptoms in Nairobi	Spirometry test on 1000 ten-year-old children in Nairobi's 9 sub-counties

6. Key milestones and achievements since 2015: winning the grant to date

Nov 2015	Print out Kenya SANA report, GEOHealth	Distributed to various stakeholders
Jan 2016	Regional workshop in Addis Ababa	Attended by 2 representatives from Kenya; A Afullo and Kevin Achola
	Seek guidance on research clearance by GoK (NACOSTI);	
14th March	Receive NACOSTI research authorization for GEOHealth	
March 2016	Seeking list of hospitals for GEOHealth research;	
	Signing of the AAU-UoK MOU	
11th April 2016	County commissioner approves the research	
12th April 2016	County director of education, NBI Approves the research	
14th April 2016	Visit Nyayo House, county education director's office for updated school list with enrolment. Apply to TSC research, planning and policy directorate, Upper hill,	Official updated list of schools available; Approval granted 18.4.16 by TSC,
18th April 2016	Access the updated list of primary schools in NBI county	
19th April 2016	Travel to USC for a 3-week PI training workshop	
June 2016	UoK receives the first batch of funds (21,000 USD)	
July 2016	Local 4-day HAP training workshop at HOAREC, ADDIS	PI travels with Yegon chepkutto
August 2016	Purchases for office establishment; (university approval of 8% admin fee; GoK tax exemption on BAM)	
	Following up approval of UoK researchers as Co-Is by NIH.	W Yegon Chepkutto and Alfred Koskei
August/ Sept	Following up IRB issue, IREC establishment and NACOSTI approval of the IRB	
Oct 2016	Procurement of BAM from MET-ONE	

7. Research timeline and work plan for Kenya

The project life is 5 years: Oct 2015-Sept 2020. The study organization is being established in Year 1. The indoor air pollution assessment with children's health, exposure to $PM_{2.5}$ and school children's health, and occupational exposure assessment will be done cross-sectionally in Year 4.

Studies/ Objectives	Year 1	Year 2	Year 3	Year 4	Year 5
Research Office Organization	XXX				
Outdoor air pollution		XXX	XXX	XXX	XXX
Hospital based morbidity and mortality		XXX	XXX	XXX	XXX
Indoor air pollution and Personal Exposure Assessment				XXX	
Children's health Study (KECHS/ EACHS)				XXX	
Occupational exposure/ heat stress					XXX

7.1. Budget and its source

The total budget is USD $293,846.40 (29.4 mill Kshs). The fund sources are from National Institutes of Health (NIH) of USA and its partner International Development Research Centre (IDRC) of Canada.

7.2. Expected outcome

At least 5 scientific papers will be generated and published in reputable journals. Policy briefs will be prepared and disseminated to relevant stakeholders, some of whom are already part of the project.

8. Progress since 2012

8.1. The following has been the progress made since 2012

1. Primary partners, USC and AAU team up and apply for the planning grant on offer by the NIH, USA;

2. The primary partners conduct the situation and analysis and needs assessment (SANA) for Ethiopia and share the results with universities and stakeholders in ADDIS;

3. The network expands its wings to cover more countries such as Kenya and

Uganda; MOUs are signed.

4. Situational analysis and needs assessment done by the partner institutions in Kenya and Uganda;

5. Visits to partner universities and stakeholders made by USC and AAU in Kenya and Uganda

6. Regional workshop conducted in ADDIS, in which jelling of the team, as well as sharing of the results of the MINI-SANA for Kenya and Uganda formed the core theme; stakeholders give their take on these presentations.

7. Regional workshop done in Kampala in 2015; attended by 4 participants from each country (2 University and 2 agency representatives);

8. Conduct another planning workshop in Addis in January 2016 to plan for the grant after awards confirmation;

9. PIs attend a 3-week training workshop in USC, USA from April 2016-May 2016; also attend a NIH workshop in Maryland.

10. June 2016: Funds are disbursed to the Universities to initiate the activities.

11. 2 university representatives per country participate in a household air pollution (HAP) workshop in Addis in July 2016;

12. Aug-Sept: administrative aspects of GEOHealth ongoing in the various universities, including establishing the GEOHealth offices.

8.2. Personnel plans

	#	1	2	3	4	5
Research Director / PI		X	X	XX	XX	X
Co-Investigators	3	X	X	XX	XX	X
Research administrator	1	X	X	X	X	X
Field researcher 1			X	X	X	
Field researcher 2				X	X	
Field Researcher 3					X	
Data manager			X	X	X	X
Data clerk			X	X	X	
Program analyst			X	X	X	X

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