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Effect of Traditional Knowledge System in Sustainable Development and Management of Natural Resources in Meru

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Abstract

This paper aimed at studying the effect of traditional knowledge system in sustainable development and management of natural resources in Meru community. The study was guided by the following questions: What is the role of indigenous system in the protection and conservation of natural resources in Meru community? What is the role of integrated environmental management frame work in the sustainable development and management of natural resources in Meru community? What is the relationship between participatory decision making, policy maker's implementation and natural resources users in Meru community? The research was conducted in Meru and Tharaka Nithi Counties and through purposeful sampling had two case studies from each county in Meru community. Data was collected using guided interviews and semi structured questions. The data was collected through a focus group discussion, documents and audio-visual materials. The study reviewed the literature to understand the effect of traditional knowledge system in sustainable development and management of natural resources in Meru community. Theoretical insights and empirical findings from the studies suggest that despite the generalized worldwide trend of Traditional Ecological Knowledge (TEK) erosion, substantial pockets of TEK persist in both developing and developed countries. The findings also reinforce previous hypotheses pointing at the importance of TEK systems as reservoirs of experiential knowledge that can provide important insights for the design of adaptation and mitigation strategies to cope with global environmental change in the management of natural resources. Recognition of endogenous management of Indigenous knowledge becomes an enhancing solution to the seemingly mega challenges of community development. Indigenous knowledge is a more secure foundation for sustainable solutions to challenges in developmental issues in communities and in Africa. Advanced technology in Indigenous knowledge (IK) usage and preservation empowers users to improve on pre-existing solutions to a problem, achieve a goal, and most of all improve on the standards of living.

Keywords: *Traditional knowledge System, development and management, Natural Resources, Meru community*

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1.0 Introduction

The history of traditional knowledge system and management of natural resources and environmental conservation is as old as history (Odera, 2004). Maathai (2007) argues that in the past unwritten, informal, and systems conservation in Kenya attic taboos, rituals and rules regulated interactions between communities goes back centuries, if not individuals and the natural environment. Nevertheless, since millennia, and is as old as the introduction of formal management systems, traditional Gloria Kendi Borona the communities who have and local mechanisms of forest management have eroded depended on it. Prior to the Communities assigned spiritual significance to specific reintroduction of the current regions referred to as "sacred sites" that Adam describes as "places protected area system of which are within ecosystems, such as forests, mountains, rivers, and water sources, which exist as a network embedded within a territory and for which there are associated spiritual values" (Adam, 2012). In addition to the spiritual values these sites are considered to be of great cultural significance for various reasons, including the belief that they are home to the community's ancestral spirits. They are akin to temples or churches and are the focal point for conducting rituals and ceremonies (Adam, 2012).

Sacred sites in the world have been protected through application of Traditional Ecological Knowledge (TEK) that hinges on the beliefs of specific communities. TEK refers to the knowledge and insights acquired through extensive observation of natural phenomenon and intricate and intimate relationship with natural resources (Christensen, 2014). Communities that practice TEK are strongly rooted to the lands that sustained their ancestors and employ time-tested landscape management practices through drawing on sophisticated and complex understanding between people and the spiritual, cultural and environmental dimensions. The term "indigenous people" has been used to refer to such communities. The study begins by discussing the positioning of TEK in international law and discourse as well as the prevailing challenges in its application in the development and management of natural resources. The background presents other examples of successful application of customary governance in the Kenyan context.

A discussion on the positioning of TEK and traditional custodianship in Kenyan legislation follows. Finally, the study concludes by making a case for community involvement in resource conservation, the application of TEK and other forms of cultural heritage in crafting resource use and conservation strategies. Advanced technology in IK usage and preservation empowers users to improve on pre-existing solutions to a problem, achieve a goal, and most of all improve on the standards of living. IK is a preferred mode used at the local levels by communities as more tacit than explicit. The study attempted to answer the following questions: What is the role of indigenous system in the protection and conservation of natural resources in Meru community? What is the role of integrated environmental management frame work in the in sustainable development and management of natural resources in Meru community? What is the relationship between participatory decision making, policy maker's implementation and natural resources users in Meru community? This paper aimed at studying the effect of traditional knowledge system in sustainable development and management of natural resources in Meru community.

2.0 Literature Review

The review of literature covers the trends and studies on indigenous knowledge and at national, regional and international levels. The review therefore makes an informed nexus between indigenous knowledge and socio-economic development. Gakuru (2006) argues that for a considerable period traditional knowledge has been considered little more than a nostalgic

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remembrance of varying pasts, being preserved only as superstition folklore. However, he continues to observe that IK is a permanent feature in the society as long as the society is alive. Anderson (2005) observes that: "it is clear that our laws and customs do not fit, the existing legal system cannot properly embrace what it cannot define and that is what lies at the heart of the problem." The use of indigenous knowledge therefore has been seen by many as an alternative way of promoting development in rural communities in many parts of the world. Briggs (2005) observers that indigenous knowledge is the local knowledge that is unique to a given culture or society. It contrasts with the international knowledge system generated by universities, research institutions and private firms.

Warren (1991) expands this notion by asserting that indigenous knowledge is the basis for local-level decision making in agriculture, health care, food preservation, education, natural resource management and a host of other activities in rural communities. Indigenous knowledge of the African communities remains a gold mine (AERN 2012). The communities need to appreciate that they are the source of crime, the victim of crime and the reservoir of support to the community as it seeks to control crime. Indigenous knowledge may not be sufficient on its own to fight crime but it would certainly be a basis to deter criminals. Crime does not always start from far, instead, it is from within the areas we are familiar with. If an area is not secure, there cannot be any development because the community is in fear. Kenyan security system is spirited to introduce the "nyumba kumi" concept in a manner to reach out to all. The concept, if adopted, is clear system of interdependence in that the communities need to know at least ten houses within its reach and the social fabric is enhanced and people get to know each other.

Although IK is derived from careful observation of the environment in a particular context, it can be widely applied in many scenarios. As Warren (1991) and Ulluwishewa (1993) aptly pointed out, the utility of IK is not confined to the locality in which it evolves, but is useful to scientists and planners alike in designing development programmes. Development is about people and communities and there is no community without human beings. Further in the Kenyan context, Njuri Ncheke of the Meru community envisages to articulate arbitration and solving of common problems including safeguarding natural resources example land issues within the Meru community using history as springboard for deliberation. This they have perfected because they have an in-depth understanding of issues ailing their society and more so the history of the community which is guided by their local knowledge. In Kenya again, the Chief Justice was on record advising Kenyans that they can seek alternative judicial services instead of going to court over basic issues like family conflict. Basic issues should be taken to mean issues that can be well mitigated at the grassroots and community levels, because they have an understanding of some springboards on indigenous or genesis of the problem.

The rhetoric of indigenous knowledge has been heralded as seemingly offering a way out of the development impasse. In contrast to the past, when traditional knowledge were typically seen as obstacles to development, it is now claimed by some that these are pivotal to discussions on sustainable resource use and balanced development. Agrawal (1995) notes that when something is indigenous, it belongs naturally to a place. Indigenous knowledge often called traditional knowledge, folk wisdom or folk knowledge is local knowledge of any field of human inquiry that does not originate in academic or corporate research institutions but rather is based on local-level accumulated knowledge that is inherited through tradition and culture. Development and growth requires knowledge management of its subjects and Indigenous knowledge would provide this

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knowledge. The World Bank is instrumental to the development of IK through community based programs in the African states. The African Department of the World Bank launched the indigenous knowledge for Development program in 1998. Since then it has continued to play a greater role in the development activities of the World Bank. Wolfensohn, President of the Word Bank observes that: ‘‘Indigenous knowledge is an integral part of the culture and history of a local community; we need to learn from local communities to enrich the development process.’’ It is further argued that uncertainty and top-down development processes brought about the African Renaissance that sought to solve African development challenges using their internal mechanisms instead of blue prints from colonizers. In this regard IK is endogenous since it has to come from within the people. It is an understanding that the challenges are with the people, the subject are the people and therefore the solutions for the challenges are within the people in the locality by making use of the resource available to them. IK therefore integrates the harnessing of the different sociocultural skills that are acquired from the rural universities (skills and knowledge that is acquired informally) within the community. Accumulation of knowledge is the total knowledge resource and the synergized skill that brings solutions to the communities.

Theories used in the study are: one is participation theory which represents a move from the global, spatial top-down strategies that dominated early development initiatives to more locally sensitive methodologies. Participation is heavily influenced by development theories. Acknowledgement of participation grew out of the realization that the world’s poor have actually suffered as a result of development and that everyone needs to be involved in development decisions, implementation and benefits. Limitations of the state in top-down conservation practices were identified and popular participation emphasized as a remedy due to the observation of the uniqueness of an individual as an entity who is capable of making unique contributions to decision making. (Claridge, 2004). Participation theories criticized the modernization theory on the ground that it promoted a top- down ethnocentric and paternalistic view of development. Current development efforts focus on ‘bottom up’ planning, ’people centered development’ and the view that ordinary people have the capacity to manage their own development. Participatory theory encourages the involvement of all stakeholders in the process of development, (Fitano, 2003). This approach views development as a process which focuses on community’s involvement in their own development using available resources and guiding the future development of their own community and emphasizes concept such as capacity building, empowerment, sustainability and self-reliance. In the context of natural resource management, devolved greater power to village communities is now widely accepted as an institutional imperative by governments, international agencies and NGOs.

The second theory is cultural ecological theory which is also referred to as the human adaptation theory is attributed to the works of Julian Steward. This theory postulates that people respond and adapt to changes in the environment and society through cultural adaptation. Cultural change generates new cultures that assist humans to adapt themselves to this change (Steward, 1955). The proponents of this theory argue that the society and its surrounding are composed of four interrelated components namely: people, culture, technology, and the physical environment in which, humans live (Duncan, 1964; Catton, 1987). They further state that these four elements are in constant interaction, and a change in one affects the other. They, however, contend that because humans occupy a central place in the society-land-environment triad, their relations and interactions with other organisms, the land they inhabit and the wider environment have a long history, much of which is intertwined in the diversity of cultures. They maintain that through the

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diversity of indigenous natural resource management systems embodied in the local people's cultures, humans are able to conquer, modify and reconstruct the physical environment to suit their changing needs. In addition, they assert that through the evolution of varied institutions and channels of communication, knowledge, skills and technologies about environmental resources and how they would be conserved and sustainably utilized are inter-generational. This way a sense of ownership and belonging is instilled in community members to the extent that their changing needs, resource values as well as attitudes and perceptions about natural resources reflect the socio-economic and ecological changes in the environment.

The third theory is Time-Space Distanciation Theory which according to Giddens (1984), social relations of pre- modern societies predominately are largely confined to a face-to-face interaction in a given locale. However, the advent of modernity undermines social interactions by fostering relations between absent others, internationally distant from any given situation of face-to-face interaction. It disembeds or lifts out social relations from local contexts of interaction and rearranges them across indefinite spans of time- space. According to Giddens (1984) changes often reflect or cause disruptions so that people's actions and their social systems become detached from the particular condition of ecosystems, in essence, people's perception of a relationship to elements in the ecosystem change. This can lead to over exploitation of resources and contribute to erosion of indigenous knowledge. This theory is useful in identifying the changes which have occurred over time in the use and application of indigenous ecological knowledge among the Meru and their effects on the natural resources.

3.0 Research Methodology

The first stage involved in conducting a documentary analysis and defining key words related to traditional knowledge system in sustainable development and management of natural resources. The research paid attention to traditional knowledge system in sustainable development and management of natural resources in global, continent, national and Meru community. The attention was given to traditional knowledge systems at local levels in management of natural resources and implementation of environmental policy in communities. The second stage was to review key documents on the traditional knowledge system in management and sustainable development of natural resources in Meru and Tharaka Nithi Counties in Meru community, Kenya. A review of Indigenous Knowledge Systems, natural resources including forest Land Conservation in Meru community was carried out. Further, a review of how traditional environmental knowledge: Relevance to the environment and natural resources management nationally, regionally and globally was done. Reasons for the Level of Participation in the Environmental Management was critically analyzed. The historical background to this study looked at the transition of Kenya from a centralized top-down government to a devolved people driven participatory government in environmental management. This brings out the importance of community participation in resource management so that people can govern their communities and as a core concept in lifting those marginalized to positions of power, authority and control.

The research used the Tangaza University OPAC bibliographical research engines for the most important collections and databases. Mendeley reference manager and JSTOR provided the main online bibliographical documentation work. The online research engines connected with Sage Publications, Taylor & Francis Online Journals, SAGE Journals, Taylor & Francis, SpringerLink, Wiley Online Library, Directory of Open Access Journals (DOAJ), Emerald Journals (Emerald Group Publishing), Oxford Journals (Oxford University Press), Cambridge Journals (Cambridge

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University Press). The Google Scholar and Google Books guided in accessing current empirical data. After making an extensive review of these materials, there was a careful selection of those documents that deal specifically with traditional knowledge system in development and management of natural resources in general and what scholars have written on the subject.

The compilation and analysis focused only on that information which was relevant to the aims of the research. The headings that guided the literature selection and review were as follows: The evolution of participatory development approach's role of public participation in environmental governance; Njuri Ncheke and environmental Conservation. Effectiveness of indigenous knowledge resources in natural resource management. This study was carried out in Meru and Tharaka Nithi Counties, which are located in the former Eastern province of Kenya or the current Mt Kenya East Region and it targeted two Sub County from each county which was sampled purposively. The researcher used key informants, community leaders and focus Group Discussions in both Meru and Tharaka Nithi Counties. The research was conducted in Meru and Tharaka Nithi Counties and through purposeful sampling it had two case studies of from each county in Meru and Tharaka Nithi. Data was collected using guided interviews and semi structured questions. The data was collected through a focus group discussion, documents and audio-visual materials.

4.0 Research Findings from Literature Review

4.1 Traditional knowledge System provides the basis for problem-solving strategies for Meru communities

World bank (1998) notes that Indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor. Indigenous knowledge (IK) is the cultural and social experiences that drive a community to adapt certain values, practices and norms to coexist in the environment sustainably. It is a common feature to all societies in the world. It is the indigenous knowledge that makes people generate comparative advantages in social and economic development as certain skills for economic production are present in one community and not in others. Therefore, indigenous knowledge grows and sustains itself in the society from one generation to the next and has given rise to interdependency in socio-economic development between nations.

Moreover, Kamara (2005) observes that in Africa, local communities possess a developed traditional indigenous knowledge system for environmental management and coping strategies, making them more resilient to environmental change. This observation means that the people knowledge can be integrated into the emerging challenges to sustainable development. Indigenous knowledge is a precious national resource that can facilitate the process of disaster prevention, preparedness and response in cost effective, participatory and sustainable ways. This knowledge had and still has a high degree of acceptability amongst the majority of populations in which it has been preserved. Community development seeks to empower individuals and groups of people by providing them with the skills they need to effect change in their own communities. These skills are often created through the formation of large social groups working for a common agenda on the springboard of indigenous knowledge.

The study looks at knowledge management and particularly indigenous knowledge as a catalyst for development and management of natural resource. Development is observed to attain sustainability by use of the local community talent and skills. By tapping the local community talent, we improve standards of living because the communities are aware of what best addresses

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the problems they encounter and the solutions to the same problems. McMillan (2001) confirms that indigenous knowledge is phenomenological meaning that it is a lived experience that makes the individuals using it feel that they understand more fully the concept. They identify with it hence take pride. Knowledge is a strategic resource that needs to be managed well, (Freeman, 2001)

4.2 Traditional Knowledge System Experiences and Challenges in proving solution to Meru community

Chitere (2011) contends that the validation of IK as part of technology cannot be over emphasized. It represents an important component of global knowledge on development issues. Technology for development is the extension of human capability in order to satisfy socio-economic needs or wants. It further denotes that it is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function. In addition, the World Bank (1998) notes that IK is an underutilized resource in the development process and therefore should be incorporated in the development planning processes. Learning from IK, by investigating first what local communities know and have, can improve understanding of local conditions and provide a productive context for activities designed to help the communities. Bruyere (1986) noted that Indigenous peoples are the base of what I guess could be called the environmental security system. We are the gate-keepers of success or failure to husband our resources. We are still the first to know about changes in the environment, but we are now the last to be asked or consulted.

In Meru, IK is not a new phenomenon in development since it has been there and it is as old as humanity. Kalu (2010) notes that while the old generations of Africans are conversant with indigenous knowledge, the new generations largely ignore such knowledge. Indigenous knowledge is part of the lives of the rural communities, their livelihood depends almost entirely on specific skills and knowledge essential for their survival. IK accepts that diversity is the basis of creativity and adaptation; therefore, it does not strive to convince others to become the same. Instead, IK proposes autonomy as a general principle. Sheehan (2011) contends that autonomy generates a more complex, reflexive and adaptive organizational state through individuated and diverse responses than could be achieved through any imposed understanding or central locus of control. This calls for respect in the diversity of the way we think and perceive development in the communities we are in. It can never be coerced and takes place in the natural setting and the design is the active human intersection between social interactions and the habitat. Much could be different in soliciting and dispensing the use of IK but the simple recognition that there could be togetherness in the different IK socialization is encouraging enough to note that development could occur in the wake of disparities.

Exchange of Indigenous knowledge is therefore the ideal outcome of a successful transfer and dissemination. This is essentially a learning process whereby the community where an IK practice originates, the agent who transmits the practice, and the community that adopts and adapts the practice all learn during the process. Indigenous knowledge is used at the local level by communities as the basis for decisions pertaining to food security, human and animal health, education, natural resources management, and other vital activities. IK is a key element of the social capital of the poor and constitutes their main asset in their efforts to gain control of their own lives. The fact that indigenous people also hold a wealth of knowledge and experience that represents a significant resource in the sustainable development of society is slowly dawning

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Briggs (2004) in his work brings out strongly the need to listen to other voices". His concerns are genuine in the sense that the voice of the indigenous person depicted in the indigenous knowledge continues to be threatened and the western knowledge management takes preference. He says that the white writing about native peoples or cultures displaces the native writer and often appropriates the culture instead of proliferating information about it. The difference between appropriation and proliferation is that the first steals and harms; the second helps heal the breaches of knowledge.

Briggs (1999) note that there continues to be a suspicion and wariness about the extent to which indigenous knowledge is capable of challenging currently accepted ideas of development by pushing formal science to the margins. Formal science still represents a powerful body of knowledge, and it is still the language of authority and dominance in many development debates. Pretty (1994) has observed that the trouble with normal science is that it gives credibility to opinion only when it is defined in scientific language, which may be inadequate for describing the complex and changing experiences of farmers and other actors in development. In this regard the IK has the following elements: Capacity building, participation, synergy.

4.3 Indigenous Knowledge Systems and Land Conservation in Meru community

Globally, indigenous agricultural knowledge systems and technologies used to manage land by most traditional communities involved a number of farming technologies that had repercussions across the whole spectrum of conservation as observed by Warren (1992a). UNEP (1999) says that most of the indigenous land management systems began with land clearing and cultivation through the use of simple tools which in most cases were simple iron blades made by the village black-smith which were not capable of cutting big trees or clearing large trucks of land easily. Such tools included curved iron blades with long handles used to clear shrubs and grass and the planting hoes (jembe) that were not capable of opening up large trucks of land or deep layers. In this regard, the use of these tools was seen as a mixed blessing because it meant that big trees and forests were left largely untouched besides being a means of controlling erosion due to minimum tillage where only the top soil was disturbed. Indeed, the commonest practice of land clearance was slash and burn where a small bush would be set on fire that was carefully controlled. In this regard, this method despite leading to the destruction of some soil nutrients and living organisms greatly helped in controlling disease vectors for both human and livestock. Similarly, UNEP (2008) focusing on indigenous knowledge in disaster management in Kenya, Tanzania, Swaziland and South Africa, observes that among the communities studied, practices such as slash-and-burn, shifting cultivation, intercropping, selective cultivation as well as a number of other technologies and practices that sought to optimize food production under varying environmental conditions were commonly used.

Correspondingly, UNEP (1999); Harwood (1979) and UNEP (2008) concur those practices such as shifting cultivation which entailed cultivating one spot of land then leaving it to fallow after a few years of cropping was common. Besides, intercropping and mixed farming were reported to have been commonly adopted by indigenous communities in most parts of the world. Thus, the resultant crop production and animal rearing in the mixed system of indigenous agricultural practices enabled communities to take the advantage of the ability of the cropping systems to reuse their own nutrients and the tendency of certain crops to enrich the soil with organic matter. UNEP (1999) notes that another common indigenous land management practice was the tropical agro-forestry system which involved the planting of coffee under shade trees e.g. in Uganda and Ethiopia (Inga SSP; Erytrina SSP) where the nitrogen input from the shade trees litter and

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symbiotic fixation was over ten times the net nitrogen fixation during harvest. Accordingly, in such systems there was thus evident ample compensation of nitrogen loss by harvest with a subsidy from shade trees thereby maintaining the soil nutrients (Beets 1990). Similarly, Lyimo and Kangawe (1997) give an example of another traditional land management system referred to as the tropical corn/bean/squash poly culture system which suffered less frequent attacks by caterpillars, leafhoppers, thrips, among other pests, due to the system's capability to hinder great numbers of parasitic wasps besides providing alternative hosts to predators and parasites.

Again, Reinjtes (1992) note that the traditional intercropping systems common among indigenous communities especially in developing countries were capable of preventing competition from weeds due to the large crop leaf area of their complex canopies that prevented direct sunlight from reaching sensitive weed species. This is also due to the fact that certain associated crops inhibited weed germination or growth by releasing toxic substances into the environment rather than using dangerous and expensive chemicals. Also, Beets (1990) observes that the traditional practice of integrating animals such as cattle, goats, sheep, swine and poultry into farming besides providing sufficient food for the communities, contributed greatly to soil fertility as animals recycled the plant content and transform it into manure that enriched soil fertility. Thus, arising from the foregoing literature, indigenous farming systems and technologies had certain elements of land conservation that enhanced the control of soil degradation and pollution besides ensuring increased crop outputs. In view of the above, the present study contributes in tracking down relevant indigenous land management systems among the Meru community members with the view to documenting the changes in these systems as well as assessing the effects of such changes on the bio-physical environment and community members‟ livelihoods within Meru community.

4.4 Traditional knowledge policies and laws in Kenya in management of natural resources.

Kenya has specific policies and laws dealing with TK protection, which are discussed below. The Constitution of Kenya 2010 obligates the state to support, promote and protect the IP rights of the 'people of Kenya' and to protect and enhance the IP and 'indigenous knowledge' associated with biodiversity and 'genetic resources of the communities.' It recognizes culture as the foundation of the nation and cumulative civilization of the Kenyan people and nation and requires the State to promote IPRs of the people of Kenya. It also enjoins parliament to enact legislation, to ensure that 'communities receive compensation or royalties for the use of their cultures and cultural heritage', and to recognize and protect the ownership of genetic resources and associated knowledge by indigenous peoples. While the provisions of the Constitution are germane to the protection of TK, their Achilles heel is that they are couched in IP terms, suggesting TK should be protected within a similar context (African Center for Technology Studies, 1999).

As regards the national policy on traditional knowledge, genetic resources and traditional cultural expressions (2009) it enable enhance the mainstreaming of TK systems into national development planning and decision-making processes at all levels, the policy requires the recognition, preservation, protection and promotion of the sustainable use of TK. It recognizes that TK is holistic, dynamic and constantly evolving through experimentation and innovation, fresh insight and external stimuli, and is transmitted in many ways through repeated practice, oral traditions, sayings, proverbs, metaphors, and apprenticeship with elders and specialists. It notes that TK and related traditions are being transferred illicitly from their original communities without fully understanding their meaning and purpose, thus eroding, debasing and ultimately destroying them. However, the policy fails to recognize the role of traditional institutions, which play a central role

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in the control, access and use of TK and that can ultimately safeguard TK against such illicit transfers and loss. It recognizes that IPRs are inappropriate in TK protection, as they serve to protect private and corporate property but not the collective wisdom of the past, present and future generations of local communities.

For the national policy on culture and heritage (2009), although dealing with culture and heritage, the policy on culture and heritage is relevant to TK. The policy defines 'culture' as 'that whole complex of distinctive, spiritual, material, intellectual and emotional features characterizing a society or social group,' while 'national heritage' is defined as the 'sum total of all the creativity in all its forms preserved, enhanced and handed over to future generations as a record of human experience and aspirations.' The policy recognizes the unique cultural innovations of the Kenyan people resulting from long-term interaction with the environment and nature. It also recognizes culture as a repository of 'knowledge' and urges government to harness culture, heritage and TK in sustainable management, preservation and conservation of the environment. While it advocates for adoption of interventions geared towards promotion and protection of the cultures of Kenya's communities, little attention is given to traditional governance structures in the protection of culture (a repository of TK).

Another pitfall with the policy is that cultural creativity is identified as an IP accruing to individuals, communities, artist or performers and is to be protected as such, implying that IP tools are adequate in TK protection. As per the Protection of traditional knowledge and cultural expressions act 2016, The Act aims 'to provide a framework for the protection and promotion of traditional knowledge and cultural expressions' in Kenya, giving effect to Articles 11, 40 and 69(1)(c) of the Constitution of 2010. It vests 'ownership' of TK on local and traditional communities, and recognizes individuals or organizations entrusted with the custody or protection of TK in accordance with customary law and practices. It employs the notion of 'ownership' as applied in IP, which may be elusive and quite problematic in the case of TK, where holders of TK are custodians rather than owners. Again, it confers both moral and economic sui generis rights akin to IPRs on 'owners' and 'holders' of TK (or in their absence, a state agency). Rights in TK are conferred without formalities and exist in perpetuity as long as the subject matter complies with the requirements for protection.

While the county and national governments are charged with the responsibility of establishing TK databases, the role of communities in that regard is not clear. Equally, it is not apparent who 'owns' the databases once established and the documented TK. Is it the communities or the county or national government? Likewise, the law fails to address the role of customary laws and traditional governance structures (like TJS) in the protection of TK. Further, the law treats TK as a natural resource that 'belongs to the people of Kenya' collectively, like land in Kenya, raising inter alia the question as to who should be rewarded for creativity. Likewise, benefits from protection of TK are framed as primarily local (for communities in Kenya) and national (for Kenya as a nation state), as is the case with other forms of real property, essentially undermining or ignoring the creative contributions of local communities as envisaged in the National Policy on Culture and Heritage, 2009. Benefits from TK protection ought to be derived by communities that have developed the TK, unless the community is not identifiable or if the TK is so widespread and it is impossible to identify a specific community. In the later cases, the benefits might not necessarily be derived by one community.

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4.5 Traditional Environmental Knowledge Relevance to the Environment and Natural Resources Management

Traditional knowledge has been broadly defined as a cumulative, collective body of knowledge, experience, and values held by societies with a history of subsistence (Ellis, 2005). Traditional knowledge is also defined as any knowledge originating from a local or traditional community that is the result of intellectual activity and insight in a traditional context, including know-how, skills, innovations, practices and learning, where the knowledge is embodied in the traditional lifestyle of a community, or contained in the codified knowledge systems passed on from one generation to another. (ARIPO, 2010). The term is not to be limited to a specific technical field, and may include agricultural, environmental or medical knowledge, and knowledge associated with genetic resources. (ARIPO, 2010). Traditional knowledge has also been defined as knowledge, know-how, skills and practices that are developed, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity. (WIPO 2019). The term indigenous knowledge may generally refer to how members of a community perceive and understand their environment and resources, particularly the way they convert those resources through labour (Castro & Ettenger, 2019)

Traditional knowledge or traditional ecological knowledge is believed to represent experience acquired over thousands of years of direct human contact with the environment. A growing recognition of the capabilities of ancient agriculturalists, water engineers and architects led to increased appreciation of ethno science, ancient and contemporary, which paved way for the acceptability of the validity of traditional knowledge in a variety of fields. One of the fields that embraced the use of traditional knowledge is the environment. The concept of Traditional Ecological Knowledge has been applied to several categories of information, which are distinguishable on substantive and epistemological ground, (Usher, 2000). These may include: Factual/rational knowledge about the environment. This includes statements of fact about such matters as weather, ice, coastal waters, currents, animal behaviour, traveling conditions and the like; Factual knowledge about past and current use of the environment (e.g., patterns of land use and occupancy, or harvest levels); Culturally based value statements about how things should be, and what is fitting and proper to do, including moral or ethical statements about how to behave with respect to animals and the environment, and about human health and well-being in a holistic sense; and culturally based cosmology—the foundation of the knowledge system—by which information derived from observation, experience, and instruction is organized to provide explanations and guidance (Usher, 2000)

Traditional ecological knowledge is also seen as bound up with "indigenous stewardship method," which is defined as the ecologically sustainable use of natural resources within their capacity to sustain natural processes (Whyte, 2013) Proponents of traditional knowledge maintain that it can offer contributions to environmental decision making from a broader scope of environmental values, practices, and knowledge. The resilience of indigenous peoples and local communities, as sustained by their cultural systems which have adapted to local ecological niches over long timeframes, and the detailed and broad knowledge they have of adaptation, is affected negatively by the loss of land, ecosystem capacity, and alienation of culturally significant places, migration and losses in livelihoods, (Crawhall, 2014). They are thus interested parties when it comes to efforts towards achieving sustainable development and should thus be included. Some communities' traditional ecological knowledge practices are perceived to promote dry land

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ecosystems management. For instance, in Tanzania, pastoralists reduce risk of livestock mortality by seasonal movement of livestock to the productive and high rainfall areas. This may however be criticized for negative effect on some environmental aspects. Regarding wildlife in the rangelands, Maasai pastoralists do not consume wild meat and therefore do not aspire to kill wildlife that grazing close to their livestock. They allow wild animals, especially the ungulates to graze with their animals without any disturbances. This knowledge is passed from generation to generation among the Maasai as part of preservation of their culture and ensuring sustainability of their livelihoods.

There are also studies that have demonstrated that the belief system of the Giriama people, through their indigenous knowledge and management systems, demonstrated through indigenous nomenclature, taboos, proverbs and lived experience, has had a great contribution to the conservation of mangroves, fisheries, corals and coral reefs. These are just a few of the many examples that may be cited to demonstrate how Kenyan communities have for years utilized their traditional ecological knowledge in environmental and natural resources conservation. There are two recognized practical methods for encouraging the use of traditional knowledge in environmental decision-making. The first one includes those methods that are based on official recognition of traditional knowledge, followed the development of rules of procedure for the use of knowledge by institutions of authority. In this top-down approach, the structures of governance are constructed accommodate traditional knowledge, but the knowledge itself is not fostered or sought out (Ellis, 2005). The second category increases the capacity of indigenous people to bring traditional knowledge to bear on policies and procedures governance and regulation. This bottom-up approach is characterized by initiatives designed to encourage learning and transmission of traditional knowledge at community level, as well as developing the means communicate this knowledge within the structures processes of environmental governance.

4.6 National Legal Framework on Traditional Environmental Knowledge in management of natural resource.

The Constitution of Kenya provides that culture is the foundation of the nation and the cumulative civilization of the Kenyan people and nation, (Art. 11(1), Constitution of Kenya 2010). Specifically, it obligates the State to, *inter alia*, recognise the *role of science and indigenous technologies in the development of the nation*, and, recognise and protect the ownership of indigenous seeds and plant varieties, their genetic and diverse characteristics and their use by the communities of Kenya (emphasis added). Art. 11(2) (b) & (3) (b). Further, with respect to the environment, the State is obligated to protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities. (Art. 69(1) (c), Constitution of Kenya). The State should not just protect the indigenous knowledge but should also actively promote the use of this knowledge for environmental protection and conservation for sustainable environment. Notably, one of the national values and principles of governance as outlined under Article 10 of the Constitution is sustainable development. The principles of sustainable development as captured in EMCA, include: the principle of public participation in the development of policies, plans and processes for the management of the environment; *the cultural and social principle traditionally applied by any community in Kenya for the management of the environment or natural resources in so far as the same are relevant and are not repugnant to justice and morality or inconsistent with any written law* (emphasis added); the principle of international cooperation in the management of environmental resources shared by two or more

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states; the principles of intergenerational and intergenerational equity; the polluter-pays principle; and the pre-cautionary principle. This is a clear indication of the central role that traditional environment knowledge should play in realisation of the sustainable development agenda.

The *Protection of Traditional Knowledge and Traditional Cultural Expressions Act, 2016*, was enacted to provide a unified and comprehensive framework for the protection and promotion of traditional knowledge and traditional cultural expressions; and to give effect to Articles 11, 40(5) and 69 of the Constitution. One of the main purposes of the Act is to recognize the intrinsic value of traditional cultures and traditional cultural expressions, including their social, cultural, economic, intellectual, commercial and educational value. The Act defines "traditional knowledge" as any knowledge originating from an individual, local or traditional community that is the result of intellectual activity and insight in a traditional context, including know-how, skills, innovations, practices and learning, embodied in the traditional lifestyle of a community, or contained in the codified knowledge systems passed on from one generation to another and includes agricultural, *environmental* or *medical knowledge, and knowledge associated with genetic resources or other components of biological diversity* (emphasis added), and know-how of traditional architecture, construction technologies, designs, marks and indications. While the enactment of this Act marked a milestone in recognition of traditional knowledge, there has been little in terms of evidence of its implementation especially in environmental management and governance matters.

4.7 Mainstreaming traditional ecological knowledge in Kenya's environmental governance framework

Traditional knowledge may contribute to improved development strategies in several ways such as by helping identify cost-effective and sustainable mechanisms for poverty alleviation that are locally manageable and locally meaningful; by a better understanding of the complexities of sustainable development in its ecological and social diversity, and helping to identify innovative pathways to sustainable human developmental that enhance local communities and their environment. The *1994 Draft Declaration on Human Rights and Environment* describes the procedural rights, such as the right to participation, necessary for realization of the substantive rights. Article 1 of the *Aarhus Convention* states that "in order to contribute to the protection of the right of every person of present and future generations to live in an environment adequate to his or her health and wellbeing, each Party should guarantee the rights of access to information, public participation in decision-making and access to justice in environmental matters in accordance with the provisions of this Convention." It is believed that environmental procedural rights such as the access to information, public participation and access to justice may be one of the ways and means to a realistic way for attaining the sustainable development. (Mohammad, 2014). Recognition and active utilization of communities' traditional environmental knowledge can create a viable channel for communities to appreciate government's efforts in effective environmental governance through promoting sustainable use of the environment and its resources.

Traditional knowledge, coupled with other forms of knowledge can enhance predicting and preventing the potential environmental impacts of development, as well as informing wise landuse and resource management especially within the local community setups. (Ellis, 2005) Proponents of traditional knowledge maintain that it can offer contributions to environmental decision making from a broader scope of environmental values, practices, and knowledge. Traditional knowledge

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can be used at the local level by communities as the basis for making decisions pertaining to food security, human and animal health, education, natural resource management and other vital activities. Exploring the community's knowledge and knowledge of people dealing with agriculture, is crucial to determine their norms, values, and belief in regards to their activities, particularly in the area of water and land management. The way people develop such knowledge by understanding their environment through observation and experiences determines the specific group of people's knowledge. Incorporating provisions recognizing traditional environmental knowledge in national environmental laws is commendable but just marks the first step towards mainstreaming such knowledge into effective environmental governance. There is need for actively and meaningfully involving communities in utilising traditional environmental knowledge to practice sustainable production methods. There is need to cultivate a culture of respect for environment by all. Environmental ethics and consciousness can go a long way in promoting participatory approaches to conservation and management of environment and its resources. Dissemination of information and knowledge in meaningful forms can also enhance participation in decision-making and enhance appreciation of the best ways of protecting and conserving the environment (Muigua, 2017).The objects of the devolution of government are, inter alia— to give powers of self-governance to the people and enhance the participation of the people in the exercise of the powers of the State and in making decisions affecting them; to recognise the right of communities to manage their own affairs and to further their development; and to protect and promote the interests and rights of minorities and marginalised communities. Encouraging and mainstreaming the use of traditional environmental knowledge by communities can go a long way in facilitating participation.

Fostering use of traditional knowledge in conservation and production to active and meaningful participation in decision-making can enable the citizenry appreciate that achieving the sustainable development agenda is not just a State's responsibility but one that requires cooperation between the State actors and the individuals, as envisaged under Article 69(2) of the Constitution. There is need to empower communities so as to actualise these constitutional provisions. Where they do not perceive a danger to their livelihoods, these communities are likely to embrace development projects and are also not likely to turn to unconventional ways of protecting their livelihoods. (Muigua, 2016).

4.8 Advocacy for Rekindling Indigenous Knowledge Systems in management of natural resources.

Gadgil (2000) observed that any attempt endeavoring to rekindle and strengthen indigenous knowledge systems for biodiversity conservation and the attainment of sustainability in community livelihoods, should be based on the principle that these knowledge systems cannot be disassociated from its cultural and institutional setting. Such an approach should rather develop projects that aim at enhancing the capacity of the local communities to use, express and develop their own indigenous knowledge on the basis of their cultural and institutional norms. Gadgil *et al.* (2000) above note that this approach should develop methods for mutual learning and information sharing between the local people and the formal scientists for acquisition, documentation, storage and utilization of these knowledge systems. Warren (1992b) and Gadgil (2000) contend that setting up national, regional and local indigenous knowledge institutions forms the starting point for the entire process of reviving and strengthening local people's traditional heritage in a given country. They note that these centers will serve as a data management venue

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for systematic acquisition, recording and documentation of indigenous knowledge systems. Besides, they will also act as a liaison center for the interaction between local communities who are the originators of indigenous knowledge and the development community. Importantly, these centers will facilitate active participation of the local community members in the conservation, utilization and dissemination of their specialized knowledge through *in situ knowledge* banks; get involved in research and development activities, farmer-to-farmer training and consultancies. Also such canters will act as a two-way conduit between the indigenous-based informal research and development systems of formal research.

Farrington (1990) recommends that training programs aimed at bringing change in the attitudes of researchers and extensionists is critical in the process of rekindling and popularizing indigenous knowledge systems. This is necessary due to the fact that though extension personnel including the village level extension workers have been trained on scientific technological innovations, they have not learned to regard farmers and local community members as their colleagues. As a consequence, these extension agents' potential to support village communities has tended to remain low. Knight *et al.* (2006) thus point out that a training program on the role of indigenous knowledge in development in general and environmental management in particular will help remove the impression among extension workers that research scientists are the only ones who generate technological innovations. Frio (1990) recommends that changing the outsider's attitudes towards indigenous knowledge requires specialized training which will have to be done in two stages. In the first stage, the resource personnel of the national indigenous knowledge resource centres will organize training for trainers' workshops. The extension trainers of the regional extension training institutes and extension education institutes of agricultural and rural development universities from various regions in the country should be the target audience for these workshops. The second stage would then involve regional extension trainers to provide similar training programs to the community level subject matter specialists.

In parallel, the extension educators of extension education institutes of agriculture and rural development will conduct training programs for research scientists on the methodologies for recording indigenous knowledge systems. However, to succeed in the above, Salas and Tillman (1989) suggest that a training manual on methodologies to identify and record indigenous knowledge systems to supplement the training program should be developed. The said manual should be based on the rural people's forms of communication which are related to their everyday socio-economic realities that have their own seasonal and life rhythms. Warren (1992) notes that the identification of the problems which include biological as well as socio-cultural limiting factors or inefficiencies in the use of resources that restrict the productivity or sustainability of a given natural resource should be done jointly by biological and social scientist in consultation with the local community members. In this regard Chambers (1983; 1993 and 1997) observes that in so doing, local community's perceptions regarding needs and priorities should be taken into account. He further emphasizes the need for local community members to be viewed as co-researchers, developers and extensionists who can provide crucial inputs into determining what environmental problems to address and what indigenous knowledge system is best suited for the same. The identified and clearly defined problem and suitable indigenous knowledge system that has been used by the local community with success should be recorded by the social scientists in coordination with respective disciplinary scientists.

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Warren (1990) observes that in spite of increasing awareness about the significance of indigenous knowledge systems in development, lack of suitable methods to document it creates a vacuum. In this regard, Jorgensen (1989) recommends that participant observations are effective in identifying various indigenous technical practices such as those used by peasant farmers. Accordingly, participant observation begins the moment the participant observer makes contact with a potential field setting. Besides collecting information, the aim of this initial observation is to familiarize with the insider's world so as to refine focus on subsequent observations and data collection. Jorgensen (1989) says that these observations should be recorded as soon as possible and with the greatest possible detail because never again will the researcher experience the setting as so utterly unfamiliar. Rhoades and Booth (1982) note that unstructured relations between the scientific experts, social scientists, field extension personnel and the local community members has to be ensured since it is critical in identifying and documenting information pertaining to indigenous technical practices (ITPs) during participatory observation. The information to be collected should include the local community's beliefs, values and customs as well as the process of decision making when selecting the ITPs. Thus, the interaction between the participants will provide an in-depth understanding of the emic perspective of the local community. Jorgensen (1989) contends that the success of unstructured interactions in extracting information related to indigenous technical practices lies in the careful involvement of local key informants especially the sages. He further argues that in order to obtain current, accurate and relevant data, participatory Geographic Information Systems approach is critical in supplementing participant observations above as observed by Jordan and Shrestha (1999).

Warren (1991) pointed out that the knowledge acquired together with past field experiences by the subject matter specialists (SMSs) should be used to validate the local community's experiences through encouraging the local community members to replicate their own experiences in their own environments. This will enable understanding of these experiments in the socio-cultural and agro-ecological environments. Besides, it also helps in determining the impact of the experiments on productivity, profitability and sustainability of the identified and documented indigenous knowledge systems. Dissemination of these knowledge systems can be through farmer-to-farmer communication, using existing agricultural extension agents, organizing village workshops and incorporation into formal educational curricula in schools' colleges and universities

5.0 Discussion

5.1 The Evolution of Participatory Development Approaches in managing natural resources.

For a long time, the centralized approach to development including natural resource management was the main management paradigm until two decades ago when a move towards more participatory management models started gaining popularity (Berkes 2007; Gavin & Vasquez, 2007). Chambers (1997; 1983) reports that the participatory approaches to development owes much to the "Freirian theme" that the poor and the exploited local communities can and should be enabled to analyze their own reality of life. It is thus associated with the adult education activist methods of Paulo Friere and the study of clubs of antigonish movement in the 1970s. On the other hand, Mulwa (2007) indicates that due to the growing dissatisfaction among the general development experts and especially the natural resource conservationists with both the reductionism of formal surveys and the biases of typical field visits in the late 1980s, the coining of the phrase "rapid rural appraisal" by Chambers to describe techniques that could bring about a reversal of learning was necessitated. Accordingly, two years later in 1985, the first conference to

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share the experience relating to RRA was held in Thailand. This was later followed by a rapid growth in the development techniques that involved the local communities in examining their own problems, setting their own goals and monitoring their own achievements. This, therefore, represented a shift from the previously dominant top-down technocratic forms of approach that imposed on diverse local realities often resulting in failure in general development projects including environmental management initiatives.

Freire (1970), Chambers (1993), Brechin *et al*. (2002) and Menzies (2007) contend that participatory models to development in general and natural resources management in particular emerged as a response to the ineffectiveness of the state managed conservation thus resulting in a need for models to involve local communities with other stakeholders in conservation programs. Indeed, the central thrust of these approaches is decentralization and empowerment of local communities especially the poor and vulnerable groups who can be enabled to take more control over their lives and secure a better livelihood with ownership and control of productive assets as the key element. On the basis of the above, the present study contributes in establishing appropriate procedure for engaging local communities such as the Meru in mapping resources in general and indigenous knowledge in particular for the development of an integrated environmental management framework.

Horwich and Lyon (2007); Spiteri and Nepal (2006) and Tai (2007) concur that high level/informative community participation in natural resource management is of paramount importance. Accordingly, a more participatory approach to the management of these resources has the greatest potential of generating a legitimate process of conservation that is regarded as right and just by the people most affected by the effects of natural resource degradation as argued by Brechin *et al.* (2002) and da Silva (2004). Furthermore, Berkes (2007) notes that active/informative participatory process in conservation management increases compliance and reduces conflicts arising from the restraints in resource use that is intrinsic to any biodiversity conservation management. Besides, active community participation in natural resource management makes enforcement of conservation regulations less costly as self-regulation is usually preferable and often more effective than government agency control. Self-regulation can be achieved through peer pressure and good example particularly when people work together in community groups that are formed to address some specific community/group issues/problems (Kothari, 2006).

Likewise, Tai (2007) argues that informative community participation leads to effective mobilization and utilization of local knowledge and skills since local people better understand the dynamics of their environment and its problems. Besides, the local contribution brought about by active community participation also increases the flexibility and responsiveness of community initiatives to local conditions than when development initiatives are designed without the knowledge and views of the intended beneficiaries. Similarly, Grumbine (1994) contends that active community participation in natural resources conservation assists in sustainability because when people initiate and actively participate in the establishment of a project, they are likely to remain motivated since they have invested their own hopes and resources. Furthermore, there is often greater stability in well-established communities than in government agencies with high staff turn-over. Participation between communities and governmental and non-governmental agencies provides a unique possibility for achieving long-term sustainability in environmental conservation as observes da Silva (2004).

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Borrini-Feyerabend (1996) further argues that active community participation brings about capacity building of all the stakeholders involved in the conservation project through sharing of different views and opinions. In this regard, when people take part in addressing environmental problems and opportunities, they acquire information and new skills which may result to self-reliance and community building of group identity. Thus, this bottom-up approach can unite communities and provide the impetus for them to solve their own problems. More so, informative community participation in environmental conservation leads to the sharing of responsibility with other groups with a range of demands thereby enabling solving certain conflicts that are likely to arise in the team. Brechin *et al.* (2002) observe that such involvement is also likely to increase citizen's understanding of how government and other stakeholders operate and may have the potential to reduce criticism of government agencies and thus improve the support for bureaucrats and elected government representatives. The above is due to the fact that through informative engagement/ participation, people sit down together, listen to each other, interact and address problems with the previous barriers becoming more porous thereby resulting to the building of confidence among participating members (Thomas1995). In this regard, the present study contributes to the existing conservation literature by examining the importance of active community participation in development projects in general and in designing an integrated environmental management frame work for Meru community in particular.

5.2 Reasons for low Level of Participation in the Environmental Management in the community

This study further shed light on the reasons behind the above levels of community member's participation in the making and passing of decisions that were critical in the attainment of sustainability in environmental management in Meru community. Accordingly, those who were regularly involved attributed their level of participation to their closeness with the organizers of the community forum who included officials from relevant government departments, private sector, NGOs and the local administration. Also, some of them indicated to be patrons or officials of local environmental clubs or to have a natural love for environmental cleanliness, have the social-cultural belief of being obligated to take care of God's creation, concerns about enhancing community livelihoods and the need to improve agricultural productivity. However, among the majority of the respondents who indicated not to have been involved in community groups that carried out deliberations to conserve the environment, gave several challenges they encountered in their bid to participate in the same. The majority blamed their low or non-involvement on their systematic exclusion from any organized events by the officials of the concerned environment conservation agents whom they described as not having respect for the locals and never listened to them thus making it extremely difficult to work with the same. The above was clearly articulated by members of focus groups, as well as nearly all the elders interviewed and those who participated in the follow-up discussions.

The above sentiments were especially expressed by elders who lamented that most of the representatives of agencies working in the various government departments, Private sector, NGOs, happened to be foreigners who did not understand the local culture of respecting elders and recognizing their significance in contributing to environmental conservation. Accordingly, these officials together with the local administration most often than not dominated the talks and decisions made during many organized by community leaders thereby discouraging participation by some community members. Similarly, they reported not to be motivated to participate in such

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forum because the emphasis was always on the modern scientific methods with very little or no reference to the traditional methods which most elders strongly believe to have greatly enhanced environmental conservation in the previous times. In the words of Njuri Ncheke elder observes that community members present were only casually asked basic questions such as evidence of environmental challenges and their causes but were never asked to suggest the way forward nor how they had addressed similar challenges in the past thereby discouraging some members from attending such forums.

The study also found out that the location and distance to the meeting venues which in most cases were situated at the district or divisional headquarters acted as a deterrent factor to the participation particularly by elderly, the sick as well as those with different forms of disabilities. Also, low or lack of motivation due to non- reimbursements to those who used their own resources to attend such fora was cited as a challenge. Similarly, language barrier that led to intimidation by the local administration featured as an obstacle to the participation of the majority of the community members in environmental decision-making processes in Meru community. Furthermore, ignorance regarding the importance of a secure and clean environment was also seen as another factor contributing to lack or low level of community members' active involvement in environmental conservation activities as exemplified by responses such as government employees being paid to care for the environment. Again, communication breakdown and delays featured prominently as greatly contributing to failure by many community members to attend conservation fora that engaged in mapping out strategies for sustainable conservation of the various elements of the bio-physical environment in Meru community. Further, cultural beliefs that such Njuri Ncheke meeting were a male activity that appeared to be upheld by most community members also seemed to be contributing greatly to low level of community members" especially female participation in environmental conservation activities in the community.

5.3 Effectiveness of indigenous knowledge resources in natural resource management

In discerning, the effectiveness of IEK in resource management and conservation efforts, previous theoretical, conceptual and empirical literature shows that IEK has a significant impact on the environment. First, indigenous people with the aid of IEK have been able to manipulate natural vegetation with significantly better results for several millennia (Donovan & Puri, 2004). Second, IEK enhances the resilience of socioecological systems because its knowledge is accumulated through experience, learning and inter-generational transmission and survival in a complex ecosystem (Barnhardt, 2014). Maila and Loubser (2003) consider IK as part of the global heritage that can be utilised for the benefit of all humanity and directly connects people to their environment and the climatic changes occurring within it (Nyong *et al.*, 2007). Due to this, advocates have supported the use of IEK in natural resource management and conservation (Huntington, 2000) as illustrated by empirical evidence gathered from different regions of the world such as USA, Canada, New Zealand and many others, where TEK/IEK has been extensively applied. These examples have shown that IEK resources have aided the management and conservation of natural resources. Therefore, what is required is a more and deeper partnership of traditional indigenous knowledge and science to solve conservation problems and emerging climatic change issues while strengthening the network of community conserved areas and the engagement in ecosystem-based management (Berkes, 2009).

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5.4 The Njuri Ncheke in the management of natural resources in Meru community.

The Ameru are one of more than 42 different ethnic communities/tribes found in Kenya. Their language is Kimeru and they practise agriculture and animal husbandry as the two main modes of subsistence. Land is therefore key to the community's life. It secures for them that peaceful tillage of the soil that is central to their livelihoods. In addition to the formal governance systems instituted by the Kenyan state the Ameru people have retained a traditional jurisdictional system of governance known as Njuri Ncheke, which is one of the defining elements of Ameru society. While other traditional ways of life that defined their ways of life have successively disintegrated in the recent decades as result of colonialism, Christianity, westernization and cash-based economies, the Njuri Ncheke has survived and thrived. The Njuri Ncheke Njuri Ncheke literally translates to "narrow jury" and it is the pinnacle of the Ameru traditional judicial system. It has a male only membership and is the highest social rank to which a Meru man could aspire, more so in the past when entry into the council was much more highly restricted and rigorous.

Membership to the council is restricted to elders of absolute integrity and maturity, those that command high respect at the community level, possess great wisdom, an intricate knowledge of the traditions, impeccable self-discipline and honesty. This is important because they are involved in performing functions for which credibility is crucial. The roles of the Njuri Ncheke include settlement of disputes, creating and executing tribal laws, acting as custodians of tribal culture, regulating the use and conservation of open grasslands, salt-licks, sacred sites and forests. The latter function involves making decisions regarding protection of indigenous tree species, inter-planting trees with crops and conserving indigenous sanctuaries. The Njuri Ncheke is the only traditional judicial system recognized by the Kenyan state through the 2010 constitution. For this reason the Njuri Ncheke wields a lot of political influence among the Ameru people and by extension in Kenya mainly due to their astute and strategic political organization. Bound by a strict oath of secrecy, the revered Njuri Ncheke, which has for centuries been the preserve of tough-talking elderly men, commands respect, awe and fear in equal measure. Membership in the council involves swearing an oath in a ceremony conducted at sacred shrines. The only aspect of this oath that is public knowledge is the promise to uphold absolute integrity. Failure to adhere to the oath is severely punished through one or more curse(s)

The Njuri Ncheke is regarded as the traditional government of the Meru people. It has deliberative councils that meet at local and regional levels to issue orders and resolve disputes. Membership in the Njuri Ncheke is open to all adult Meru men but requires an initial financial contribution and on-going commitment to exhibiting good behavior and protecting Njuri Ncheke secrets. When asked about the criteria for joining the Njuri, elders in Igembe listed several moral qualities such as straight dealing, honesty, generosity, good work ethic, and calm temperament. Local Njuri Ncheke councils in Igembe have been active in settling a variety of disputes, such as land boundary disputes, inheritance disputes, family matters like marital disputes and child welfare, and small-scale crimes and misdeeds like theft. The Njuri is most well-known among local farmers in Igembe for its ability to compel people to tell the truth by administering powerful ritual oaths. The Njuri is not involved in regulating other crops but claim a special role in managing khat because it is Igembe's unique traditional crop. In addition, the pan-Meru Njuri council has explicitly embraced an environmental mission as part of its duty to look out for the interests of future generations of Meru. The Kenyan government has some ambivalence about working with the Njuri, even though the Njuri is now widely accepted as a legitimate forum for alternative dispute resolution.

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The British colonial government initially outlawed the Njuri as a witchcraft organization in the 1920s. Subsequently in the 1930s and 40s through a series of sympathetic district commissioners, the colonial government came to rely on the Njuri, particularly the pan-Meru Njuri Ncheke council that meets at Nchiru, to implement government policy, particularly things like health policy, e.g., ending female circumcision and improving sanitation, and land policy, e.g., controlling soil erosion and managing the transition to individual land ownership (Fadiman 1993, Thomas 2003, Krueger & Jacobs, 2016). During Kenyan independence, the Njuri sought greater local autonomy to govern in Meru, but this effort ultimately was rejected by Kenyan nationalists and the first President, Jomo Kenyatta, who insisted that Kenya could have only one government. Nonetheless, local Njuri Ncheke councils rose to prominence as a legitimate forum for resolving local property disputes during the post-independence transition from customary property to formal private property.

5.5 Njuri Ncheke and environmental Conservation in Meru community

A lesser known, yet important function of the Njuri-Ncheke, is the overseeing and enforcing the rules and regulations controlling the use and conservation of open grasslands, salt-licks and forests. Their work as conservators extends to the preservation of the Sacred Sites. The Njuri Ncheke is also influential in the socio-economic and political decision making amongst the Meru. The Council of Elders spearheaded the establishment of the Meru College of Science and Technology and donated 641 acres of community land in 1983 for its siting and development. Njuri Ncheke is represented in the University Council. Ncheke council has been able to use it as the monument for making decision on variety of issues, environmental conservation, settling land disputes, fighting crimes, promoting human rights, among others. Environmental degradation has been identified as a major challenge in Meru County. The main environmental challenges affecting the County include deforestation, soil erosion and destruction of water catchment areas. In addition, the Njuri Ncheke has also come out strongly against retrogressive traditional practices such as the Female Genital Mutilation (FGM) which was once a widespread vice among the Ameru. They have instead proposed alternatives rites of passage for girls (Muchui, 2013a). In Environmental and Heritage Protection, the Njuri-Ncheke oversees and enforces the rules and regulations on the use and conservation of open grasslands, salt-licks, forests, and other natural resources. The hallmark of conservation is enshrined in the Njuri Ncheke Shrine, which is located at the heart of Meru and sits on a twenty acres piece of land.

5.6 Njuri Ncheke Council of Elders Role as Guardians of Environmental Conservation

The Ameru have since the 17th Century been governed by elected and hierarchical councils of elders from the clan level right up to the supreme Njuri Ncheke Council. To become a member of the Njuri-Ncheke is the highest social rank to which a Meru man can aspire. The elders forming the Njuri-Ncheke are carefully selected and comprise mature, composed, respected and incorruptible members of the community. This is necessary as their work requires great wisdom, personal discipline, and knowledge of the traditions. The Njuri Ncheke is also the apex of the Meru traditional judicial system and their edicts apply across the entire community. The functions of the Njuri-Ncheke are to make and execute community laws, to listen to and settle disputes, and to pass on community knowledge and norms across the generations in their role as the custodians of traditional culture. Local disputes will invariably first be dealt with by lower ranks of the elders (Kiama), then the middle rank (Njuri) and finally the Njuri-Ncheke. However, Njuri Ncheke does not handle matters involving non-Meru people, or those that are expressly under the Kenya's

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common law. The determination of cases by the Njuri Ncheke, just like is for common law, relies a lot on case law and precedence.

A lesser known, yet important function of the Njuri-Ncheke, is the overseeing and enforcing the rules and regulations controlling the use and conservation of open grasslands, salt-licks and forests. Their work as conservators extends to the preservation of the Sacred Sites. The Njuri Ncheke is also influential in the socio-economic and political decision making amongst the Meru. The Council of Elders spearheaded the establishment of the Meru College of Science and Technology and donated 641 acres of community land in 1983 for its siting and development. The college was in 2008 upgraded to a University College of Jomo Kenyatta University of Agriculture and Technology (JKUAT) and in early 2013 awarded a charter by H.E Mwai Kibaki - the then President of Kenya and renamed Meru University of Science and Technology (MUST). Njuri Ncheke is represented in the University Council. The study discusses the njuri ncheke institution, the supreme decision-making organ among the Ameru people. The term njuri ncheke means the narrow jury. Njuri ncheke members are mature men believed to be almost faultless and people of high moral standing. The njuri ncheke elders are the manifestation of TJS in this community. They are the custodians of the Ameru TK, culture, customs and traditions, and have developed a system of customs and practices for protecting their TK. These include the use of community sanctions and oaths to govern disclosure of TK. Moreover, the njuri ncheke are customary governance or legal systems of TK holders and are also being used as the first port of call for disputes (including land, family and political) in the community.

6.0 Conclusion

This paper concludes by using the tent of Conway (1997) who observes that given time; everything that is old will become new again. In this regard indigenous knowledge is an essential element in the development process and the livelihoods of many local communities. The challenge lies in how to reconcile IK and modern science without substituting each other. No living community is absolutely poor, every community has resources. A resource is any good or service that is relatively scarce and relatively useful. Indigenous knowledge is one aspect of a resource. IK is a social fabric that can positively be used to control issues of ethnicity and especially in Kenya where tribal clashes are known to erupt. IK is used for peace and conflict management in communities. It is inherent in microfinance support. Such knowledge and understanding of the original issues that appear thorny all the time would bring to an end the troubled and perceived enmity in the ethnic groups. When such issues are resolved, then development issues are easily agreed upon and enforceable without one community having to refer to another as an adversary.

Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with peoples' cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives. Though Kenya is a little advanced in using IK in its development policies (devolution) a few other countries in Africa are similarly engaged such as South Africa, Cameroun, Tanzania, and Ghana. Areas of more scrutiny should be how IK can be transferred from one community to another without having to get a resource person to interpret the meaning as some cardinal facts are lost in the process. Yet, every community has its own IK that cannot be easily put into pen and paper; it is more observable and more participatory.

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Challenges of reserving and preserving still exist. However, for as long the generation of mankind exist, and the willpower to cascade the knowledge to the next level generation exists, and an interest of the upcoming generation exists, IK could overcome the storage challenges of the time. The concept of IEK is based on the holistic nature of IKS which views the socioecological system not as individual parts but as a unified whole, thus it considers humans as part of the whole universe. Any imbalance arising from a component of the socioecological systems tends to introduce disequilibrium in the socio-ecological system and these calls for the appreciation of the IK as a comparative and alternative knowledge system. In particular, a qualitative study on IEK can help to replace overt and simplistic underscoring of its contribution to environmental and natural resource management and climate with notions of sustainability, co-evolution and reciprocal relationships between communities and their environment. The scientific publications have increased the emphasis on climate change studies but they have not been able to resolve some of the underlying changes in the environment. They have therefore recognised the impact of the indigeneity of the knowledge derived from the natural ecosystems and have validated its use in natural resource management and sustainability in the efficiency, diversity and resilience of social and ecological systems.

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