Tanzanian Journal of Population Studies and Development, Vol. 29 No. 2, 2022: 84-106

Preferences of Communication Systems For Climate Change Adaptation Among the Maasai Of Ngerengere in Morogoro Region, Tanzania

Dotto P. Kuhenga[1]

Abstract

This paper examines the type of communication systems used between indigenous and modern systems for climate change adaptation among rural communities like the Maasai of Ngerengere, Tanzania. The aim is to find out why such communities prefer particular communication systems. The study was informed by the conceptual framework of Western science versus indigenous knowledge binary tensions approach, and the interplay of indigenous and modern media systems for climate change adaptation. It employed the embedded case study design, with data being generated through interviews, documentary review and observation. The sample included the Maasai community, Ngerengere extension officers, and media experts and veteran journalists on climate change. The findings indicate that indigenous communication systems are the most preferred ones in communicating climate change adaptation information among the rural Maasai community of Ngerengere, followed by the use of both systems whereas modern communication systems play second fiddle to the indigenous ones. This article concludes that particular communication systems are preferred for climate change adaptation by rural communities because of their interactivity, proximity to meeting community needs, ability to effect change and their trustworthiness. It recommends that policy formulation and intervention should support indigenous communication systems by encouraging their usage in relevant rural areas, and the provision of supportive resources. Also, the governments and stakeholders should promote the use of indigenous-modern communication systems, such as community radios, which incorporate elements from both systems, for climate change adaptation, as well-received interventions among rural communities.

Keywords: *indigenous, modern communication systems, climate change, adaptation*

1. Introduction

Global response to climate change consists of adaptation strategies to accommodate the adverse impacts of climate change and related phenomena to modify the livelihoods and means of sustenance of communities that are vulnerable to climate change (Practical Action, 2010). Climate change adaptation refers to the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm, or exploit beneficial opportunities (IPCC, 2015). The tools that make up adaptive capacity,

[1] School of Journalism and Mass Communication, University of Dar es Salaam: kuhenga@udsm.ac.tz

 ▪ *https://doi.org/10.56279/tjpsd.v29i2.176*

therefore, include both tangible assets (such as financial and natural resources), and less tangible elements (such as skills and opportunities) to make decisions and implement changes to livelihoods or lifestyles. Communication or media is among such adaptive strategies as it plays a crucial role in disseminating useful climate information to guide practices, public debate and an understanding of the adaptation of climate change (Practical Action, 2010).

Modern systems of media include electronic forms of communication (e.g., television and radio), print modes of communication (e.g., newspapers and magazines) and internet-based forms of communication (e.g., Facebook, websites, blogs, etc.). These modes of communication help to create awareness, transfer knowledge, educate, mobilize or entertain (Warren, 1991). Indigenous media systems are also the main forms of communication for passing on indigenous knowledge on various issues such as strategies for climate change adaptation. In this research, the term 'indigenous' was used synonymously with the term 'traditional'. As applied in this study, tradition is the vehicle through which every person learns or is informed about something of the society, such as climate change, and a store of accumulated knowledge and prejudice of one's forefathers. This is in the form of artefacts, morality, behaviour, attitude and the like, that constitute culture (Kerubo, 2016). Music and music instruments such as drums are among forms of indigenous media systems (Ojebode, 2002). Generally, communication systems, which enable access to knowledge and information, are therefore a necessary component of climate change adaptive capacities (Practical Action, 2010). The importance of communication systems or media in communicating information on climate change, especially climate change adaptation, is particularly emphasized by Beck (1994: 23) who notes that "… climate change risks can be changed, magnified, dramatized or minimized within knowledge, and to that extent, they are particularly open to social definition and construction."

Notably, there is an increasing emphasis on the use of both indigenous and modern communication systems for communicating climate change information, especially when formulating strategies of adapting to the effects of climate change (Pippa, 2008). The integration is meant to tap into their existing traditional systems of adapting effects of climate change and incorporating them with modern communication systems for adapting climate change. Ison and Russell (2007) suggest that any efforts aimed towards adapting the effects of climate change should incorporate indigenous knowledge of systems of climate change adaptation.

Accordingly, this article analyses the views of the rural people—the Maasai of Ngerengere Division as respondents in this context—on the preference of particular communication systems for climate change adaptation. In particular, the study focuses on the suitability of indigenous communication systems; indigenous communication systems and information needs on climate change adaptation; suitability of modern communication systems; and how such modern communication systems meet information needs on climate change adaptation in the study area. In addition, it focuses on the type of

communication systems—between indigenous and modern ones—which the Maasai of Ngerengere prefer for information dissemination in climate change adaptation in their area, and the reasons for such preferences.

The Maasai are a Nilotic ethnic group of semi-nomadic people inhabiting East Africa, and are among pastoralists who occupy 70% of the total land of Kenya, 50% of Tanzania, and 40% of Uganda (Fratkin, 2001; Jens, 2000). Being semi-nomadic, the Maasai—such as those living in Ngerengere—follow seasonal changes in climate with their herds. Their livelihood is communally-based and relies on their herds for subsistence (Kerubo, 2016). Keeping of cattle or pastoralism (a land-use system associated with the use of natural rangeland encompassing humans, rangelands and herds as three interlinked pillars) is their most important economic activity and culture (Baxter, 1994). Climate change has essential impacts on livestock in multiple ways such as on production, performance; as well as by affecting the environment, society and the economy (FAO, 2016).

The gap that this study aimed to address is that there is limited knowledge on issues of how indigenous knowledge and communication systems complement modern communication means and knowledge on climate change adaptation, particularly in seemingly conservative rural-based communities such as the Maasai. In addition, though indigenous and modern knowledge and communication means exist in Tanzania's local communities on climate change adaptation, how they co-exist and in what manner, remains largely an unexplored issue, particularly among rural communities such as the Maasai. Therefore, in line with this study's objective, an examination of the particular communication systems used between indigenous and modern systems, for climate change adaptation among the Maasai rural community in Ngerengere Division, helps to fill in the said gap. The article explores how the use and preferences of the two systems is determined by their functionality, usefulness and effectiveness in meeting community needs in the context of climate change adaptation in rural-based and largely conservative communities.

The importance of investigating why the Maasai community in Ngerengere Division prefer particular communication systems for climate change adaptation relates to the fact that societies and individuals mostly prefer communication systems that provide them with two significant things. First, they seek an effective means for accessing various types of information related to their needs such as climate change, farming and day-to-day life; and second, they look for relevant content that would suit their community's needs (Mundy & Compton, 1995; Wilson, 2008). Through certain mostly preferred communication systems, communities generate, store, share, communicate and utilize information related to their needs and interests (Mundy & Compton, 1995). Communication systems or media directly affect government, education, environment, climate change, the economy, and other systems; hence they are central to organizing every aspect of life (Davison et al., 1982; Deacon et al., 2010). In this regard, this article explores

what constitutes the most preferred communication systems, and how centripetal they are to organizing climate change adaptation issues, strategies and activities among the Maasai of Ngerengere.

This article, therefore, analyses which particular communication systems used, between indigenous and modern systems, are used for climate change adaptation among the Maasai community in Ngerengere Division, Morogoro Region, in Tanzania. Following this section, the article presents the theoretical and conceptual frameworks underpinning the study, methodology, results and discussion, conclusion and policy recommendations.

2. Theory and Conceptual Framework

This study was informed by western science versus indigenous knowledge binary tensions approach by Mohan and Stokke (2000) and Briggs (2005). The approach describes the prevailing position—or 'accepted reality'—of how modern communication systems or media and indigenous communication systems media are represented as two different opposing knowledge systems, characterized by a binary divide due to their epistemological foundations. Hence, this study considered the assumption that the tendency of treating these two types of communication systems as discrete entities, separable from each other in space, has had an influence and impact on the preference to particular communication systems (either indigenous or modern) for climate change adaptation among the rural people. As Mohan and Stokke (2000) note, this tendency precludes dialogue and learning (interplay and functioning together respectively in this regard) between the two systems.

This study also employed the modified Lasswell linear communication model (Lasswell, 1948 in Fourie, 2012; Wilson, 2008) as its conceptual framework (Figure 1). This model describes communication and consists of five elements: '*Who* says *What,* in *Which Channel,* to *Whom,* with *What Effect?*' Commonly understood, the '*Who*' component implies the communicator or origin of the message or *sender*; and who formulates and spreads a message. The '*What*' component is the content of the message, or the *message* or information that the sender spreads. '*Which channel*' describes the *medium* or media that is/are used to convey and spread the message. '*To whom*' implies the receiver(s) of the message, also known as the *audience*, such as a target group or an individual. Finally, the *'What effect'* component implies the result the message leads to (for instance, in this regard, climate change adaptation).

As described in details by Wilson (2008), in indigenous communication systems such as village meetings, these five elements are: the *sender or source,* which is usually an individual or a group of people who act as the origin and giver of the message. The *message,* as the intended information to be communicated, can be a complex combination of verbal and non-verbal communication. Its content can include a variety of issues ranging from directives/instructions, announcements, news of events, deaths, upcoming events, etc. The *channel* is both the medium and the instrument for getting the message across to an audience. The venue where the

communication event is taking place is also seen as a channel. The *receiver(s)* (audience) of communication may be either an individual or groups depending on the nature of the message. The *effect* desired in indigenous communication may vary greatly according to the time of message delivery, the nature of the message (the urgency of informing affected groups) or how important the immediate response of the people may be (Wilson, 2008).

In modern communication systems such as radio, TV, newspapers and others, the five elements of this model happen differently, as described by Fourie (2012). The sender or communicator is sometimes a 'collective body', a group of people responsible for the production of news, information or programme. The medium or channel, which is the one that determines the name of a particular communication system, can now be radio, television, film, newspapers, magazines, the Internet, videos, etc. The message has both concrete and abstract meaning. The audience comprises listeners, viewers and readers. The effect implies the audience's making use or not making use of the message or content (concrete or abstract) communicated. The effect can be in many ways, and can be to either individual or groups/community at large, or both.

The application of the framework (Figure 1) was designated to enable an understanding of which particular communication system, between indigenous and modern media systems, is preferred for communicating climate change adaptation, especially among rural communities such as the Maasai of Ngerengere.

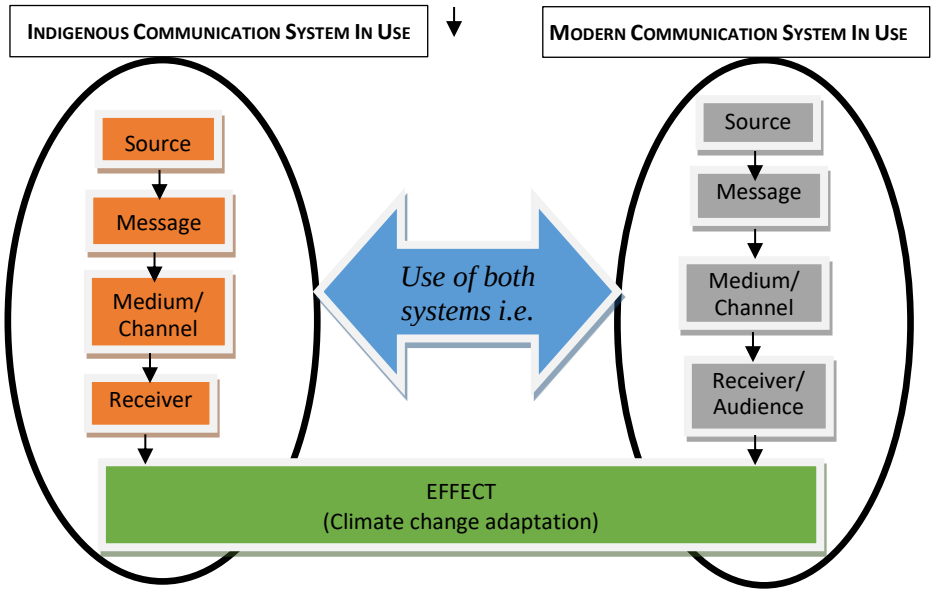

Figure 1: Interplay of Indigenous and Modern Communication Systems for Climate Change Adaptation Framework
Source: Lasswell (1948, in Fourie, 2012; Wilson, 2007, 2008).

3. Methodology of the Study

3.1 Location of the Study

This study was conducted in Ngerengere Division, Morogoro District, in Morogoro Region. Morogoro Region lies in the south-eastern part of Tanzania, between the central highlands and the coastal lowlands (Burgess et al., 2002). The district is located in the north-eastern part of Morogoro Region (Figure 2) and has a total area of 11,925km², which is about 16.34% of the total area of the region (URT, 2007). This study focused on Ngerengere Division, which has five (5) wards, namely, Ngerengere, Kidugalo, Matuli, Tununguo and Mkulazi (Figure 2). At an altitude of 100–300m above sea level, the Ngerengere area features sparsely wooded and rolling plains that connect the coastal lowlands with the higher elevations of the central region. River valleys and basins shape the landscape, and provide continuous water supply throughout the year. The bodies of water are crucial to the survival of the Maasai pastoralists during the dry season, which usually lasts from June to mid-November (URT, 2008).

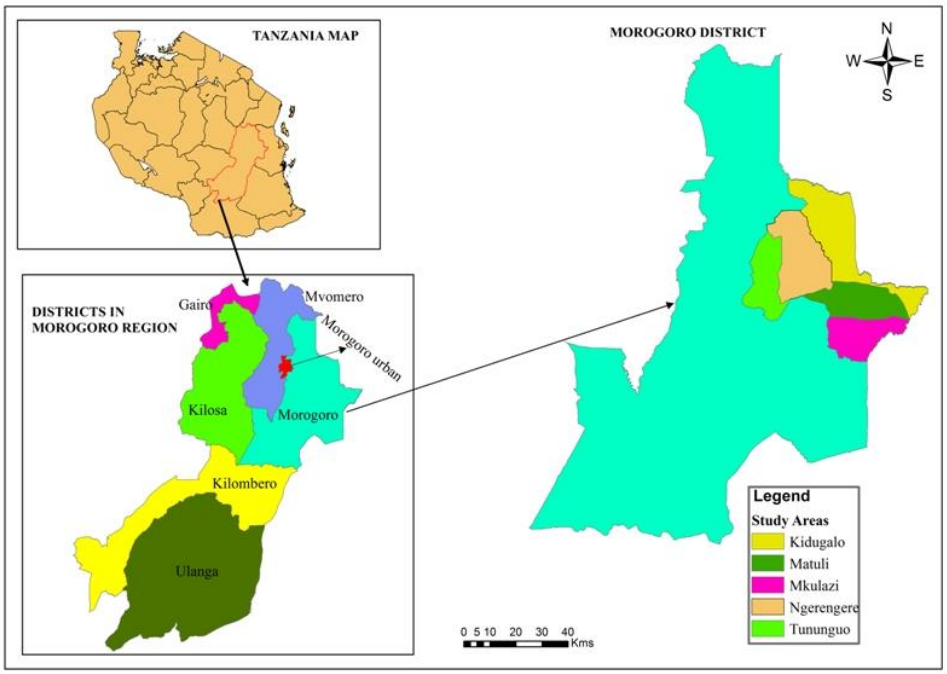

Figure 2: Study Area (Ngerengere Division and Wards)
Source: Field Data (2018)

Ngerengere was chosen as the area of study because, first, it is marked by both production systems: agriculture and pastoralism (Mero, 2011). Second, this is one of the areas which have proved to have more climate change adaptation

activities and options than any other part of Tanzania where such options—especially smallholders' adaptation options—are limited (Van Aelst & Holvoet, 2017). Significantly, pastoralism and farming activities in Ngerengere are attracted largely by the Ngerengere River. There is a high increase in the rate of agricultural activities and population growth in the downstream zone of the river, which exacerbates water pollution threats. The crops cultivated in Ngerengere include maize, bananas, tomatoes and vegetables (Kihila, 2005). The type of agriculture practised is a combination of irrigation and seasonal cultivation, complemented by the application of fertilisers and pesticides throughout the year (Mero, 2011). Finally, Ngerengere Division was chosen for this study because the area is an under-researched part of Maasailand compared to other Maasailand parts (Loos, 2014) such as the northern part of Tanzania, which includes areas such as Loliondo and Simanjiro, where many studies on the Maasai and their livelihoods have been undertaken (Ndesanjo, 2017). Hence, as Ngerengere Division has also exclusively both rural and urban areas (Loos & Zeller, 2014), this study was essential as far as exploring distinctive Maasai livelihood strategies such as those related to climate change adaptation.

The dominant economic activities in Ngerengere Division include livestock-keeping, crop cultivation and agro-pastoralism. The Maasai pastoralists, who are the most dominant residents of Ngerengere, graze their livestock on communal and government-owned rangelands, sometimes far from their homesteads. They have adequate knowledge on the weather pattern, and can cope well with climatic variability typical of semi-arid areas (Ndesanjo, 2017).

Four, out of five wards of Ngerengere Division, namely, Ngerengere, Mkulazi, Kidugalo and Tununguo were selected for the study. In all, 20 villages of these wards were reached. Matuli Ward was not selected because, based on official information from the local government leaders of the Ngerengere Division, it is not resided by Maasai people who were the subjects of this study.

3.2 Research Design

This study used an embedded case study design. This type of research design tends to involve more than one unit or object of analysis, and it is usually not limited to qualitative analysis alone as it can integrate both qualitative and quantitative methods. This research design investigates a multiplicity of evidence is at least partly in sub-units, focusing on different salient aspects of a case (Scholz & Tietje, 2002). Also, it allows for multiple units of analysis and the use of mixed methods to collect data, such as observation, survey and case study (an in-depth study of an individual or group of individuals) (Skogerbo, 2011). It is suitable for studies that explain and analyse variables and their relationships (Churchill, 2002). As such, it was relevant to the purposes of this study, which assessed preferences of particular communication systems for communicating climate change adaptation information among rural people.

3.3 Sample Size

The population of the study comprised individuals from households of the Maasai community living in Ngerengere Division, Morogoro Rural District, in Morogoro Region. The population of the study also involved agricultural and livestock extension officers working in various villages in Ngerengere Division; and media experts, preferably communication or knowledge systems experts; and climate change experienced people or senior journalists. First, the sample size of the study consisted of 60 Maasai respondents (who were both/either farmers or/and pastoralists) of Ngerengere Division who were purposively selected using the criteria noted above. This number was representative of the village population in the division mainly in terms of gender and age. The distribution of respondents in the four wards was as follows: Kidugalo – 15, Ngerengere – 18, Tununguo – 15, and Mkulazi – 12.

Further, the sample size also comprised 10 agriculture and livestock extension officers who were purposively selected from 10 villages (providing particular representative officers from each selected study wards) in Ngerengere Division; 5 senior or experienced environmental journalists (mainly members of the Association of Journalists for Environment in Tanzania-JET) and, finally, 5 communication/media experts from the University of Dar es Salaam, to provide informed insights on rural people's understanding of climate change. These made a total of 80 respondents.

3.4 Sampling Procedures and Justification

The research used a non-random sampling technique to select respondents among the population of the study at three levels: ward, village and individual levels. Ward and village (local government) leaders helped the researcher to purposively select the respondents. These respondents were chosen among residents of the Ngerengere Division based on their duration of stay in the area (which determined their familiarity with the activities related to climate change and understanding of the environmental and socio-political phenomenon at the study area). This helped in getting informed and 'strong views' on the subject under review (Deacon et al., 2010).

3.5 Data Collection

The embedded case design used allowed for both qualitative and quantitative data and strategies of synthesis, or knowledge integration. The study collected both primary and secondary data. Secondary sources of data included books, journals, articles, official publications, newspaper clippings, reports and seminar papers. Primary data, on the other hand, came from interviews, photographs and observation. In particular, semi-structured interviews were conducted with 60 Maasai respondents (who were both farmers and pastoralists), and in-depth interviews to 10 agriculture and livestock extension officers, 5 senior climate change journalists (mainly members of the JET), and 5

communication/media experts from the University of Dar es Salaam. While the researcher used interviews because they allowed face-to-face communication with the respondents, he also used the observation method to evaluate the climate change understanding of the Ngerengere residents. Documentary review was used to collect data and historical information on the subject of study. This study used observation during field visits to villages to complement the results of the interviews and documentary review.

4. Results and Discussion

As mentioned earlier, the study aimed to examine the particular communication systems used, between indigenous and modern systems, for climate change adaptation among the Maasai community in Ngerengere Division, in Morogoro. The findings of the study are dealt with in the sections that follow.

4.1 Suitability of Indigenous Communication Systems

From the findings, the Ngerengere Maasai respondents described variously what they found useful about indigenous means of communicating information on climate change adaptation in their area. They noted that in communicating information related to climate change adaptation, they preferred indigenous communication systems because such means were *instructive, all-inclusive*, and had *deference* and *respective sanctions*. In their explanations, indigenous communication systems were instructive in the sense that they had clear and easily understood mechanisms to access and use such systems. Being *all-inclusive* means that the access, use and benefits of these means were equally distributed to all members of the society: elders and youths, men and women, rich and poor, leaders and ordinary people. Also, indigenous communication systems had deference, implying that they were respected and accorded respectful discipline and implementation. Finally, indigenous communication systems were preferred because they have sanctions; that is, certain strict regulations, rules, beliefs and punishments, as far as the instructions to apply or not to apply such means or their content are concerned. One respondent, a pastoralist and farmer B1, explained these aspects thus:

> *"The best approaches are these indigenous means that allow the Maasai warn each other. For example, we have a tradition of giving more respect to what the Laigwenan says than what ordinary people might tell us. So I think this is better…. But also look at the Laiyoni who go to graze; it is not easy for them to access the mass media."*

Similarly, extension officers of the Ngerengere District concurred with this assertion on the merits (as mentioned by Maasai respondents) of indigenous communication systems in communicating climate change adaptation in Ngerengere, as noted by Extension Officer 2:

"Truly, we as experts depend on meetings but for their [Maasai] elders, they would convene their vigwena *when they note a threat from climatic change and they do not let us participate in those meetings. But such* vigwena *are useful as far as the needs of the community are concerned."*

In addition, communication experts and veteran journalists, drawing on their experience in research and coverage on the related subject, also identified the merits of indigenous communication systems. These merits, they noted, influence rural communities such as the Maasai of Ngerengere to prefer and use such systems in communicating climate change adaptation. According to these experts and journalists, indigenous communication systems are locally specific or targeted. They are also inexpensive and, hence, easily accessible; and their information (message) is easily understood, memorable, practical to communities' needs and abilities related to climate change adaptation, and can be trusted. Specifically, Communication Expert 2 provided the following elaboration:

"It is easy to understand indigenous communication systems, and to link them to realities surrounding them. Something you have experienced; for instance, when it is too hot, automatically there will be rain. So when you tell me from my experience, it is something I will remember: that 'when we reach at this point, there will be rain'. So, the message is more understandable. The information is memorable and practical; and again people trust information delivered in this way. Information in indigenous ways comes from those people they respect; so they trust it, and they will implement it."

These findings, coupled with field observation, suggest that indigenous communication is an important consideration in so far as a community's choice to use particular communication systems is concerned. Such a choice, as noted by Mundy and Compton (1995), also determines the role and usefulness of such communication systems on the community's needs, such as ways to undertake proper climate change adaptation processes. It is thus evident that rural communities, such as those of Ngerengere, prefer indigenous communication systems to modern ones because people are familiar with them; and can understand, trust, accept and handle them better than externally introduced systems. Indigenous communication systems are heterogeneous, flexible with time, location-specific, suited to local socio-cultural conditions, already in place, involve less costs, and are accessible to the majority of people in the community.

These findings are in line with opinions held by some scholars (Ansu-Kyeremeh, 1994; Mundy & Compton, 1995; Kidd, 2002; White, 2008), as well as with the conceptual framework of this study (modified Lasswell's linear communication model). This opinion considers the nature of, and particular aspects in, the (modified) model of communication as merits that influence rural communities towards certain means of communication, such as indigenous communication systems to disseminate information on particular issues, including climate change adaptation. In particular, the interactive, participatory, inclusive, relatively flexible, and spontaneous nature of indigenous communication systems

make particular systems preferable for community uses. The reason, as also argued by Epskamp (2006), is the fact that they influence indigenous societies to adopt certain climate change adaptation strategies.

These findings, especially the attendant merits of indigenous communication systems for rural communities such as the Maasai of Ngerengere, relate to some elements of the conceptual framework of this study. Among the major systems that form part of this model is the indigenous communication system that comprises the elements of *sender, message, medium* or *channel* and *message*. Accordingly, some of the merits mentioned by the respondents supportive of indigenous communication systems for climate change adaptation relate to such elements. For instance, the Maasai respondents found indigenous communication systems to be instructive and all-inclusive, in addition to being linked to the type of message a particular communication system carries, and the mechanism or medium/channel through which the message is transmitted. Being all-inclusive implies that receivers are properly targeted/treated, and the message is relevant or responds to the needs of the people.

As pointed out by experts and journalists in this study, by being locally specific or targeted, indigenous communication systems make messages relevant to receivers. That a particular communication system is inexpensive and easily accessible implies that the medium used is relevant and active; whereas the information being relayed is easily understood, memorable, practical to communities' needs and abilities. All this implies a practical use of the elements in the framework, namely, the *message* and (ability of) *receiver*.

Generally, the reasons why people prefer and use indigenous communication systems for climate change adaptation confirm that communication systems and their elements work as important agents of the social construction of reality function. In addition, these indigenous systems work in line with existing dominant social norms, beliefs, discourses, ideologies and values (Devereux, 2007). Thus, climate change adaptation and related processes that engage such rural communities should be undertaken while understanding the preferences to certain communication systems by such communities, and the contexts of the related reasons.

4.2 Indigenous Communication Systems and Adaptation Information Needs

The study aimed to establish the ways through which indigenous communication systems, as used by Maasai of Ngerengere, met their climate change information needs. Thus, the respondents explained how successful or unsuccessful these systems were in meeting the information needs of the community. According to the findings, respondents (Ngerengere Maasai respondents and extension officers) acknowledged the fact that indigenous communication systems mostly met the needs of the community related to climate change adaptation in the area. They pointed out how such communication systems met particular community needs,

including the provision of: practical options and solutions related to climate change adaptation; relevant and accommodating ways on climate change adaptation; a platform for both parties involved in the communication process (the *senders* or *givers* of messages, such as elders; and *receivers* of messages such as the community at large) can both interact; and, finally, the possibility of feedback and assessment of the effectiveness of the message or information given. Extension Officer 1 explained thus:

> *"For indigenous ways, elders know exactly that if you plant certain trees or plants such as bananas you will have water. This is because some trees, by nature, retain water, so elders tell children not to cut them. They use threats, and make people believe that if one cuts a particular tree, something bad will happen. They, too, have faith and pray for rainfall. So, indigenous communication systems give people options that are relevant to them."*

In other words, certain issues related to what communities anticipate from communication systems and the needs of the latter, especially with regard to climate change adaptation, are apparent. In particular, the information needs of a community include being fully made aware of its situation and options for change, and being assisted in resolving related challenges. Also, as noted by Fraser and Restrepo-Estrada (1998), a community needs communication systems to help it work towards consensus, plan actions for change and help it acquire relevant knowledge and skills. Communication systems should also help a community to improve its condition and the effectiveness of its institutions.

On the other hand, these findings differ in some ways with some assumptions of Western science versus indigenous knowledge binary tensions approach used by this study, and embraced by some scholars (such as Howes & Chambers, 1979; Warren, 1991; Agrawal, 1995; Escobar, 1995; Ellen & Harris, 2000; Herbert, 2000). In particular, these findings deviate from this model's position that development cannot emerge from the application of indigenous means; and that indigenous knowledge is a closed, parochial, unintellectual, emotional, and even a primitive and backward way of life. On the contrary, the study findings indicate that even indigenous communication systems are never backward or undeveloped, as they are useful tools through which the information needs of communities (such as climate change adaptation) are addressed.

Despite most of the respondents' views favouring indigenous communication systems because of their propensity to meet the information needs of the community related to climate change adaptation, some of them noted a few shortcomings of such systems. They reported that some of the systems were bureaucratic, untimely and took longer to reach some audiences; and had elements of rigidity, as Pastoralist/Farmer D3 noted:

> *"Indigenous methods are stronger for they are believed; and there are sanctions on non-conformists. With elders, we still have our unchanging customs that help us; but if there quick changes, it takes a long process to get to such changes. Our methods [indigenous] are not that fast."*

This view can, arguably, be linked to some shortcomings of communication systems as far as their facilities for operation are concerned. As pointed out by some scholars, such as Herman and Chomsky (1988), communication systems do not operate in a vacuum; instead, they are also influenced by political, social and economic contexts. For instance, communication systems deploy—or may be influenced—by systematic propaganda. This propaganda, according to Gurevitch et al. (1982: 2) implies the use of interpretive frameworks consonant more with interests of the dominant classes than those of the audiences of the media or communication systems. As a result, as also pointed out by Herman and Chomsky (1988; 2002), communication systems sometimes no longer serve as the servants of the communities *per se*, such as being the 'fourth estate' or the watchdog of the political and social systems in countries. On the contrary, they are subordinates to the existing political and economic elites, and their work is largely a product of the elites' machinations.

All in all, the findings have established that information or communication needs of communities (such as the Maasai of Ngerengere) related to particularly climate change adaptation include the provision of real, timely, regular and accurate information on climate change adaptation; effective guidance on various climate change adaptation practices and options; and the provision of public debate and understanding on the weather and climate change. As it was also noted by Lwoga and Chilimo (2006) and Practical Action (2010), these needs revolve around the position that communication and information are important enablers of, and catalysts for, achieving set goals on climate change adaptation at a particular area more expeditiously. Thus, communication systems—indigenous systems in this case—which enable access to knowledge and information, are a necessary and key component of climate change adaptive capacities.

4.3 Suitability of Modern Communication Systems

The findings indicate that the Ngerengere Maasai respondents offered a variety of views to explain why they preferred modern means of communicating information on climate change adaptation in their area. They noted that in communicating information related to climate change adaptation in their area, they preferred modern communication systems because such means were research-based, universal, prompting and interrogative on issues, and allowed verifiability.

In particular, a research-based system imply that the information given by such a system is an outcome of scientific and proven research and facts, whereas universal communication meant that the system and the message by such a system was not only for a local community (e.g., Ngerengere community), but also for a larger community (regional, national or global). The claim that modern communication systems were prompting and interrogative on issues implied that the systems could use as many ways as possible to deliver messages and reach targeted audiences. For instance, such systems have different

programmes, advertisements, and many others that attract and bring closer the intended audiences to such systems. Finally, these systems allow for verifiability of meaning; that is, modern means provide many ways or choices to substantiate, verify or confirm the information they disseminate. Such ways include using other means to confirm information. For instance, one would verify the information read in a newspaper by listening to a radio or watching TV broadcasting related information. Pastoralist/Farmer B1 explained:

> *"Here [in Ngerengere], it is better to use modern methods; the experts could call elders and use screen projectors to show the impacts; and put some posters and that will easily deliver the message across the society. It is a good method; you can show the Maasai very dry grass conditions and other very green conditions; and convince them that the latter seem more favourable, given their way of life*."

Also, extension officers, communication experts and veteran journalists identified particular advantages of modern communication systems that influence rural communities such as the Maasai of Ngerengere to prefer such systems in communicating climate change adaptation. According to these experts and journalists, while modern communication systems reach many people at the same time and faster, their information is also systematic and researched. Furthermore, modern means can store information for future use, as Journalist 2 noted:

> *"Modern communication has strengths such as the ability to reach many people at a go and it is accessible from many places at the same time. Secondly, in some cases, targeted audiences may miss messages either because they are not listening in at that particular point, but they can get that information when the programme is broadcast again."*

Generally, these findings imply that modern communication systems are preferred and seemingly effective communication tools because, as pointed out by some scholars (Omenesa, 1997; Okwu et al., 2007), they can bridge the communication distance gap that is between the sender and the receiver of a message; they are also usually timely and capable of extending messages to the audience regardless of where they are. In addition, as also pointed out by Folarin (1998), modern communication systems—especially the electronic media such as radio and television—certainly transcend the barriers of illiteracy and demand less intellectual exertion than other kinds of media messages.

Again, these findings relate to some elements that make up the modified Lasswell's linear communication model, the conceptual framework of this study. The modern communication system which comprised the elements 2—namely, *sender, message, medium* or *channel* and *message*—forms a part of this model. Accordingly, benefits of modern communication systems for climate change adaptation, as identified in the findings, relate to—and reflect—such

[2] As noted earlier, the last element, which is *effect* (particularly climate change adaptation) according to the model or conceptual framework used, is, arguably, a result of the working of a particular communication system (indigenous or modern communication systems), separately or together with another system.

elements as found in the model. For instance, as noted by Maasai respondents, modern communication systems are research-based and universally link the type of message given with the mechanism or medium/channel through which the message is given. Prompting and interrogative refers to the kind of medium or channel and the sender, and their different means of delivering the message to the audience. Verifiability refers to the type of audience or receiver (and their ability to verify information), and the presence of numerous messages (on the same issue) and channels to enable the audience to choose which one bears relevant information.

Furthermore, as pointed out by communication, livestock and agriculture experts and journalists, modern communication systems reaching many people at once and fast refers to the kind of receiver, and the medium targeted and used, respectively. Modern communication systems' information being systematic and researched (use of experts) refers to the kind of sender and message involved. 'Modern' means the ability to store information for future use: again, this refers to the kind of channel used and the sender, as well as their respective ability (usually technological).

Generally, this understanding on how such a communication model was applied in this study relates to the reasons that make modern communication systems deployable for climate change adaptation. The findings concur with the position by Mowlana and Wilson (1990), who underscored the fact that modern communication systems are used primarily because of their versatility, which facilitates their use in various types of communication purposes. Relatedly, Heeks (1999) noted that modern communication systems largely depend, in their operations, on the socio-political and economic context of the society, which also determines the usage of such systems. Thus, the preference and merits of certain communication systems by a community for mediating issues such as climate change adaptation are determined by several factors, especially socio-political and economic contexts as the elements in this study's model like *sender* (such as their expertise, knowledge), *medium* (technology, policies), *message* (needs and interests of the target audience and so on), and many others.

4.4 Modern Communication Systems and Climate Change Adaptation Information Needs

On this aspect, the study aimed to determine ways in which modern communication systems, as used by the Maasai of Ngerengere, met their climate change information needs in their area. In this regard, the respondents explained how successfully or unsuccessfully such modern communication systems met such community needs. The respondents (Ngerengere Maasai respondents and extension officers) explained how modern communication systems met community needs related to climate change adaptation in Ngerengere in terms of the provision of broad/global knowledge (information

that is not only based on a community's locality, but also on the wider or global arena); setting or initiating motions for debates (introducing new things or issues; and letting the community know, ponder and deliberate on the same); and accommodating diversity (getting universal information targeting anyone regardless of gender, race, education and age). In this regard, Pastoralist/ Farmer B14 gave the following comment:

> *"On the issues of weather and climate change, we hear about them; for example, through radio broadcasts we know when it is going to rain. We do not have a reliable source of such information, but we are used to our environment; that is how we go by what is happening around us. I have a television set, and I watch weather forecasts and newscasts; and because of this, I get to hear about new things happening even in other places."*

These statements indicate that modern communication systems perform particular basic tasks in contemporary society to address particularized information needs. Such tasks, as pointed out in the findings, include observing and informing; participating in public life (Christians et al., 2009); functioning as independent actors and watchdogs; and providing a channel, forum, or platform for extra media voices or sources to reach a self-chosen public. In fact, such modern communication happens to serve as informational, educational, persuasion and entertainment tools in society. As observed by Omenesa (1997), they are universal and versatile media of communication that can be used for the benefits of the broader society.

More significantly, the findings conform to the position by Practical Action (2010): that modern communication systems, like any other communication systems, ought to address several information or communication needs of communities (such as that of the Ngerengere Maasai) related to climate change adaptation; offer real, timely, regular and accurate information on climate change adaptation; offer effective guidance on various climate change adaptation practices and options; and provide public debate and understanding on the weather and climate change.

Furthermore, although most respondents' views acknowledged that modern communication systems had benefits that enabled them to meet community's information needs on climate change adaptation, some respondents (especially journalists and communication experts) noted a few shortcomings in such systems. These include the systems having irrelevant and artificial programmes or articles; are more urban-based; and have less connectivity or proximity with their audience, as Journalist 5 noted:

> *"There are not many programmes, especially those tailored for disseminating climate change issues. So, even if farmers have access to the radio they may not get enough of the information they need to adapt to climate change. Recurring droughts have frequently caused clashes between farmers and pastoralists who are jostling for dwindling pastures and water for their animals. If there was enough information on the weather and what the pastoralists/farmers needed to do, probably such conflicts would have been avoided."*

Despite the findings, especially views from respondents, indicating that modern communication means address various climate change adaptation communication needs community's, certain challenges face these systems. Such challenges, as detailed by MCT (2017), include their complex nature in terms of technology they use, high cost hence largely unaffordable to the majority of the rural folks, and other accessibility issues. Thus, acknowledging abilities and benefits of such communication systems to meet community's needs, especially those related to climate change adaptation, should also consider attendant challenges.

4.5 Preference of Particular Communication Systems for CCA: Choice and Reasons

This aspect was aimed at further expansion and discussion of the understanding presented in the preceding sections. In particular, in these sections the study explored what the Maasai of Ngerengere respondents found as the merits of both indigenous and modern systems as far as communicating information on climate change adaptation in their area was concerned. In addition, the sections explored how both indigenous and modern means of communicating climate change information met specific information needs of the people, and how successful or unsuccessful they were in meeting these needs, and relevance related to communicating climate change adaptation in Ngerengere.

In view of the qualitative findings, the quantitative findings indicate that, of the 60 Ngerengere Maasai respondents interviewed, 20(33.3%) admitted they preferred indigenous communication systems; 17(28.3%) preferred both systems (indigenous and modern); nine (15%) preferred modern communication systems; and 14(23.3%) did not provide any response to this question, as Table 1 illustrates.

Table 1: More Preferable Type of Communication System

Responses	Frequency	Percent
No responses	14	23.3
Indigenous communication system	20	33.3
Modern communication system	9	15.0
Both systems be used	17	28.3
Total	**60**	**100.0**

Source: Field Data (2018)

The ranking in Table 1 shows indigenous communication systems as the most preferred systems (33.3%) by the Maasai community of Ngerengere in communicating information related to climate change adaptation. This is followed by preference to use both systems (indigenous and modern) (28.3%), whereas modern communication systems come last (15%). The reason for these choices, according to the respondents, are related to the following reasons: interactivity (accommodating their situations, integrating them); proximity to

meeting needs (being relevant to their needs and interests); ability to effect change (responding relevantly to their needs); and being more trustworthy (their message was relevant to them, and could be followed to bring results). In this regard, Pastoralist/Farmer A10 noted:

> *"We need to try hard to invent our own [indigenous methods] instead of repeating the white man's inventions. The former President of Tanzania [Julius Kambarage] Nyerere said we should wait; the elites are coming. Now you have come; but you lead us astray. We used to make matches which we kept improving until they became perfect. We need to improve our innovations."*

From field observation, it emerged that the use of indigenous communication systems was so apparent in meetings and instructions by Maasai elders, embracing as they did, local traditions and practises compared to the use of modern means (with the use of the radio, mostly for music entertainment). Extension officers in Ngerengere also concurred with the views of the Maasai respondents that indigenous communication systems were the ones preferred more than modern ones in informing people about climate change adaptation, as Extension Officer 2 further noted:

> *"I would suggest that indigenous methods be used more often because they are the most frequently used means here, and they command respect. If we say we use TV, only a few will watch or hear; but for indigenous methods, all can hear at a go, and people will likely take to action."*

These findings generally indicate how and why particular communication systems cannot only be preferred by a community but also how they can be maintained to serve certain purposes and needs of such a community, including disseminating climate change adaptation information. In particular, and as observed by Poberezhskaya (2013), for communities to prefer certain communication systems, they must be relevant and effective in terms of performing the functions as per the needs of the society they serve. For instance, in terms of climate change and climate change adaptation issues and needs in a society, such communication systems should perform particular functions. These include translating the abstract threats of climate change reported by science into the language of the public; informing people's opinion; shaping perceptions and reactions to the danger posed by climate change; serving as mediator between the people, science, business and policy makers; and prescribing responsibility for the creation and resolution of problems (Poberezhskaya, 2013).

As these findings have established, the fact that indigenous communication systems are preferred in informing the local community of the study area about climate change adaptation, this disagrees with the assumptions of Western science. Earlier researchers, including Chambers (1979), Warren (1991), Agrawal (1995), Ellen and Harris (2000), and Herbert (2000) consider only Western science or modernization (such as modern communication systems and their content) as open, systematic and objective, dependent on a detached centre of rationality and intelligence; whereas indigenous knowledge is closed, parochial, unintellectual,

emotional and even primitive. Contrary to this assumption, these findings show that even indigenous communication systems are useful and relevant to indigenous communities and their needs related to climate change adaptation.

The significance of indigenous communication systems lies in people being familiar with them; in addition to understanding, trusting, accepting and handling them better than externally introduced modern ones. More critically, in some ways this preference of indigenous systems appeared to be based more on the nature and type of channels used rather than on the content (*message*). Accordingly, this was evident as the main reason for preferring certain communication systems for climate change adaptation. Information dissemination was based on reasons related to channels, as noted by Mundy and Compton (1995), in that such systems were heterogeneous, flexible in time, location-specific, suited to local socio-cultural conditions, already in place and so involving less costs, and accessible to the majority of the community. Hence, channels or media of communication act as significant factors in influencing people's choice and preference of certain communication systems. Again, as pointed out by Nsi (2003), indigenous peoples are more receptive to messages delivered using traditional than modern communications systems.

5. Conclusion and Recommendations

This study has established, and thus concludes, that indigenous communication systems are the most preferred in communicating information related to climate change adaptation in the study area, followed by the use of both indigenous and modern communication systems. Pure modern communication systems were found to be the least preferred, particularly when the indigenous ones were left out of the equation. The reasons for these choices, as pointed by respondents, included the interactivity of the preferred communication systems (accommodating their situations and integrating them); proximity to meeting needs (being relevant to their needs and interests); ability to effect change (relevance and sensitivity to the communities' needs); and being more trustworthy (the communication systems' messages were more relevant and practical when it came to meeting the needs of the community, could be adhered to, and trusted to bring about the intended results).

On the whole, this study's findings disagree with the assumptions of Western science versus indigenous knowledge binary tensions approach, which sees only the former or its concept of modernization as open, systematic and objective, thriving as it does on a detached centre of rationality and intelligence; whereas the latter has been dismissed by scholars (Howes & Chambers, 1979; Warren, 1991; Agrawal, 1995; Ellen & Harris, 2000; Herbert, 2000) as closed, parochial, unintellectual, primitive, and emotional; and part of a residual, traditional and a backward way of life. In this regard, the study has established that even indigenous communication systems are relevant to the communities and their needs when it comes to accessing information related to climate

change and adaptation. Hence, stakeholders, policy-makers, communicators and scholars should harness, promote and enhance them for climate change adaptation, especially in rural areas. The findings have shown that Ngerengere rural communities prefer indigenous communication systems and networks because they provide an effective means for accessing various types of information related to their needs, and offer relevant content that suits their needs and interests. Thus, development of policy formulation and intervention could have more impact if they consider supporting these indigenous communication systems by encouraging their usage in relevant rural areas; and by the provision of any assisting resources. Doing so would ensure wide use of such systems for climate change adaptation in respective areas.

The findings have also indicated that the interplay between indigenous and modern communication systems (that is, the use of both systems) is crucial, as it facilitates the highest level of local participation. It provides valuable insights into how both indigenous and modern systems share and interact or combine messages, and allows the intended beneficiaries to develop strong and relevant skills and practices for climate change adaptation. As such, this study also recommends that, policy-wise, development interventions by the government and other stakeholders should put stress on raising awareness among communities that one type of communication system should not be a substitute for the other. Indeed, indigenous techniques should not be substituted by modern techniques, and vice-versa. Instead, the two systems should be complementary to each other, in purpose and design, to produce best practices for climate change adaptation among indigenous local rural-based communities. In addition, the government and relevant stakeholders should promote gradual use of indigenous-modern communication systems such as community radio for climate change adaptation (that incorporates both indigenous and modern elements) as a well-received intervention among such rural communities.

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