

African Indigenous Languages and Environmental Communication

F.A. Ruffin¹, L.J. Teffo² and H.O. Kaya³

¹*School of Management, Information Technology And Governance,
University of KwaZulu-Natal, Durban, South Africa*

²*School of Trans Disciplinary Research Institutes (STRI), Graduate Studies,
University of South Africa, Pretoria, South Africa*

³*DST-NRF Centre in Indigenous Knowledge Systems (CIKS),
University of KwaZulu-Natal, South Africa
E-mail: ruffin@ukzn.ac.za*

KEYWORDS Indigenous Knowledge. Culture. Environment. Ubuntu. Biological Diversity

ABSTRACT The paper uses secondary sources to discuss the importance of African indigenous languages in communicating environmental issues. It argues that the desired change in environmental conservation can only be achieved if the information appeals to the cultural values of the recipients. In the context of Africa, African indigenous languages are the best vehicles of communicating environmental information as they are culturally specific. It is therefore recommended that African indigenous knowledge stakeholders including researchers and academics apply them to correct dominant Eurocentric values and misinterpretation of Africa's environmental realities. This is important if they are to mobilize African communities for sustainable environmental conservation. They also need to cooperate and coordinate their activities to avoid duplication of efforts in a competitive global knowledge environment.

INTRODUCTION

African Indigenous Languages (AIL) are the languages that are aboriginal to the people of Africa (Adéníyì and Bèllo 2006) and are part of African indigenous knowledge systems (IKS). Hunn (2001) defines African indigenous knowledge Systems (AIKS) as bodies of long standing traditions and practices of specific African local communities. It encompasses the skills, innovations, beliefs, values, language, experiences and insights of the people in their respective natural and cultural environments, accumulated over the years and applied to maintain or improve their livelihood. These cultural based knowledge and value systems are communicated through language tools such as folklores, proverbs, drama, myths, legends, initiation ceremonies, etc.

As a result, there has recently been a growing interest in Africa and the world at large about the relationship between African indigenous knowledge systems as part of culture, and environmental issues (Melvin 2007). This interest is attributed to the realization that language and culture cannot be separated from the articulation of environmental issues including the local knowledge systems associated with them. They have a relational sustainability which is well ex-

pressed in the African humanistic philosophy and principles of Ubuntu. This explains a common bond or relationship between all human beings and other forms of creation.

In Africa, a large proportion of the people, especially in the rural areas depend on the natural environment for their livelihood in terms of food security, housing and health (Rowland 2002). Therefore, environmental issues including desert encroachment, flooding, bush fires, deforestation, land reclamation, soil and water pollution require urgent call for resolution. Some of these environmental issues have degenerated into conflicts between ethnic groups or ethnic groups with the government. A case in point is, for instance, that of the crude oil environmental pollution in the Niger-Delta in Nigeria; pastoralists and crop producers in various countries of the continent including Tanzania, Kenya and Nigeria (Muya 2002).

This is mainly because the role of African indigenous languages in communicating the cultural and environmental concerns tends to be neglected in the relationship between human societies and environment (Ortiz 2006). The following section discusses the role of indigenous African languages in cultural communication.

Thus the imperative of African indigenous languages as media of culture and environmen-

tal communication is associated with the concerns on creation of knowledge, awareness and attitude change towards environmental conservation (Prain 2006). This is based on the argument that most of the international environmental conservation policies and conventions including the Earth Charter and Climate Change Conventions do not take into consideration the fact that peoples of the world live in diverse cultures including indigenous language communication systems which influence their attitudes and relations to the environment (Berkes 2008).

Furthermore, the international conventions on environment, especially their preambles, are dictated by western values (Pitso 2008). These values put the responsibility of environmental conservation on the individual and the state, neglecting the role of the community and culture. There is, therefore, need to break this western cultural hegemony on the environment, by making environmental ethics cultural specific and holistic in approach (Wa Thiong'o 1986). The relation between culture and natural environment is well articulated in African humanistic philosophy of Ubuntu as discussed below. Using an examination of secondary sources, the paper interrogates the role of African indigenous languages in environmental communication.

METHODOLOGY

The paper uses secondary sources to discuss the importance of African indigenous languages in communicating environmental issues. According to Black (1996), secondary data refers to information collected by someone other than the researcher conducting the current study. Such data can be internal or external to the organization and accessed through the internet or perusal of recorded or published information (Berg 1995). Secondary sources employed in this work include relevant journal articles, books, internet sources and past research documents. It contrasts with a primary source which is an original source of the information being discussed; a primary source can be a person with direct knowledge of a situation, or a document created by such a person (Girden 1996). In the context of this study secondary data were cost effective and more quickly obtainable than the primary data (Marshall et al. 1995). The following section presents and discusses the research findings.

RESULTS AND DISCUSSION

African Humanistic Philosophy of Ubuntu and Environmental Conservation

The African Ubuntu philosophy is articulated in various folkmedia such as songs, proverbs, myths, etc. of the respective African cultures. It is through this bond and interaction among the various forms of creation that humans discover their own human qualities. These values and principles are communicated through indigenous languages. For example, one of the South African indigenous languages, IsiZulu, has a saying: "*Umuntu Ngumuntu Ngabantu*", which means that a person is a person through other persons, that is, we, as human beings, affirm our humanity when we acknowledge that of others including other forms of creation (Muya 2006). Similarly, in Kiswahili language they say "*Mtu ni watu*", meaning a human being is other people, that is, without other people one cannot realize his/ her humanity (Muya 2006; Kingazi 2005).

Flippin Jr. (2014) shows that as a value system "*Ubuntu*" has a universal applicability because it emphasizes the fact that to be human involves valuing the good of the community and other forms of creation, above self-interest. It regards humanity as an integral part of the eco-systems that lead to a communal responsibility to sustain life. Ubuntu emphasizes the sharing and conservation of our natural resources on the principle of equity among and between generations.

The African humanistic philosophy of Ubuntu as already conceptualised indicates the relationship between human societies and natural environment have shaped the way in which humans view the world including their actions towards the environment (Berkes and Folke 2002). It is on the basis of this that Toledo (2001) indicates that in most African traditional societies the distinction between social, language and natural systems tend to be somewhat artificial and arbitrary as human societies have been interacting and communicating with their biological diversity, that is, the natural environment through adaptive and co-evolutionary processes for thousands of generations (Heckenberger et al. 2007). Berkes and Folke (2002) use the term 'social-ecological system' to refer to this integrated concept of humans and nature.

In their discussion on the importance of nature and bio-diversity, Gunderson and Holling (2002) define biological diversity as the variation of life at the level of gene, species and ecosystem (CBD 1992). Much has been written on the importance of biological diversity in terms of its intrinsic value, its anthropocentric uses (in terms of the goods and services it provides), its role in today's economic market and its inextricable interdependence with the resilience of the natural environment (Constanza et al. 1997).

Berkes (2004) reveals that a wide variety of sub-disciplines have emerged in recent years using many terms and definitions to provide a kaleidoscope of perspectives on the many interactions between nature and culture including the role of local languages as media of communicating this symbiotic relationship. Some of these sub-disciplines are 'bridging' fields that explore the boundaries of different disciplines, particularly between the natural and social sciences (including biological, sociological, historical, economic and political sciences) to give rise to various possible combinations of theoretical assumptions, methods and applications (Rickford 2005). This is meant to deepen human understanding of the linkages across the global system. This is stated by Komiyama et al. (2006):

"Our common future" depends critically upon preserving the life-giving functions of the Earth's ecosystems, landscapes, and biosphere. To achieve this requires the deepening of our understanding of the linkages between the "global system" (the planetary base for human survival), the "social system" (the political, economic, industrial, and other human-devised structures that provide the societal basis of human existence), and the "human system" (the sum total of all factors impacting the health of humans).

Rapport (2006) refers to the ecosystem health, as the extent to which complex ecosystems maintain their function in the face of human disturbance, it is an essential precondition to sustainable livelihoods, human health, and many other social objectives, as reflected in the Millennium Development Goals (MDGs) (MEA 2005). This implies that not only does biological diversity represent the product of thousands of years of evolution and is a vital component of human society's survival through to the present day (in terms of healthy peoples, healthy communities and sustainable livelihoods), it also serves

as an absorptive barrier, providing protection from environmental shocks and stresses.

Prain (2006) indicates that in the same way that biological diversity increases the resilience of natural systems, cultural diversity has the capacity to increase the resilience of social systems. Language is used by people to articulate and share both their biological and cultural diversities. UNESCO (2003) looks at culture as a myriad of ways, such as a set of practices, a network of institutions or a system of meanings. Cultural diversity, therefore, comprises of the variety of indigenous languages and ethnic groups present in the world.

Prah (2006) on the other hand looks at culture anthropologically, as a concept that encompasses all that is the product of human creation. This includes both tangible objects such as all material products of humanity and intangible creations of the human creativity like religion, language, customary usages and everyday practices, particularly those that enjoy institutional representation. It is the sum total of these time-tested habits, attitudes, tastes, manners, shared values, traditions, norms, customs, arts, history, institutions and beliefs of a group of people that define for them their general behaviour and way of life.

Culture, therefore, is the total sum of learned behaviours and activities of a people. As human beings live in society, they create culture on a continuous basis; adapting it, shedding parts, adopting others, acculturating and passing on these features from one generation to the other. This is done both consciously and unconsciously. But, if human beings create culture, dialectically, culture also creates human beings. Human beings are educated and socialized in respective cultures in as much as they slowly, steadily and increasingly create culture (Mnkande 2000).

Raymond (2000) adds that if culture is the main determinant of human values and attitudes, language is the central feature of culture because it is through language that culture as defined above is transmitted, interpreted and configured. Geertz (2001) explains that these meanings and interpretations are perhaps the most diverse in their linkage to the natural world, with the most conspicuous links often observable within traditional resource-dependent communities, like in most Africa countries which are predominantly rural. In these communities not only do peo-

ple and communities interact with biological diversity on a daily basis, but their values, knowledge and perceptions are strongly centred on natural environment (Romaine 2004).

However, Harmon (2002) indicates that in practice, cultural systems contain a great deal more, coding for the knowledge, practices, beliefs, worldviews, values, norms, identities, livelihoods and social organisations of human societies. The maintenance of cultural diversity into the future, and the knowledge, language media, innovations and outlooks it contains increases the capacity of human systems to adapt and cope with change. According to him different cultures, value nature in different ways and have different connections with their natural environments including their indigenous language systems of communicating that cultural specific relationship with the environment.

In his critique of the universalization of environmental ethics as dominant in western environmental paradigms, Berkes (2004) argues that the difference in cultural worldviews and cosmologies of natural environment between industrialised and resource-dependent (or subsistence-oriented) communities like those in most of Africa, stems from a difference in need and purpose. For instance, whereas many African indigenous communities regard nature as a force managing them (for example, through droughts or famines), many industrialised communities strive to achieve the opposite and assert their dominance in managing the natural environment. Thus the former will view themselves as interdependent components of nature, fluctuating with its rhythms, whereas the latter will view themselves as separate from nature, dislocated from its fluctuations and therefore independent of its vagaries (Samson 2004).

Therefore, this paper argues that although human communities cannot be divided neatly into these two positions, they do form a spectrum along which the different relationships human societies form with natural environment exist. Taking into consideration the impact of climate change, it is conceivable that those whose industrialised livelihoods appear somewhat resource-independent may have to undergo substantial changes in the near future. Turner et al. (2006) discuss the linkages between local language, environmental activities and practices which stem from diverse worldviews with re-

gard to the interaction between humans and the natural environment.

Sauer (2005) states that as a set of social practices or ways of doing things, cultures communicated in local languages, shape biological diversity through the direct selection of plants and animals and the reworking of whole landscapes. The composition of such landscapes have been described as anthropogenic in nature. This may be represented by introduced species, agricultural monocultures or genetically modified crops. This is a reflection of local culture as a product of human history and interaction, including the context in which individuals and groups live their lives. The following section discusses African indigenous knowledge systems and languages in the context of environmental conservation.

African Indigenous Knowledge Systems and Languages in the Context of Environment Conservation

Maffi (2005) has the opinion that if diverse cultural practices and worldviews are central to the management of biological diversity, then the key linkage between nature and culture is the knowledge upon which these practices and worldviews are based. This is based on the view that the way people know the world determines behaviours, understandings and values that shape their interactions with the natural environment. Berkes (2008) calls this a “knowledge-belief-practice”. It is a complex relationship that is key to linking nature with culture as articulated in the African Ubuntu philosophy. The author further explains that the indigenous knowledge systems of the natural environment, is accumulated within a society and transferred through cultural modes of transmission, such as stories and narratives, and observation of social practices.

In discussing the challenges of climate change on developing countries, Melvin (2007) states that the precipitous rise in the world’s human population and the human ever-increasing dependence on fossil fuel-based ways of living have played a significant role in raising the concentration of atmospheric greenhouse gases (GHG). As a result, global temperatures are increasing, the sea level is rising, and patterns of precipitation are changing. Kirby (2002) interrogates this aspect within the situation in

Africa by indicating that Africa is currently facing a number of environmental challenges including the adverse effects of climate change, expressed through continuous change in rainfall patterns, droughts, flood conditions, hurricanes, diseases, famine and the depletion of biodiversity.

The impact of climate change affects local communities regardless of race, gender, social class across the continent. Muya (2002) elaborates that besides food security and health being affected, climate change brings human and social conflicts for limited resources, such as water and arable land; it also creates regional and continental migrations in the search of alternative life opportunities. Thus the paper argues that in this situation African countries face twofold-challenges under changing climatic conditions: They have to counter the adverse effects of climate change, while at the same time often lagging behind in terms of agricultural productivity and hence food security. Yet, many African countries and communities have a lot to offer with regard to climate change adaptation and mitigation. In terms of the reduction of Green House Gases (GHG) emissions respectively, African countries may be able to safeguard carbon sinks through sustainable agriculture and rangeland management.

African indigenous languages have also been used as instruments of communicating early warning systems for natural disaster management. For instance, Weisheit (2010) and Wolfgang (2004) show how African communities have for centuries developed various indigenous knowledge value systems (IKS) of coping with climate change. These include early warning systems, such as the knowledge of behaviours of living organisms, the monitoring of short term weather cycles, as well as long term experiences with climatic variability and the resulting livestock breeds, plant varieties, and resource management practices, such as mixed cropping practices, which involve the cultivation of different types of crops including root crops (cassava, sweet potatoes) on the same piece of land that could be harvested at different periods of the year, ensuring food security throughout the year. These were shared and transmitted within and across generations, using various folk media including proverbs, stories, myths, taboos and legends.

African Indigenous Languages and Environmental Communication

There has been a growing interest on environmental issues in recent times due to the realization that environment is synonymous with human sustainability. Environmental issues have social, political, economic ethnic, spiritual, health and legal implications. Therefore, this has made researchers, policy makers and development agencies to make efforts to crystallize their thoughts on preservation of the environment and on how to make this sustainable. In their discussion on the aim of environmental communication Louis and Taylor (2001) state that environmental communication, like any other developmental tool, is meant to effect a positive change in the living conditions of a people. This emphasizes that communication for development should among other things, change people's lifestyle through awareness, peer-counselling techniques of interpersonal communication, and social communication methods to pioneer attitudinal changes. This implies that communication should be for speedy transformation of society. Sadik (2003) adds that the desired change can only take place through provision of adequate knowledge and information so that the people are persuaded, through sound reasoning to change towards certain direction. Thus, the method of packaging and dissemination of the environmental message is of very importance.

An examination of environmental messages shows an alienation of most of the people for whom the messages are meant. The reason is that the messages are packaged in the language that most people do not understand. The newspapers contents, and most radio and television programmes are designed in foreign languages such as English. Not only does the language of packaging make the messages foreign and elite-oriented, it results in the alienation of the people for whom the messages were meant. This brings the significance of indigenous or local languages in environmental communication. Tennant (1995) notes that language is primarily a means of conveying meaning from one person to another, that is, it is a means of communication. However, it does not exist independent of culture. In other words, language is situated within a socio-cultural setting or community. It is an integral part of culture, a reflection of many features of a given culture. Like culture itself, it is a

learned behaviour, which can be facilitated or enhanced through direct or indirect context and acculturation. The inseparable nature of language from culture makes it of much significance to environmental communication. Wolfgang (2004) emphasizes that the success of any development message will be determined by the extent to which such communication is “predicated on an understanding of the society’s culture, its peculiar system of values and attitudes”. It follows then that indigenous language being a part and carrier of culture is best suited for communicating environmental messages.

Tebogo (2000) identifies in his study of the Tswana people in Botswana and North-West Province (South Africa) that the acceptability of language of communication to the audience is one of the criteria for thriving environmental awareness campaigns. This stresses the significance of indigenous language to environmental communication because it is the most acceptable language to the audience being an integral part of the culture of the people. He emphasizes that the local language when used in the media, writing or the arts is powerful in bringing about changes in the lives of people. He also states that the local language heals; it sets the mind positively in whatever endeavour being undertaken and that it is critical to being whole and well. He adds that the native language is a catalyst toward strengthening the concept of becoming; that is, the recognition of the importance of self, getting to know and accepting self.

Indigenous language has been proved to be very potent in creating a critical mass of real communication for substantial change. Weisheit (2010) notes that indigenous language can be used to raise the standard of living in the rural areas by using adult education programmes to teach basic technology. She has also called attention to the fact that indigenous language press can be a veritable instrument in mobilizing the vast majority, who are unlettered in the English language, to be involved in the political process.

In addition a study done by Lesego (2003) in North-West Province on the significance of indigenous language use in broadcasting reveals that indigenous language is significant because it gives good understanding and better meaning of radio messages to the listeners. The survey shows that majority of the respondents, 88 percent, understood radio programmes better in

their indigenous language (Setswana) and more than 90 percent agreed that they derive better meaning from the radio messages when Setswana is used. The study also discovered that people generally have a natural liking for their local language and this gives them a feeling of enjoyment and sense of satisfaction when they listen to radio.

However, Mohapi (2008) warns that most of the African indigenous knowledge and value systems including communication skills on climate change adaptation and mitigation are still resident in older members of the local communities, hence threatening its sustainability and minimising its potential to contribute to the global knowledge pool on climate adaptation and environmental conservation. It is, therefore, important that culturally appropriate communication channels are devised to communicate and share such knowledge and skills with the younger generations under the influence of globalization to ensure sustainability and successful application of this knowledge to meet current and future developmental challenges affecting the environment.

The African younger generations have a high potential to mobilise communities to respond to climate change as a challenge of their generation. They live in these communities; know the local cultures including languages and are among the most vulnerable social groups affected by the adverse effects of climate change, especially the depletion of natural resources which lead to limited employment opportunities and poverty and hence vulnerable to risk behaviours such as prostitution, drug abuse, etc. which lead to dreadful diseases such as HIV/AIDS, etc. Therefore, if properly mobilised and supported, the youth who form the majority of the African population, can make a sustainable difference in minimising the impact of climate change at national, regional, continental and global levels (Spencer 2005).

Melvin (2007) argues that communicating this African indigenous knowledge on climate change adaptation to the young generations is one of the challenges which tends to be marginalized by policy makers, researchers, activists and other stakeholders. This is an important component of tackling the adverse effects of climate change at community level. However, UNESCO (2003) states that in order for this communication to be effective and sus-

tainable, cultural, especially linguistic consideration need to be taken into account. This is due to the fact that most of the climate change communication models are western dominating and perpetuate western conceptualization of climate change including environmental conservation. They do not take into consideration of the fact that there is still an enormous gap between what is known about Western and African perceptions of climate change.

A study conducted by Zulu (2009) in the Eastern Province of Zambia, on Knowledge and Perceptions of Youth Toward Indigenous African Knowledge Systems on Climate Change Adaptation, revealed that more than eighty percent of the respondents (both male and female) indicated that they wanted this local knowledge to be communicated in the local language Chinyanja because it gave them good understanding and better meaning of the messages. The study is supported by a similar study conducted by Mohapi (2008) in the North-West Province (South Africa) on Knowledge and Perceptions of Batswana Youth Toward Indigenous African Knowledge Systems on Climate Change Adaptation and Mitigation.

This study also revealed that more than seventy percent of the respondent youth (both male and female) preferred the Batswana Indigenous Knowledge Systems on Climate Change to be communicated in the local Setswana language due to similar reasons indicated by the youth in the Eastern Province of Zambia. Both studies stated that translating the local knowledge into English or any other foreign language will dilute and distort the messages because listening the messages in Setswana or Chinyanja carried with it the wisdom, habits, mannerisms and identity of the indigenous knowledge holders. One indigenous knowledge holder in Eastern Province of Zambia stated that an indigenous language constitutes the memory-bank of the people as it an embodiment of both continuity and change in the historical consciousness of the native speakers.

CONCLUSION

The paper discussed the role of African indigenous languages in environmental communication. It concludes that African indigenous languages are the best medium of communicating environmental knowledge and awareness in

any linguistic community. This is due to the fact that the use of these languages as part of the African people's cultures, gives people, especially at local community level, a better understanding and meaning of environmental messages in their own ways of knowing and value systems. The majority of African people, especially in the rural areas still depend on their local languages for communication and other social interactions. Unfortunately, colonialism and other forms of imperialism marginalized these languages in the developmental and environmental discourse including issues of climate change. They are seen as incapable of dealing with contemporary scientific and technological challenges.

RECOMMENDATIONS

It is recommended that African indigenous language researchers, academics, promoters and other stakeholders have the following tasks towards the promotion of these languages: (i) to correct the Eurocentric misinterpretations of African indigenous realities which characterise African indigenous ways of knowing, knowledge production and value systems if they are to involve local people in environmental sustainable conservation; (ii) to devise and facilitate the development of African indigenous languages to be in line with the current advances in science and technology including environmental challenges such as climate change. This is based on the realization that since active participation and contribution in the global knowledge economy is not possible without Information and Communication Technology (ICT), indigenous African language researchers, academics, promoters and other stakeholders have to be proactive in the areas of science and technology. This should involve the development of African indigenous knowledge systems research and teaching programmes in African indigenous languages taking into account the current global trends and needs, especially in the area of ICT; (iii) in order to promote sustainability, there is need to develop a critical mass of young experts grounded in African indigenous knowledge Systems, indigenous African languages and ICT.

However, the success of this endeavour will need the different stakeholders of African indigenous knowledge systems and African in-

indigenous languages in all parts of the world to work together by cooperating and coordinating their activities, share resources, and experiences to avoid duplication and reduce costs. This can be done through joint projects, fellowships, scholarships, external examining, conferences and electronic interaction; (iv) to promote a new paradigm that 'modernity' should not always be seen as that which comes from the West. Africa has a rich history of knowledge production in science and technology which contributed greatly and still contributes to the global body of knowledge including environmental issues; and has produced high-class intellectuals in all fields of knowledge including indigenous languages to communicate different fields. It is unfortunate that such achievements are reflected through foreign languages. In contrast colonial governments in East Africa, especially the Germans used Kiswahili for administrative and educational purposes due to its cross-cultural nature and multi- and trans-disciplinarity.

The above findings and discussions have shown that African indigenous languages can be an important tool for communicating environmental issues within the context of the African philosophy and principles of Ubuntu. It is therefore recommended that any environmental ethic should take cognisance of the values and associated indigenous knowledge systems of the respective cultures.

REFERENCES

- Adéníyí HR, Bèllò R 2006. Nigerian media, indigenous languages and sustainable development. In: Olaoba F, Arasanyin, Michael A Pemberton (Eds.): *Selected Proceedings of the 36th Annual Conference on African Linguistics*. Somerville, MA: Cascadilla Proceedings Project, pp. 155-160.
- Berg BL 1995. *Qualitative Research Methods for the Social Sciences*. 2nd Edition. Boston: Allyn and Bacon.
- Berkes F 2004. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia: Taylor and Francis.
- Berkes F 2008. *Sacred Ecology. Traditional Ecological Knowledge and Resource Management*. 2nd Edition. Philadelphia: Taylor and Francis.
- Berkes F, Folke C 2002. Back to the future: Ecosystem dynamics and local knowledge. In: LH Gunderson, CS Holling (Eds.): *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington DC: Island Press, pp. 121-146.
- Black CE 1996. *The Dynamics of Modernization: A Study of Comparative History*. New York: Harper.
- Flippin Jr. WE 2014. Ubuntu: Applying African Philosophy in Building Community. *Huff Post*, 16 January 2014, P. 1.
- Geertz C 2001. *The Interpretation of Cultures*. New York: Basic Books.
- Girden ER 1996. *Evaluating Research Articles from Start to Finish*. Thousand Oaks, CA: Sage.
- Gunderson LH, Holling CS (Eds.) 2002. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, DC: Island Press.
- Harmon D 2002. *In Light of Our Differences*. Washington DC: Smithsonian Institution Press.
- Heckenberger MJ, Russell JR, Schmidt MJ 2007. The legacy of cultural landscapes in the Brazilian Amazon: Implications for biodiversity. *Philosophical Transactions of the Royal Society*, 362: 197-208.
- Hunn E 2001. What is traditional ecological knowledge? In: N Williams, G Baines (Eds.): *Traditional Ecological Knowledge: Wisdom for Sustainable Development*. Canberra: Centre for Resource and Environmental Studies, ANU, pp. 13-15.
- Kingazi S 2005. *Kiswahili and African Indigenous Languages for Sustainable Development in Tanzania: The Case of Western Usambara*. Masters Mini-Dissertation, Unpublished. IDS. Tanzania: University of Dar es Salaam.
- Kirby R 1999. *Ecosystem Variability in North-Eastern Kenya*. Nairobi: University of Nairobi Press.
- Komiyama H, Takeuchi K 2006. Sustainability science: Building a new discipline. *Sustainability Science*, 1(1): 1-6.
- Lesego S 2003. *Indigenous and Communication among the Batswana: Challenges and Opportunities*. Unpublished Manuscript. Department of Communication. South Africa: University of North-West.
- Louis W, Taylor DM 2001. When the survival of an indigenous language is at stake. *Journal of Language and Social Psychology*, 20(1/2): 111-151.
- Maffi L 2005. Linguistic, cultural, and biological diversity. *Annual Review of Anthropology*, 34: 599-617.
- Marshall C, Rossman GB 1995. *Designing Qualitative Research*. 2nd Edition. Newbury Park, CA: Sage.
- MEA 2005. Current state and trends: Ecosystems and well-being. In: *Millennium Ecosystem Assessment (MEA)*. Washington DC: Island Press.
- Melvin G 2007. A study of culture and environment in developing societies. *Plains Anthropologist*, 32(102): 10-22.
- Mnkande L 2000. Challenges of Integrating Culture into the Language Curriculum in Africa. *Paper presented at a Workshop on Culture and Development in Africa*. Organized by College of Business Education and Ministry of Culture, Peacock Hotel, Dar es Salaam, Tanzania, 20-21 April 2000.
- Mohapi H 2008. *Knowledge and Perceptions of Batswana Youth in the North-West Province (South Africa) Toward African Indigenous Knowledge Systems and Climate Change Adaptation*. MA Mini-Dissertation. IKS Programme. South Africa: North-West University.
- Muya A 2006. Kiswahili Media and Sustainable Development in Tanzania. *Paper presented at a Workshop on Media, African Indigenous Languages and Sustainable Development*, Organized by Radio Tanza-

- nia and College of Business Education, Protea Hotel, Dar es Salaam, Tanzania, 23 November, Dar es Salaam, Tanzania.
- Muya A 2002. *Environment and Conflicts in Africa Rural Communities*. Unpublished Manuscript. Dar es Salaam, Tanzania: College of Business Education.
- Ortiz PR 2006. *Indigenous Knowledge and Language: Decolonizing Culturally Relevant Pedagogy in a Mapuche Intercultural Bilingual Education Program in Chile*. Utah: Utah State University Press.
- Pitso F 2008. Understanding Ways: Communicating between Cultures. *Paper presented at Indigenous Knowledge Systems (IKS) Workshop on Culture, Development and Communication*. IKS Centre, North-West University, South Africa, 1 October 2008.
- Prah KK 2006. Challenges to Promotion of Indigenous Languages in South Africa, *Review Commissioned by the Foundation for Human Rights in South Africa*. October–November 2006. Cape Town: The Centre for Advanced Studies of African Society.
- Prain G 2006. *Indigenous Experimentation and Cultural Diversity*. London: IT Publications.
- Rapport D 2006. Ecosystem health: The concept, the ISEH, and the important tasks ahead. *Ecosystem Health*, 5(2): 82-90.
- Raymond P 2000. Intercultural Competence Through Language Education in East Africa. *Paper presented at a Workshop on Culture and Development in Africa* Organized by College of Business Education and Ministry of Culture, 20-21 April 2000, Peacock Hotel, Dar es Salaam, Tanzania.
- Rickford J 2005. *Language, Education and Cultural Diversity in Africa*. Berlin: German Foundation for International Development.
- Romaine S 2004. *Language and Society*. London: Oxford University Press.
- Rowland H 2002. Africa and global climate change. *Journal of Modern African Studies*, 34(10): 163-178.
- Sadik D 2003. *African Language, Politics, and Social Interaction*. Berlin: Mouton de Gruyter.
- Samson T 2004. *Framework for Enhancing the Use of Indigenous Knowledge Africa*, London: Development Alternative Press.
- Sauer CO 2005. The morphology of landscape. In: J Leighly (Ed.): *Land and Life*. Berkeley: University of California Press, pp. 315-350.
- Spencer J 2005. Language and development in Africa: The unequal equation. In: N Wolfson, J Manes (Eds.): *Language of Inequality*. New York: Mouton, pp. 123-143.
- Tebogo D 2000. *African Indigenous Languages, Power and Communication Challenges*. Unpublished Manuscript. Communication Department. South Africa: University of North-West.
- Tennant E 1995. Maintaining and renewing native languages. *The Bilingual Research Journal*, 19(2): 279-304.
- Toledo VM 2001. Biodiversity and indigenous peoples. *Encyclopaedia of Biodiversity*, 3: 451-463.
- Turner N, Berkes F 2006. Coming to understanding: Developing conservation through incremental learning in the Pacific Northwest. *Human Ecology*, 34: 495-513.
- UNESCO 2003. *The Use of Vernacular Language in Education*. Paris: UNESCO.
- wa Thiong'o N 1986. *Decolonising the Mind. The Politics of Language and Culture in African Literature*. Nairobi: Heineman.
- Weisheit A 2010. *African Young Scientists on Climate Change and Indigenous Knowledge Systems*. Unpublished Manuscript. Mbarara: Mbarara University of Science and Technology.
- Wolfgang C 2004. *Indigenous African Institutions*. New York: Transnational Publisher.
- Zulu R 2009. *Knowledge and Perceptions of Youth towards African Indigenous Knowledge Systems in Climate Change Adaptation in Eastern Province Zambia* Unpublished Manuscript. Department of Development Studies. Zambia: University of Zambia.