

Land: An Empowerment Asset for Africa

The Human Factor Perspective



Edited by
Claude G. Mararike

Land: An Empowerment Asset for Africa
The Human Factor Perspective

Edited by
Claude G. Mararike



University of
Zimbabwe



© C. G. Mararike, 2014

ISBN 978-1-77920-110-2

First published in 2014 by
University of Zimbabwe Publications
P. O. Box MP 203
Mount Pleasant
Harare
Zimbabwe

Typeset by D. Masala, University of Zimbabwe Publications

Printed by Printforce Productions

Chapter Seven

Land as the Nexus in Youth, Female Unemployment and Poverty Reduction 96
Zororo Muranda, Rangarirai Frank and Fanny Saruchera

Chapter Eight

Land as the Game-changer: Utilising Local Community Talent and Resources in Development Initiatives 118
Mcdonald Matika

Chapter Nine

Urban Land Development in Africa 127
Innocent Chirisa, Elmond Bandauko and Godfrey Chikowore

Chapter Ten

Were It Not for the Land Revolution: Cases of Empowerment in Marondera District 150
Charity Manyeruke and Ashton Murwira

Part Three

Indigenous Knowledge and the Human Factor

Chapter Eleven

Language, Indigenous Knowledge and Survival Strategies 166
J. Mapara and N. Mpofu-Hamadziripi

Chapter Twelve

Climate Change and Indigenous Knowledge in Zimbabwe: A Human Factor Approach 182
Sandra Bhatasara and Enock. J.R. Mandizadza

Chapter Thirteen

Land Reform Programme and Rural Tourism in Zimbabwe 203
E. J. R. Mandizadza, S. Bhatasara and O. Nyamwanza

Chapter Fourteen

Land and Indigenous Knowledge Systems: Some Salient Issues 223
Blessing Makunike

Part Four

Land, Wildlife and Environment

Chapter Fifteen

Agro-forestry Resources Management, Transformation and Challenges in Southern Africa: The Case of Post-land Resettlement in Zimbabwe, 2000-2013 232
Godfrey Chikowore, Innocent Chirisa, Harold Annegarn, Tafadzwa Makonese, Chihiro Ito, Verengai Mabika and Sam Ruturi

Chapter Twelve

Climate Change and Indigenous Knowledge in Zimbabwe: A Human Factor Approach

Sandra Bhatasara and Enock. J.R. Mandizadza

Introduction

This chapter examines the interface between climate change and Indigenous Knowledge (IK), paying particular attention to the role of IK in rural people's livelihoods. People in rural agrarian economies have often survived harsh and changing climatic conditions. They have developed ingenious indigenous adaptation measures and managed to build resilient livelihoods. However, whilst IK has been a source of resilience, climate change provokes serious threats to both livelihoods and the nature of indigenous climate knowledge. Within an increasingly changing context, it is becoming problematic whether IK on its own remains sufficient for people to adapt their livelihoods sustainably. We, therefore, suggest that in order to have sustainable indigenous adaptive strategies, a Human Factor approach can be adopted.

Zimbabwe has begun to experience the effects of climate change, notably rainfall variability, extreme events and warming trends. These are expected to render land increasingly marginal for rain-fed agriculture, posing a threat to the economy and the livelihoods of the poor. With more than 90 per cent of small holder farmers in Zimbabwe depending on rain-fed agriculture for their livelihoods, the impact of changing rainfall patterns and increasing frequency of droughts could be devastating, unless concrete steps are taken to enhance the resilience of rain-fed agriculture upon which millions of small-holder farmers depend for their food security and livelihood (Unganai and Murwira, 2010). Brown *et. al* (2012), also concur that it is expected that farmers, who represent approximately 62 per cent of the total population, will experience disproportionate impacts because of their limited adaptive capacity.

The imperatives for adaptation are thus clear. Rural farmers, particularly in marginalised ecosystems, need to adapt their livelihoods. Yet adaptation

of rural farming systems should not be considered as solely a contemporary phenomenon or as ahistorical. People in agrarian systems have always adapted their livelihoods to harsh climatic conditions. They have drawn and still draw on IK to devise diverse coping and adaptive mechanisms. However, considering the enormity of the challenge of climate change and other contemporary process, IK alone may not be the panacea to sustainable adaptation. In this regard, we seek in this chapter to propose a Human Factor (HF) approach to the management of climate change.

Methodology

Literature review and conversations with selected key informants were the main methods of data collection employed in this study. These conversations were carried out with elderly key informants in Charewa A, a communal ward (ward 3) in Mutoko District. The key informants were selected based on a number of considerations: social position/standing; roles or responsibilities and social cultural embeddedness based on their roles and age. The assumption on age was that those who had lived many years had heard, experienced, seen and done a great deal. Questions included asking key informants to narrate their observations and experiences on climate components or parameters and what they have done or are doing to offset livelihood vulnerabilities (coping and adaptive strategies).

Climate Change in Zimbabwe

Climate change is commonly defined as the significant variation of the mean state of climate relevant variables such as temperature, precipitation and wind in a certain period of time, usually over 30 years (IPCC, 2007). By the end of the 20th century, Zimbabwe was a warmer and drier country than it was at the beginning. Based on the existing studies and climate projections employing diverse quantitative models, Zimbabwe is experiencing climate change and increasing climate variability. Increased variability of rainfall, rain days and temperature in Zimbabwe are possible pointers of climate change and variability (Makarau, 1999). For example, historic and future climate change scenarios have been studied using observed climate data and seven global climate models (See, Unganai, 1996; Hulme and Sneard, 1999; Hume *et. al*, 2001; IPCC, 2007). Overall, even though the climate in Zimbabwe is regionally differentiated, it is generally becoming warmer with more erratic rainfall patterns (c.f Makadho, 1996; Brown *et.al*, 2012). At the same time, some parts of Zimbabwe are becoming warmer and drier (Low, 2005). Three models used to analyse climate data predict a temperature rise of 2-4°C and an

average rainfall decrease of 10-21 per cent by 2100 (Mano and Nhemachena, 2006).

A consistent conclusion is that the frequency of the country's annual rainfall variations has increased since the early 1980s, resulting in repeated droughts and floods. On a similar note, findings suggest that annual rainfall will decline by five to 18 per cent of the 1961 to 1990 average by the 2080s. The decade 1986-1995 has also been observed as 15 per cent drier than average. During the 20th century, there has been an overall decline in rainfall of 5 per cent across the country (Ministry of Environment and Natural Resources Management, 2008). The timing and amount of rainfall received are becoming increasingly uncertain and the last 30 years (from 1980) have seen a trend towards reduced rainfall or heavy rainfall and drought occurring in the same season (Mudombi and Muchie). Precipitation has declined by up to 10 per cent on average over the period 1900 to 1993, which is about 1 per cent per decade (Simba *et.al*, 2012a).

Attempts have also been made to examine temperature changes in Zimbabwe and the results tend to agree with the regional and global warming trends. Three models used to analyze climate data predict a temperature rise of 2-4°C and an average rainfall decrease of 10-21 per cent by 2100 in Zimbabwe (Mano and Nhemachena, 2006). What is clearly emerging is that minimum temperatures are gradually increasing as the number of cold days is decreasing and the same result was observed for Africa from the 1980s to 2000 when the mean temperature anomaly started increasing (MET-CCO, 2004). Brown *et. al* (2012) report that according to the Zimbabwe Meteorological Service, daily minimum temperatures have risen by approximately 2.6°C over the last century while daily maximum temperatures have risen by 2°C during the same period (c.f, MET-CCO, 2004). Average temperature has been increasing by 0.2 degrees C per decade (Mika, 2011). Almost similar trends have been noted by the Zimbabwe Meteorological Services Department (1996) cited in Simba *et. al* (2012a) which says day time temperatures over Zimbabwe have risen by up to 0.8 from 1933 to 1993, which translates to a 0.1°C rise per decade. Unganai (1997) also examined temperature trends for Zimbabwe from 1933 to 1993, in which data from the rural areas showed a rise in maximum temperatures, a decrease in minimum temperatures and a substantial rise in the diurnal temperature range (Mudombi and Muchie).

Local level studies also reveal that farmers in semi-arid regions of the country have made significant observations in their climate. Mapfumo *et. al* (2010) in their study in Wedza (eastern Zimbabwe, agro-ecological zone

III), they highlighted that most farmers were aware that climate was changing in their localities as almost all of them observed changing trends in weather patterns, notably changing rainfall distributions, increased drought incidences and unpredictable wind movements and cyclones. Similarly, in Wedza and Makoni, Mtambanengwe *et. al* (2012), using participatory research approaches, observed that most of the farmers reported to have experienced changing trends in weather patterns. The changes noted among farmers in these areas included increased drought incidences, citing the 1991-92 drought as the worst in their memory, temperature extremes (very hot summers and very cold winters) and unpredictable wind movements bringing in cyclones (*ibid*). The above scholars also noted that the non-occurrence of previously known rainfall events often marking the beginning of winter (*mavhurachando*), end of winnowing of small grain cereals (*gukurahundi*) or the beginning of spring (*bvumiramitondo*) was a prominent observation made by farmers.

In Masvingo and Hwange, some of the observations made by farmers reported by Moyo *et. al* (2012), include: the shift in the onset of the rain season from around the third week in October to end of November and early December; fairly high rainfall amounts in January lately; season had become more unpredictable; rainy season ending abruptly and early; effective rains now fall within one month, mostly December and the distribution had become more unpredictable and erratic (now experiencing increasing spatial rainfall variation, with some places receiving evenly distributed rainfall, whilst their neighbouring areas received erratic rainfall); and rise in temperatures, with the perceptions that the winter months were no longer as cold as in the past (and also receiving rain in June, which is normally the dry winter period in Zimbabwe).

Other scholars have made similar observations. For example, general community perceptions in Masvingo indicated that the rainfall patterns were now erratic and no longer supported viable crop production, rainy seasons have become shorter and increasing ambient temperatures especially in summer are responsible for high evapo-transpiration rates (Chikodzi, *et.al*, 2012). Similarly, Simba *et. al* (2012a and 2012b) detected that farmers' perceptions on climatic conditions are in line with the scientific observations in terms of climate and environmental changes because about 57 per cent of them observed that winters are becoming warmer, 86 per cent observed hotter summers with received rainfall not supporting crop yields, rainfall seasons becoming shorter, onset of rains delaying to mid-November and cessation time coming early.

Theorising Indigenous Knowledge

Our understanding of IK is that it consists of a body of knowledge, beliefs, traditions, practices and institutions developed and sustained by indigenous, peasant and local communities in interaction with their biophysical environment. It is a knowledge form that has failed to die despite the racial and colonial onslaughts that it has suffered at the hands of Western imperialism and arrogance (Mawere, 2010). The belief in IK practices, such as avenging spirit (*Ngozi*), fencing a wife (*runyoka*), fencing property (*rukwa*), and taboos (*zvierwa*) is commonplace across the whole spectrum of the Shona culture despite colonial experiences.

IK forms a holistic worldview which is inseparable from the very ways of life of traditional communities - their cultural values, spiritual beliefs and customary legal systems. IK or African knowledge (here used interchangeably), is experiential knowledge based on a worldview and a culture that is basically relational (Owusu-Ansah and Mji, 2013). The spirit of the African worldview embraces wholeness, community and harmony which are profoundly entrenched in cultural values. A person becomes human only in the midst of others and pursues both individual and collective harmony as the prime task in the process of becoming a true person. Central to the African worldview is the durable disposition to collective values and harmony embedded in a collective sense of responsibility – a “collective ethic” – which recognises that survival of the group develops from harmony through interdependence and interconnectedness.

IK has also been framed as local knowledge-knowledge that is unique to a given culture or society. It is the basis for local-level decision-making in agriculture, health care, food preparation, education, natural resource management, and a host of other activities in rural communities. Like its peoples, acquisition of knowledge is collective and community-oriented. Such knowledge is passed down from generation to generation, in many societies by word of mouth. African knowledge, and its Afrocentric method of acquisition, has a practical, collective and social or interpersonal slant (Owusu-Ansah and Mji, 2013). As a knowledge system, it is characteristically oral and passed on from generation to generation in the context of community living and activities (Sarpong, 1991; Mkabela 2005 as cited in Owusu-Ansah and Mji, 2013).

A plethora of literature shows that scholars often juxtapose western knowledge with IK. This is problematic because it implies that IK has no meaning unless defined side by side with western knowledge. Barnhardt and Kawagley (2005), in their comparative analysis of indigenous

knowledge and western science, noted that the former is contextualised, thus indigenous people have traditionally acquired their knowledge through direct experience in the natural world, whilst western science tend to emphasize compartmentalised knowledge that is often decontextualised. IK has a sense of place and its attendant cultural practices and manifestations (Barnhardt and Kawagley 2005). This was also highlighted by Scoones and Thompson (1994) who noted that rural peoples' knowledge is highly specific, context bound with knowledge emerging simply from localised, practical experiences.

Although erroneously termed irrational and unscientific by western imperialists, indigenous populations are scientific when they are involved in a cycle of subsistence. The argument to consider is that there is no process of making IK a "science". Burgess (1999) in Sillitoe (1998:11) noted that indigenous communities have studied and know a great deal about the flora and fauna, and they have their own classification systems and versions of meteorology, physics, chemistry, earth science, astronomy, botany, pharmacology, psychology (knowing one's inner world) and the sacred. Owusu-Ansah and Mji (2013) refer to silenced contributions from ancient Egyptian education to philosophy, mathematics, architecture and medicine. Rejecting the notion that IK is irrational, Nzewi (2007:56) asks:

If our ancestors had no sound intellectual mettle, how did they develop the scientific cultures of food, childbirth, and mental nurture, also the musical arts genres that were non-sanctionable mediators in the indigenous societal polity and social-cultural practices, including the policing of egalitarian law and order, medical arts delivery?

There has been proliferation of criticism on how traditional knowledge is conceptualised. For example, conflating other knowledge traditions into a single local meta category overlooks important differences within each tradition and similarities between various indigenous and scientific perspectives (Barnhardt and Kawagley, 2005). The distinction fails on three grounds, substantive because of similarities in content of different knowledge systems; epistemological because of certain similarities in methods used to investigate reality; contextual because science is no less culturally located than other knowledge traditions. It is also argued that distinguishing between "others" knowledge traditions and "ours" privileges the scientific perspective (Nader, 1996). Using critical and post-colonial theoretical perspectives, this creates knowledge hierarchies and elusive geographies of knowledge. Similarly, Mararike (2011) refers to knowledge as power which flows from the powerful to the less powerful.

As a critique to some definitions of IK the Indigenous Knowledge and Pedagogy in First Nations Education Canada (2005), cited in Barnhardt and Kawagley (2005), noted that indigenous scholars discovered that IK is far more than the binary opposite of western knowledge. As a concept, IK benchmarks the limitations of Eurocentric theory its methodology, evidence and conclusions, re-conceptualises the resilience and self-reliance of indigenous peoples and underscores the importance of their own philosophies, heritages, and educational processes. Agrawal (1995, 2002) questioned the divide created between indigenous and scientific knowledge. Agrawal (2002), argued that there is no universal criterion to separate “western” and “native” knowledge. To productively engage IK in development, we must go beyond the dichotomy of indigenous vs. scientific, and work towards greater autonomy for “indigenous” people (Agrawal, 1995: 413).

The term “indigenous knowledge” has also been refuted as colonising, with some people preferring to use the term farmers’ ecological knowledge. This is because of the history of colonialism, particularly in Africa. IK was swept aside and denigrated by the colonialists and their sciences as backward and “uncivilised”. Colonisers deployed terms such as primitives, natives and indigenous people to maintain hegemony over the colonised. This legacy persists as historically marginalised and oppressed people in contemporary societies are still being represented as “other” or pathologically described as non-western, indigenous people and third world. The process of knowledge imposition is one of the problems which has continued to affect village people as they attempt to survive (Mararike, 2011). However, though suffering colonialism from imperialists and empirical scientists, it remains a truism for the Shona traditionalists that IKSs can be used to institute and foster a virtuous, moral society (Mawere, 2010).

IK in Climate Change Discourse

There is increasing recognition of the significant role of IK in climate change mitigation and adaptation. Various scholars submit that IK strengthens community resilience to respond to the multiple stressors of global environmental change. Traditional Ecological Knowledge (TEL) are reservoirs of experiential knowledge that can provide important insights for the design of adaptation and mitigation strategies to cope with global environmental change (Gomez-Baggethun, 2013). Design of adaptation strategies at the local level should focus on the stressors that local people judge most important (Boissiere *et. al* 2013). IK has also gained importance from scholars who are questioning how climate change knowledge is

constructed and even the language used (see Hulme and Mahony, 2011, Nerlich *et al.*, 2010; Whitmarsh, 2009; Nisbet 2009). Brace and Geoghegan (2010) brought together the themes on landscape, temporality and lay knowledge to propose new ways of understanding climate change. Pettinger (2007) alludes to the social constructedness of climate change and how power is used to impose a hegemonic discourse on climate change and its impacts. Miller *et al.* (2008) argue for epistemological pluralism when it comes to understanding complex systems that embrace the human and non-human worlds and climate change is one such system. Hoffman (2011) points out that climate change is not yet a “social consensus”, drawing attention to the various contestations and divergences surrounding the framing of climate change.

Scholars are also progressively drawing attention to the links between climate and culture in understanding climate change (for example, Meyer, 2000; Strauss and Orlove, 2004; Boia, 2005; Cruikshank, 2005; Fine, 2007; Golinski, 2007). Strauss and Orlove (2004) focused on temporal and linguistic aspects of the relationship between meteorological phenomena and human societies. They explored the human-weather/climate interface standpoint to demonstrate that the way meteorological phenomena is discussed and interpreted concerns not only the events in question but, more complexly, the cultural, political and historical framework in which people discuss them. This is consistent with the Afrocentric approach that puts at the centre of analysis African cultures and value systems (see Asante 1988).

The global scientific community acknowledged the relevance of IK and endorsed it at the World Conference on Science in Budapest, Hungary, in 1999 and recommended that scientific and traditional knowledge should be integrated in the field of environment and development. International policy processes such as the United Nations' Declaration on the Rights of Indigenous Peoples and the Convention on Biological Diversity have also been crucial. The United Nations Framework Convention on Climate Change (2007) has acknowledged some experiences of local communities in dealing with climate change. This was from the realisation that indigenous people throughout the world have sustained their unique worldviews and associated knowledge systems for millennia, even while undergoing major social upheavals as a result of transformative forces beyond their control (Barnhardt and Kawagley: 2005:9). For example, the United Nations Framework Convention on Climate Change, (2007) noted that the Aymaran indigenous peoples of Bolivia have been coping with water insecurity and scarcity over centuries such that in order to collect rainwater in the mountains and pampas, they have developed a

sophisticated system of rainwater harvesting by way of constructing small dams (qhuthañas) which have proved to be vital not only to people but also to livestock in times of droughts.

The International Conservation Union of Nature (IUCN (2008) identified options of adaptation to, and mitigation of, climate change based on the traditional knowledge of communities at risk, in order to reduce their vulnerability and to enhance their cultural resilience and adaptation capacity for example, in the Arctic. Arctic communities have a long history of adaptation to extreme environments, to environmental changes as well as to other types of changes such as colonisation, forced resettlement and rapid cultural change (Nuttall, 2001). For example, the Arctic communities' adaptive strategies for subsistence encompass increased water quality testing and consumption of bottled water due to decreasing water quality and accessibility; changing hunting habits, by either hunting with boats or switching to fishing, as well as hunting quotas and increased consumption of store-bought foods due to scarcer local foods (IUCN, 2008:33). The IUCN also provides cases on Bangladesh. One paper mentions that indigenous strategies remain the dominant form of response to climate disaster (Srinivasan, 2004). The strategies include improvement of housing conditions, taking shelter in elevated grounds, selling land, fuel and dry food storage, or diet change. The author of the paper then calls on the importance and value of integrating indigenous knowledge and adaptation strategies into climate change adaptation policies (IUCN, 2008: 35).

Boillat and Berkes (2013) examined how indigenous peoples near Cochabamba, Bolivia, ascribe meaning to global environmental change by means of their local belief systems. The authors describe how local people track environmental changes by TEK-based observations and document local adaptation practices including adjustments in cultivation cycles, spreading risks of harvest failure through geographical dispersal of cultivated plots, buffering strategies sustained in social networks and diversification of income sources, including off-farm employment. The authors claim that indigenous peoples should not be regarded as "helpless victims" of climate change but rather as active subjects that are able to build socio-ecological resilience by developing multifaceted coping and adaptation strategies. Boissiere *et. al* (2013) examine local perceptions of climate change in the tropical watershed of Mamberano, Papua, Indonesia. Some coping strategies are based on existing TEK, such as rituals or internal customary rules.

IK has also been thrown into the spotlight in Africa by scholars who have paid attention to the cognitive and cultural landscape in which farmers'

understanding of climate and climate information is grounded and the decision-making processes and environment which shape farmers' adaptive strategies (Roncoli, 2006). In a related manner, Orlove, *et. al* (2008) present a conceptual framework that underlies farmers' understandings of climate and, like Strauss and Orlove, highlight the importance of linguistic analyses of typologies and terminologies of seasonal change and climatic events. Similarly, Speranza *et al* (2010) focused on the IK that agro-pastoralists in larger Makueni District in Kenya hold and how they use it to monitor, mitigate and adapt to drought. The scholars showed that agro-pastoralists hold IK on indicators of rainfall variability. They believe in the efficacy of IK and IK forms the basic knowledge frame within which agro-pastoralists position and interpret meteorological forecasts. In Darfur, Sudan, there are more than 25 different names for famine, each describing different aspects of famine and hunger. These include *cok dukruai* (meaning breaking relationships), *cok macok gaar* (meaning famine with bell in foot) and *marabilian* (meaning famine of Kerubino/Arab militia).

The argument that indigenous communities possess intricate knowledge systems to read and forecast weather is also articulated in the study in Burkina Faso. Roncoli *et. al* (2000) highlight that farmers' forecasting knowledge encompasses shared and selective repertoires, most farmers formulate expectations from observation of natural phenomena and cultural and ritual spiritualists also predict rainfall from divination, visions and dreams. Rather than positing local and scientific knowledge as self-exclusive, research shows that farmers operate in multiple cognitive frameworks (Roncoli, *et. al* 2000). Kamara, (2005) and Chang'a, *et. al* (2010) also observed that, based on traditional knowledge and people's long standing experience concerning cloud formation, lightning, wind direction and the occurrence of rain in particular period of the lunar calendar, the indigenous rain forecasts predict reasonably the exact nature of rainfall for the entire season including good and undesired effects (including floods and droughts).

Throughout history, communities maintaining tight links to ecosystem dynamics have developed knowledge, practices, and institutions to accommodate recurrent disturbances to secure their livelihood (Berkes *et al.* 2003). Mortimore and Adams (2001), focusing on North-East Nigeria, are of the view that household livelihood and farming systems show that adaptive strategies have been evolved in response to crises in rainfall (drought), food supply, livestock management and environmental degradation. They raise an important point that systematic understanding of indigenous adaptive capabilities (such as negotiating rain) can provide

a basis for policies enabling a reduction of dependency on aid assistance in the Sahel. Local Knowledge also provides farmers with mental reliance and security in their production decisions.

Mararike (2011) highlighted the role of IK in people's survival in rural Zimbabwe and emphasized that for people to survive one of the strategies required is the application of relevant knowledge. He observed versatile local indicators used for survival. For example, the behaviors of trees, birds and animals are applied to discern start of rain, rain adequacy, break in rain, drought, water levels and soil fertility. An impending drought is indicated by failure of certain trees to flower and the start of rain is heralded by the singing of a bird called *haya* (Mararike, 2011). Similarly, Nyong *et. al* (2007) explored some of the ways in which local populations in the Sahel have integrated mitigation and adaptation into their livelihood strategies to reduce their vulnerability to droughts. Farmers are known to make decisions on cropping patterns based on local predictions of climate and decisions on planting dates based on complex cultural models of weather.

Adaptation strategies that are applied among the pastoralists include the use of emergency fodder in times of droughts, multi-species composition of herds to survive climate extremes and culling of weak livestock for food during periods of drought. During drought periods, pastoralists and agro-pastoralists change from cattle (*Bos*) to sheep (*Capra*) and goat (*Capra*) husbandry as the feed requirements of the latter is less than the former (Oba, 1997). Pastoralists' nomadic mobility reduces the pressure on low-carrying capacity grazing areas through the circular movement from the dry northern areas to the wetter southern areas of the Sahel and this system of seasonal movement represents a local type of traditional ranching management system of range resources (Nyong, *et al.* 2007). Leclerc *et al.* (2013) analyzed local perceptions of crop losses and associated causes – including extreme climate events – over the past 40 years among Meru farmers in Kenya. The analysis suggests that local farmers hold fairly accurate knowledge and memory about the occurrence and intensity of drought and flooding-related events, especially those affecting crop yields. The authors conclude that this high level of accuracy in climate knowledge relates to the cross generational development of a local drought nomenclature among the Meru.

Indigenous Adaptive Strategies: Evidence from Mutoko

In this section, we present some findings gathered from conversations with elders from Charewa ward in Mutoko District. These elders either

lead or participate in various ceremonies conducted in Dzimbahwe such as *mabira* for rain or *kutsvaira Dzimbahwe* (sweeping in the Dzimbahwe, which is done in October). Those of the Nzou and Shumba totems were part of the group (as we did not know when we approached the leaders) but are not allowed to lead in the ceremonies in Dzimbahwe because they are *vanatezvara* (in-laws) and relatives of Nehoreka respectively.

The interviews were conducted between 17 and 21 April 2014. These aspects presented are not exhaustive, but serve to illustrate how farmers use IK to adapt to increasing changes in rainfall variability. Our findings show that between 1992 and 2014, rainfall has fluctuated enormously not only in totals received annually but in dates of onset, cessation and length of rain season. An increase in extreme climatic events such as droughts has also been observed. For example, in 1991/1992, 1993/1994, 1994/1995, 2003/2004, 2007/2008, 2010/2011 and 2011/2012 seasons. Droughts between 1992 and 1995 were followed by above average amounts of rainfall in 1996/1997, 1998/1999 and 1999/2000 seasons. Farmers have also indicated that rainfall onset was normal as it started within the expected dates between late October and early November in 2012/2013 and 2013/2014 seasons following the droughts between 2008 and 2011.

Reading the Rainfall Patterns

Most farmers formulate their strategies from observation of natural phenomena. They use aspects such as plants, clouds, stars and animals' and birds' behaviours to forecast, predict and interpret rainfall. When there is a lot of mist (*Mahwakwanya*) in Dorongoma Mountain, it means there will be a lot of rain, so farmers plant crop varieties which require a lot of water such as rice. Rainfall coming from the south is termed *mvura yaNhamhanga* because it is sometimes intense, heavy and accompanied by thunder and lighting. In this case, livestock such as cattle are driven into kraals early. Again, when a small bird called *Kadzonya* builds its nest with entrance facing the south, the season will have a lot of rain. When a *Muhacha* tree produces less fruits, farmers interpret this to mean the season will have little rains, hence they plant short-season maize varieties and intensify horticultural crops such as tomatoes, beans and onions using groundwater reservoirs. Mararike (2011) also observed that indicators which convinced villagers that there would be adequate rains were the presence of large numbers of *makurwe* (crickets) and an abundance of fruits such as *mazhanje* and *mapfura*.

Negotiating Rain

We have noted the intricacies and complexities of negotiating uncertainties of rainfall. Farmers in Mutoko have an agricultural calendar. The agricultural year begins from the time rain falls until the end of crop harvesting. Major activities undertaken during the agricultural season include ploughing, planting, weeding and harvesting. The end of crop harvesting is signaled by *kusairira mombe* (letting cattle graze freely). Farmers tailor their activities according to their own understanding of the nature of the rain season. For example, dry planting is done in anticipation of rain. Some farmers practise planting after the fall of the first heavy rains even if a prolonged dry spell follows. The practice of staggered planting is done so that farmers have early, middle and late crops to address within season variability. Horticulture crops (such as beans and tomatoes) are planted in the fields after harvesting crops. This is done in seasons where rain has been excessive causing leaching and ultimately crop failure such that crops are harvested earlier and farmers take advantage of the moist conditions to plant tomatoes, peas or beans. Naming the rains is also another way of negotiating seasonal rainfall. For example, rain that falls in March is named *mvura yenyemba* (rains for planting cowpeas) and when it comes farmers plant beans and early maturity cowpeas. In the 2013/2014 rain season, this rain did not come.

Kukumbira Mvura

When people are faced with both difficulties and good times, they cry to and praise their ancestors and God. People in Mutoko have traditionally held *mabira ekukumbira mvura*. However, from conversations with elders, this practice became inconsistent over the years. After the insistent dry spells between 2008-2011, people resumed visiting Mutimuchena in Mt Darwin and conducting ceremonies in Dzimbahwe. The heavy rains, which have been described as markers of good seasons, in 2012/2013 and 2013/2014 seasons, have been attributed to these ceremonies. At the same time, people also pray to God within churches. Through praying, spiritual leaders are given signs and visions of both good and bad seasons. In this case, people know how to structure their farming.

Drought Resistant Crops

Drought resistant maize, groundnuts, rapoko, millet and sorghum have been traditionally grown in the area. With increasing seasons with inadequate rainfall and poor quality rainfall, these crops remain integral in the livelihoods of farmers in the semi-arid area. These are normally

planted under *Muhacha* trees (where there is natural manure) or *Pachuru* (where there is thick clay soil). However, the growing of these crops remains limited as compared to hybrid crops. Reasons cited include land scarcity and poor soils, making farmers grow hybrids for better yields. In addition, traditional seeds such as sorghum (*mukotami*), groundnuts (*mukadzi usaende*) and maize (*ambuya vangafe*) have been largely eroded by droughts. Farmers also cited that with hybrids they get better prices.

Contestations on IK in highly dynamic Contexts

It is crucial to note some of the contestations surrounding IK in dynamic and highly vulnerable contemporary contexts. Questions and concerns have emerged on the loss of IK in the face of global climate change. Steffen *et al.* (2004) raised the question of whether IK systems would adapt or disappear in the face of urbanisation, technological development, market globalisation and increasing climate variability. People have also warned against romanticism and basing adaptation on nostalgia.

However, theoretical insights and empirical findings from several studies suggest that despite the generalised worldwide trend of IK erosion, substantial pockets of IK persist in both developing and developed countries (Gomez-Baggethun *et al.* 2013). Recent research from developed and developing countries has found that substantial pockets of IK persist in many rural and urban areas that have been subject to modernisation processes (Godoy *et al.* 1998, Olsson and Folke, 2001; Pieroni *et al.* 2004, Gómez-Baggethun *et al.* 2010, Calvet-Mir *et al.* 2011) cited in Gomez-Baggethun *et al.* (2013). Barthel *et al.* (2010) call *pockets of social-ecological memory* those places that having captured, stored and transmitted through time the knowledge and experience of managing a local ecosystem and the services it produces, continue to maintain and foster them despite drastic changes in the surrounding environments (see also Barthel and Isendahl 2013, as cited in Gomez-Baggethun *et al.* (2013).

IK is increasingly seen as having a hybrid and dynamic nature, more capable of adapting to new ecological and socioeconomic conditions than previously assumed. The dynamic nature of IK is sometimes achieved through the accommodation of new forms of knowledge and by disregarding those knowledge components that become obsolete or less useful for daily life, provided that local people maintain the capacity to apply their knowledge (Gomez-Baggethun and Reyes-García 2013).

IK for Resilient and Sustainable Adaptation: A Human Factor Perspective

Recognition of the adaptive nature of IK to understand where resides the capacity of IK to evolve and adapt in the face of change is imperative but also well prepared people who have acquired the correct Human Factor (HF). Even with abundant IK, adaptation cannot occur in the midst of human factor decay. Our main argument here is that any people who hope to develop sustainable adaptive strategies and become resilient in the face of continuous change must adopt a sustained human-centred approach. HF based adaptation must form the true foundation of responses to climate change. Mararike (2001) noted that the main claim of the HF approach is that no organisation or, indeed, any human activity, can sustain itself without people who are reliable, committed, disciplined and have appropriate skills and qualifications. Adjibolosoo (1995:33) defines Human Factor as:

The spectrum of personality characteristics and other dimensions of human performance that enable social, economic and political institutions to function and remain functional over time. Such dimensions sustain the workings and application of the rule of law, political harmony, a disciplined labor force, just legal systems, respect for human dignity and the sanctity of life, social welfare, and so on. As is often the case, no social, economic or political institutions can function effectively without being upheld by a network of committed persons who stand firmly by them. Such persons must strongly believe in and continually affirm the ideals of society.

In this regard, cooperation and building networks are imperative. For example, with increasing climate variability, people's ability to read the rains is increasingly required. Certainly, this cannot be done individually. Individualistic tendencies should be replaced by a cooperative ethic. Community adaptation also requires honest, trust and dependency. Since IK is passed from one generation to the other, people should have a responsibility to one another. People well versed with IK, such as those able to predict and interpret rain, have an obligation to share and preserve IK for good of societies. IK may be extinct if people are self-centred. IK is community/society knowledge and its use in enabling adaptation should be geared towards community welfare, not self-adaptation.

The HF concept of adaptation is based on the belief that the success or failure of adaptive strategies rests primarily more on the quality of people involved than the state of available IK. If the appropriate quality of people is not available, any IK available will produce minimal results in the longterm. We contend that no successful adaptation can occur without

positive HF attributes such as respect, responsibility and reciprocity. This calls for households and communities to pool and share knowledge and resources for resilience through intercommunity networks and practices. For example, in conducting *mabira emvura*, a cooperative ethic is required for the process to succeed. Adjibolosso (2000) alludes to personal responsibility, accountability, integrity, commitment and selflessness. Those who fail to develop the appropriate HF traits in themselves will neither attain nor sustain any long-term resilience.

IK is also under threat from various processes, including climate change, calling for the need for cooperation in preserving pockets of IK that still exist. Selfish and individualistic tendencies are not required. If people are to act morally and devise adaptive strategies that are good, and also adapt IK, they should be equipped with positive human factor traits. Incorporating moral issues in adaptation is thus inevitable. Some adaptive strategies are not sustainable and do not lead to sustainable adaptation. For example, digging *mufuku* (sand water holes) can seriously deface rivers and consequently erosion. Ecological ethics should be cultivated to ensure environmental reclamation in the process of adaptation.

Conclusion

Climate change and variability pose serious threats to rural livelihoods. However, farmers do not live at the mercy of climate. Drawing from IK, they have dynamically structured and restructured their farming systems to cope with and resist climate change and variability. Farmers in Mutoko are able to predict rains and negotiate seasonal rainfall and subsequently tailor their livelihoods according to the nature of the rains. Farmers also grow drought resistant crops as both seasonal quantity and quality of rainfall continue to deteriorate. Whilst these strategies are held together by IK, this is not enough in a highly variable and dynamic environment. Arguably, strategies that do not consider the importance of HF are bound to be unsustainable and not to foster resilience against continuous challenges. In essence, a HF approach needs to be extended in adapting to climate change and variability.

References

- Adjibolosso S. (1995) (ed) *The Significance of the Human Factor in African Economic Development*, Westport, Praeger.
- (2000) The International Development Program of Activities: What are we Doing Wrong? Department of Accountancy, Business, & Economics Point Loma Nazarene University San Diego, CA A paper presented at the October 2000 CBFA Conference, Ohio.

- Agrawal A. (2002) "Indigenous Knowledge and the Politics of Classification". *International Social Science Journal*, 173:287-297.
- (1995) "Dismantling the Divide between Indigenous and Western Knowledge". *Development and Change*, Vol 26, No 3-4, pp 413-439.
- Asante, M.K. (1988), *Afrocentricity*, New Jersey: Africa World Press.
- Barnhardt, R and Kawagegley (2005) "Indigenous Knowledge Systems and Alaska Native Ways of Knowing", *Anthropology and Education Quarterly*, Vol. 36, Issue 1, pp. 8-23.
- Barthel, S., C. Folke, C. and J. Colding (2010). "Social– ecological Memory in Urban Gardens: Retaining the Capacity for Management of Ecosystem Services". *Global Environmental Change* 20:255-265.
- Berkes, F., J. Colding and C. Folke (2000) "Rediscovery of Traditional Ecological Knowledge as Adaptive Management". *Ecological Applications*, 10:1251-1262.
- Boia, L. (2005) *The Weather in the Imagination*, London: Reaktion Books.
- Boillat, S. and F. Berkes. (2013) "Perception and Interpretation of Climate Change among Quechua Farmers of Bolivia: Indigenous Knowledge as a Resource for Adaptive Capacity". *Ecology and Society* 18(4): 21.
- Boissiere, M., B. Locatelli, D. Sheil, M. Padmanaba, and E. Sadjudin (2013) "Local Perceptions of Climate Variability and Change in Tropical Forests of Papua, Indonesia". *Ecology and Society* 18(4):13.
- Brace, C and Geoghegan, H. (2010). "Human Geographies of Climate Change: Landscape, Temporality and Lay Knowledges" *Progress in Human Geography*, 35(3) 284–302.
- Brown, D. Chanakira, R. Chatiza, K. Dhliwayo, M. Dodman, D. Masiwa, M. Muchadenyika, D. Mugabe, P. and Zvigadza, S, (2012) Climate Change Impacts, Vulnerability and Adaptation in Zimbabwe. IIED Climate Change Working Paper No. 3, October 2012.
- Changa'a, Yanda and Ngana (2010) "Indigenous Knowledge in Seasonal Rainfall Prediction in Tanzania: A case of the South-western Highland of Tanzania". *Journal of Geography and Regional Planning*, Vol. 3(4), pp. 66-72.
- Chikodzi, D. Simba, F.M. and Murwendo T. (2012) "Perceptions, Vulnerability and Adaptation to Climatic Change and Variability in Masvingo Province". *Greener Journal of Political Sciences*, Vol. 2 (5), pp. 156-165, November 2012.
- Cruikshank, J. 2001. "Glaciers and climate change: Perspectives from Oral Tradition". *Arctic* 54(4):377-393.
- Fine, G. A. (2007) *Authors of the Storm: Meteorologists and the Culture of Prediction*, Chicago IL, University of Chicago Press.
- Golinski, J. (2007) *British Weather and the Climate of Enlightenment*, Chicago University Press, Chicago IL.
- Gomez-Baggethun, E. and V. Reyes-García. 2013. "Reinterpreting change in traditional ecological knowledge". *Human Ecology*, 41:643-647.

- Gomez-Baggethun, E., E. Corbera and V. Reyes-García. (2013). "Traditional Ecological Knowledge and Global Environmental Change: Research Findings and Policy Implications". *Ecology and Society* 18(4): 72. <http://dx.doi.org/10.5751/ES-06288-180472>
- Hoffman, A. (2011) "The Culture and Discourse of Climate Skepticism". *Strategic Organization* 9, 77–84.
- Hulme, M. and Mahony, M. (2010) "Climate change: What Do We Know about the IPCC?" *Progress in Physical Geography*, 2010, 34- (5) 705-718.
- Hulme, M. and Snead, N. (1999). *Climate Change Scenarios for Zimbabwe*. Climatic Research Unit, Norwich, UK.
- Hulme, M., Doherty, R., Ngara, T., New, M. and D. Lister (2001) "African Climate Change: 1900-2100". *Climate Research* 17: 145-168.
- IPCC (2007) *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press.
- IUCN (2008) *Indigenous and Traditional Peoples and Climate Change Issues Paper*, March.
- Kamara, J. (2005) "Indigenous Knowledge in Natural Disaster Reduction in Africa". UNEP, *Poverty Times* No. 3 (Jan 2005).
- Leclerc, C., Mwongera, C., Camberlin, P. and Boyard Micheau, J. (2013) "Indigenous Past Climate Knowledge as Cultural Built-in Object and its Accuracy". *Ecology and Society*, 18(4): 22.
- Makadho, J. M. (1996) "Potential Effects of Climate on Corn Production in Zimbabwe". *Climate Research*, Vol.6, pp.146-151.
- Makarau, A. (1999) "Zimbabwe Climate: Past, Present and Future". In: *Water for Agriculture: Policy and Management Options for the Smallholder Sector*. Harare, University of Zimbabwe Publications.
- Mano, R. and Nhemachena, C. (2006) *Assessment of the Economic Impacts of Climate Change on Agriculture in Zimbabwe: A Ricardian Approach*. CEEPA Discussion Paper No. 11. Pretoria: Centre for Environmental Economics and Policy in Africa, University of Pretoria, South Africa.
- Mapfumo P., Chikowo, R., Mtambanengwe P., (2010) *Lack of resilience in African smallholder farming: Exploring measures to enhance the adaptive capacity of local communities to pressures of climate change. A Project Final Technical Report Submitted to the International Development Research Centre (IDRC) Climate Change Adaptation in Africa (CCAA) program*. October.
- Mararike, C.G. (2011) *Survival Strategies in Rural Zimbabwe: The Role of Assets, Indigenous Knowledge and Organizations*. Harare: Best Practices Books.
- (2001) "Revival of Indigenous Food Security Strategies at the Village Level". *Zambezia* (2001), XXVIII (i).

- Mawere, M. (2010) "Indigenous Knowledge Systems' (IKS) Potential for Establishing a Moral, Virtuous Society: Lessons from Selected IKSS in Zimbabwe and Mozambique". *Journal of Sustainable Development in Africa* Volume 12, No.7, 2010.
- Meyer, W. B (2000) *Americans and their Weather*, Oxford: Oxford University Press.
- Miller T.R, Baird T.D and Littlefield C.M. (2008) "Epistemological Pluralism: Reorganizing Interdisciplinary Research". *Ecology and Society* 13(2): 46.
- Ministry of Environment and Natural Resources Management (Climate Change Office) (2008) National Self-Assessment for Climate Change, Biodiversity and Land Degradation in Zimbabwe. Government of the Republic of Zimbabwe
- (MET-CCO), (2004) Technology Transfer Needs in Zimbabwe, Available at: http://unfccc.int/ttclear/sunsetcms/storage/contents/stored-file-20130313150839141/Zimbabwe-draftTNA%20_Combined.pdf.
- Mortimore, M. J. and Adams, W. A. (2001) "Farmer Adaptation, Change and Crisis in the Sahel". *Global Environmental Change* 11 (2001) 49-57.
- Moyo, M, Mvumi, M, Kunzekweguta, M, Mazvimavi, K, Craufurd, P and Dorward, P. (2012) "Farmer Perceptions on Climate Change and Variability in Semi-arid Zimbabwe in Relation to Climatology Evidence". *African Crop Science Journal*, Vol. 20, Issue Supplement 2, pp. 317-335.
- Mtambanengwe, F, Mapfumo, P, Chikowo, R. and Chamboko, T. (2012) "Climate Change and Variability: Smallholder farming Communities in Zimbabwe Portray a Varied Understanding". *African Crop Science Journal*, Vol. 20, Issue Supplement 2, pp. 227 – 241.
- Mudombi S. and Muchie, () Analysis of the role of Information, Communication and Technologies (ICTs) in Climate Change Awareness in Seke and Murewa Districts, Paper produced as part of the implementation of the ATPS Phase VI Strategic Plan, 2008-2012 funded by ATPS donors including Ministrie van Buitenlandse Zaken (DGIS) the Netherlands, amongst others.
- Nader, L. (1996) "Anthropological Inquiry into Boundaries, Power, and Knowledge". In L. Nader (ed.) *Naked Science: Anthropological Inquiry into Boundaries, Power, and Knowledge*. New York: Routledge.
- Nerlich B, Kotevko N. and Brown B. (2010) "Theory and Language of Climate Change Communication". *WIREs Climate Change* 97–11.
- Nisbet M. C. (2009) "Communicating Climate Change: Why Frames Matter For Public Engagement". *Environment*. 51(2): 514–518.
- Nuttall, M. (2001) "Indigenous Peoples and Climate Change Research in the Arctic". *Indigenous Affairs*, Vol. 4, pp. 26-33.
- Nyong, A, Adesina F and Elasha, B, (2007) "The Value of Indigenous Knowledge in Climate Change Mitigation and Adaptation Strategies in the African Sahel". *Mitigation Adaptation Strategy and Global Change*, (2007) 12:787–797.

- Nzewi, M. (2007) "A Contemporary Study of Musical Arts: Informed by African Indigenous Knowledge Systems" *Illuminations, Reflection and Explorations Volume Four*. Ciima Series.
- Oba G. (1997) Pastoralists' Traditional Drought Coping Strategies in Northern Kenya. A Report for the Government of the Netherlands and the Government of Kenya, Euroconsult BV, Arnheim and Acacia Consultants Ltd, Nairobi.
- Orlove, B. Rancoli, C. Kabugo, M. and Majugu, A. (2008) "Indigenous Climate Knowledge in Southern Uganda: The multiple Components of a Dynamic Regional System". *Climatic Change, Springer*.
- Owusu-Ansah, F. E. and Mji, G. (2013). "African Indigenous Knowledge and Research". *African Journal of Disability* 2(1), Art. <http://dx.doi.org/10.4102/ajod.v2i1.30>
- Pettenger, M.E. (2007). *Social Construction of Climate Change: Power, Knowledge, Norms, Discourses*, Abingdon, Oxon, Ashgate Publishing Group.
- Roncoli, C. (2006) "Ethnographic and Participatory Approaches to Research on Farmers' Responses to Climate Predictions". *Climate Research*, Vol. 33: 81-99, 2006 .
- Roncoli, C., Ingram, K and Kirshen, P. (2000) "The Costs and Risks of Coping with Drought: Livelihood Impacts and Farmers' Responses in Burkina Faso" *Climate Research*, 19, 119-132.
- Scoones, I. and Thompson, J. (1994) "Knowledge, Power and Agriculture-Towards a Theoretical Understanding. In: Ian Scoones and John Thompson (Eds.) *Beyond Farmer First : Rural People's Knowledge, Agricultural Research and Extension Practice* London: Intermediate Technology Publications Ltd .
- Sillitoe, P. (1998) "The Development of Indigenous Knowledge: A New Applied Anthropology". *Current Anthropology* 39:223-23.
- Simba, F. M. Chikodzi, D. Murwendo, T. (2012a) "Climate Change Scenarios, Perceptions and Crop Production: A Case Study of Semi-Arid Masvingo Province in Zimbabwe". *Journal of Earth Science and Climate Change* 3:124.
- Simba, F. M. Murwendo, T. Chikodzi, D. Mapurisa, B. Munthali, A. and Seyitini, (2012b), "Environmental Changes and Farm productivity: An Assessment of the Masvingo Province of Zimbabwe". *Sacha Journal of Environmental Studies*. Volume 2 Number 1 (2012) pp. 114-129.
- Speranza, C. I. Kiteme, B. Ambeje, P. Wiessmann, U. and Makali, S. (2010) "Indigenous Knowledge Related to Climate Variability and Change: Insights from Droughts in Semi-arid Areas of Former Makueni District, Kenya". *Climatic Change* 100:295-315.
- Srinivasan, A. (2004) Local knowledge for facilitating adaptation to climate change in Asia and the Pacific: policy implications, IGES-CP Working Paper Series 2004-002, IGES Climate Policy Project. URL: <http://www.iges.or.jp/en/cp/pdf/report8.pdf>.

- Steffen, W., A. Sanderson, P. D. Tyson, J. Jäger, P. A. Matson, B. Moore III, F. Oldfield, K. Richardson, H. J. Schellnhuber, B. L. Turner II and R. J. Wasson. (2004) *Global Change and the Earth System: A Planet Under Pressure*. New York. Springer-Verlag Berlin Heidelberg.
- Strauss, S. and Orlove, B. (2004) (eds). *Weather, Climate and Culture*, Oxford: Berg/Oxford International Publishers.
- (2004) "Up in the Air: The Anthropology of Weather and Climate" *In: Weather, Climate and Culture*, Oxford, Oxford/Berg International Publishers, pp1-12.
- UNFCCC, 2007. Database On Local Coping Strategies. <http://maindb.unfccc.int/public/adaptation>
- Unganai, L. S. (1996) "Historic and Future Climatic Change in Zimbabwe". *Climate Research*, 6, 137-145.
- Unganai, L. S. and Murwira, A. (2010) Challenges and Opportunities For Climate Change Adaptation Among Smallholder Farmers in Southeast Zimbabwe, Paper presented at the 2nd International Conference: Climate, Sustainability and Development in Semi-arid Regions August 16 - 20, 2010, Fortaleza - Ceara, Brazil.
- Whitmarsh L. (2009) "What's in a Name? Commonalities and Differences in Public Understanding of 'Climate Change' and 'Global Warming'". *Public Understanding of Science* 18: 401–420.



This work is licensed under a
Creative Commons
Attribution – NonCommercial - NoDerivs 3.0 License.

To view a copy of the license please see:
<http://creativecommons.org/licenses/by-nc-nd/3.0/>

This is a download from the BLDS Digital Library on OpenDocs
<http://opendocs.ids.ac.uk/opendocs/>