Climate Change Management

Walter Leal Filho
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Handbook of Climate Change Communication: Vol. 3

Case Studies in Climate Change Communication

Springer

Climate Change Management

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Preface

Climate change is a very complex issue. Communication about climate change is therefore anything but a simple task and the one which needs to take into account a variety of factors. Apart from the need to provide due consideration to cultural values, traditions and lifestyles, there is a perceived need to take into account the social and economic contexts which surround people and which influence their views and perceptions on climate change. Therefore, in order to yield the expected benefits, initiatives on climate change communication need to have a sound evidence basis.

This book, titled "Case Studies in Climate Change Communication", addresses the need for peer-reviewed publications which examine and discuss practical experiences, projects and case studies surrounding communication related to climate issues. It documents and promotes experiences from researchers and practitioners on climate change communication from round of the world and illustrates a variety of approaches, methods and strategies being used today to cater for a better understanding of what climate change is and what it means to people.

We thank the authors for their willingness to share their experiences and initiatives, as well as the many reviewers who have checked and provided valuable insights to their contributions, making sure they are of the highest quality. Enjoy your reading!

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In Search of New Narratives for Informed Decisions on Climate Change Crisis in the African Drylands

Aliyu Barau and Adamu Idris Tanko

1 Introduction

Many people in the developing world are fed the news of climate change through the mainstream media which feeds in from briefs released by scientists and policymakers. People including farmers and those living in flood vulnerable cities listen and watch scenarios of climate change both local and global through the media. Nevertheless, it is hard to believe that such people clearly understand the basic terms of climate change science. Indeed, many people in the developing world lack access to climate change MOOCs—massive online open courses taught by experts in foreign languages and scientific jargons. Therefore, it is urgent to address this challenge through better means of communicating climate change concepts through integration of indigenous knowledge systems and their modern counterparts. This strategy is based on the assumption that climate plays an important role in every human society and development. Hence, the representation of climate in folklores and myths could be used to bridge gaps between local people, science communicators, and climate change science and policy community. Indeed, the increasing

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uncertainty, vulnerability, complexity and ambiguity associated with wicked challenges such as climate and global environmental change drive many scientists, engineers and innovators to explore solutions. However, the main challenge is how to communicate this in the best way to convince all stakeholders.

According to Yale University's Climate Change Communication Program,[1] Climate Change Communication (CCC) is concerned with "educating, informing, warning, persuading, mobilizing and solving this critical problem." It adds that, "[a]t a deeper level, climate change communication is shaped by our different experiences, mental and cultural models, and underlying values and worldviews." Shedding more light on this, Dulic et al. (2016) observed that climate science communication develops out of the field of science communication which aims at bringing scientific knowledge to the public arena and thus make it relevant to the everyday life. Science communication is a flexible means of engaging public informally, shaping public policy, and may involve use of arts as one of its strategies (Lesen et al. 2016). Thus, CCC has great potential contribution in addressing the current global climate change crises. Even in developed countries such as Australia, where climate change science communication is integrated into the schools' curricula, there are challenges pertaining to trusting the source of climate change information in the public domain (Boon 2014). Hence, it is important to look for holistic approach in designing CCC in way and manner that useful knowledge is disseminated to all stakeholders.

Given the successive failures to conclude global climate negotiations on fair, effective, implementable means of reducing greenhouse gas emissions, Ostrom (2010) called for the need to fast track emission reduction through efforts of individuals, families, firms, communities, and governments. Some critical scholars have also paid attention to multi-scalar approach by expressing the urgency for climate scientists to pay close attention to scales of real human activity and ecosystem services e.g. headstreams, watersheds, and flow characteristics (Ivanov et al. 2012). Climate modelling is often conducted at coarse scales, while that span hundreds to thousands of kilometres at the detriment of community or livelihood levels.

A number of multidisciplinary scholars have continued to recognise the importance of multiscalar approach because of its ability to transcend many issues related to climate change vulnerability and risks in developing countries. For instance, considering the disproportionate reference to biophysical dimensions of climate change, Ghosal (2016) examined the crosscutting relations of geographic, political, socio-economic dimensions of vulnerability. Socio-economic issues in particular may fit into what Lovell et al. (2002) categorised as belonging to institutional scale where issues such as actors, jurisdiction, informal networks, indigenous knowledge, and governance come to the limelight. In other words, ignoring multiscalar dimensions can impede and undermine efforts to effectively address regional environmental sustainability (Morrison 2007). Again, the role of

[1]What is Climate Change Communication? See: http://climatecommunication.yale.edu/about/what-is-climate-change-communication/.

interpersonal influences also suggests the critical role of individuals who communicate climate change through community network and influences (Leombruni 2015) and eventually that influences government policy.

The greatest impediment to climate change science may come through misinformation and misrepresentation that may arise from poor communication of narratives associated with the notion of climate change. Such skewed communication may affect how households, communities, corporate bodies, policy and decision makers receive knowledge about climate change related issues. All these actors need to know how climate change affect their future and how any measure taken to tackle climate change may also positively or adversely affect the future of their stake. For some time now, the knowledge brokers are increasing recognised as persons and or organizations that struggle to create and share knowledge and are able to help their audience to know-how, know-why, and know-who, said what in science (Meyer 2010). As per climate change communication to the public, a study by O'Neill and Nicholson-Cole (2009) revealed that using tone of narratives of climate change alarmism is counterproductive. As such, inclusive and innovative tools are essential for effective climate change communication.

In spite of the alarmists of climate change, the situation of many African communities is pathetic as far as climate change is concerned. In effect, given the myriad of the challenges that climate change poses in Africa, the complexity of the problems can only be appreciated deeply through multiscalar prisms. For instance, from development perspective, it is reported that climate change could hinder the attainment of the Sustainable Development Goals (SDGs) and could also reduce by 12% Sub-Saharan Africa's Human Development Index (Chirambo 2016). Another critical dimension of climate change crises in Africa is food insecurity. A recent study reveals that adaptation mechanisms being taken to improve adaptation of staple crops (e.g. sorghum: *Sorghum bicolor Moench*) to future climate change is not promising as their production would only be marginal (Guan et al. 2017). Such decline in agricultural productivity resulting from climate change would affect the income levels of smallholder farmers and other repercussions include increased vulnerability to diseases and education in drylands (Amjath-Babu et al. 2016).

Considering the increasing population and energy demand and also Africa's potentials in generating renewable energy, studies have indicated that climate change undermines realisation of Africa's potential solar and wind energy options (Fant et al. 2016). Even as more people inhabit urban centres in Africa and the number keeps growing with increasing migration, only cities in South Africa appear on the global map of cities with defined adaptation strategies (Araos et al. 2016). Going in tandem with this chapter's arguments on multi-scale dimensions of climate change, Lyle (2015) pointed out that climate change adaptation ought to consider cross-scale interactions and hierarchical problems of the climate change crises. In other words, using positive images and narratives is the most engaging tool. Nevertheless, scientists have continued to publish alarming study findings, the media spills negative news about human future in the era of changing climate, while environmentalists confront corporate bodies. Several rounds of climate talks have witnessed frustrations and deadlocked meetings. Climate change issues are

communicated to the audience from business, policy, communities, universities and research centres who interpret them according to their concerns. Hence it is possible that narratives emerging from such meetings create confusion and frustration. In writing this chapter, the authors were motivated by the recent arguments made by Mortimore (2016) who raised the issue of changing paradigm in managing crisis of desertification in the Sahel region. The highlighted the nature of gaps between communities, policymakers and international development organisations.

2 Justifications and Options for Delivering Climate Change Communication Narratives in the Drylands of Sub-Saharan Africa

The Sahel region is about the most infamous region in Africa for its droughts and climate stressed human casualties and sufferings. The United Nations Environment Programme (UNEP 2011) dubbed the Sahel region as a ground zero to mark it as a dryland area with severe levels of starvation particularly during drought cycles. This situation of the area usually makes it attract the attention of the international media, science, development and humanitarian communities. Another critical issue that makes the area very known in the cycle of climate change and human impact research groups is the accelerated drying up of the Lake Chad. Situated between Latitude 13° 0′ 0″ (13.0000) and Longitude 14° 10′ 0″ (14.1667), the Lake Chad is Africa's fourth largest lake.[2] The lake's waters and marshes have desiccated progressively to the extent that its areal coverage of about 25,000 km^2 has shrunk to less than 2500 km^2 which is less than 10% of its size in 1960 (Lake Chad Basin Commission 2016). Many scholars have attributed this to droughts and other upstream land use activities in the basin. As such, the recurrent droughts, and desiccation of the Lake Chad and its tributaries are seen as driving forces behind food insecurity, rising conflicts and insurgencies in the area.

3 Narratives on Climate Change in the Sahel

The Sahel is a strip of dryland that extends from Senegal in the West though the Horn of Africa and it forms a major transitional land between Sahara desert and Savannah region. The Sahel region receives little rainfall and experiences minor and major droughts within every five years (Kandji et al. 2006). In connection to that, Ching (2010) predicts that yields from rain-fed agriculture could fall by 50

[2]Lake Profile—http://www.worldlakes.org/lakedetails.asp?lakeid=8357.

percent by 2020 in Africa; and livestock production would plunge due to rangeland degradation. These drought cycles undermine food security, which in turn affects livelihoods in the West African Sahel (Mortimore and Adam 1999; Wittig et al. 2007; Mortimore et al. 2009; Mortimore 2010). This makes vast groups of agriculture dependent people vulnerable. The 20th century had several bouts of intense droughts: 1898–1916, 1930–31, 1940–41, 1947–49 through those of 1968–1988 which recorded minimal rainfall in 1971, 1973, 1981, 1982 and 1987 (Jacques and Le Treut 2006). For some researchers, the 1983–1985 droughts were the worst in terms of population drift to cities (Wilson and Legesse 2004). Neo-Malthusians surmise that some Sahelian states are "demographically entrapped" as their population has exceeded their physical carrying capacity (King and Wang 2007). Such countries struggle to cope with droughts and desertification, but trends in climate variability now make them to battle with floods too (Dembowski 2007). In the same fashion, conflicts over control of natural resources are part of African drylands risks (Osman-Elasha 2007). Consequently, the future of African Sahel is apocalyptic due to combined impacts of up-surging climate change events on the quality of human life (Ehrhart et al. 2009).

Some scholars view what is happening in the Sahel as climate change and climate variability. According to, Mouhamed et al. (2013) warming trend throughout the region was observed from 1960 to 2010, and this was noticed through negative trend in the increasing number of cool nights, warm days and warm spells. Rainfall trends have shown the nature of changes as shown in Table 1.

The decades long climatic data variability shown in Table 1 lends credit to some previous studies that single out rainfall and also wind as main features of changing climate and the Sahel and at the same time attributed poor livestock health and reduced crop yield to climatic change and variability (Mertz et al. 2009). In other words, it is crucial to communicate the story of the Sahel through different prism and perspectives.

More recently some studies suggested that drought tolerant native and exotic tree cover lost 1968–1984 were recovered particularly around residential areas (Hänke et al. 2016). These kinds of positive narratives are rarely discussed and communicated to communities and policymakers. The findings underscore the critical role of land use change in environmental change in African drylands. Nonetheless, this does not mean droughts do not have negative effects on the Sahel vegetation at all. Drought occurrence has affected species distribution which is shown to reduce remarkably after drought incidents in the region (Hiernaux et al. 2006; Spiekermann et al. 2015). Tuareg people are closely associated with social and environmental conditions explained above. They are minority ethnic group with population of three million in the Sahel and Sahara states have been involved in crises in Niger and Mali that trigger migration (African commission on human and people's rights —ACHPR 2005).

Table 1 Rainfall trends 1960s to 2010 as collected from different synoptic stations across the Sahel

Indices	Nouakchott		Bamako		Ouagadougou		Niamey		N'Djamena		Units
Periods	1961–1990	1991–2010	1961–1990	1991–2010	1961–1990	1991–2010	1961–1990	1991–2010	1961–1990	1991–2010	
Max 5-day rainfall	33.7	44.7	123	117	104	109	86	97	88	103	mm
Extremely wet day total rainfall	5.7	18.6	48.1	62.7	44.4	45.6	30.9	37.8	29.3	45.7	mm
Annual total rainfall	84.6	95.5	913	943	782	724	535	541	505	583	mm
Max consecutive wet days	2.1	1.5	5.0	5.4	5.1	4.6	3.8	3.8	4.2	3.7	day

Adapted from: Mouhamed et al. (2013)

4 History of Climate Change Science and Climate Change Negotiations

Circumstances of regions such as the Sahel provide cogent reasons on the urgent need to explore more scientific and policy options to deal with the challenge of climate change. It took many years of blame shifts before countries and institutions agree on the need to go for negotiations on climate change. Negotiations are part of the science, policy, development and diplomacy narratives and response to climate change. However, the dividing line between them is slim because they are often intertwined and closely related. For instance, greenhouse gas mitigation and climate change adaptation are two critical terms that always bring science and policy community to dialogue (Schipper 2006). According to Hulme (2009) the history of modern climate change dates back to 19th May 1859 when John Tyndall an Irish scientist working with the Royal Institute in London discovered the absorptive capacities of gases and vapours when exposed to atmospheric radiation. This discovery followed the ideas put forward by French Scientist namely Joseph Fourier 30 years before Tyndall findings. Following Le Treut et al. (2007) we here extract the most important climate science related activities over time as illustrated in Table 2.

Based on the information in Table 2, the world has witnessed tremendous scientific contributions in the field of climate science and data collection. Thus, there is massive improvement in knowledge and data collection which is sufficient and reliable enough to establish patterns of climate change. However, since scientific findings

Table 2 Climate science in a timeline extracted by authors from Le Treut et al. (2007)

S/N	Period	Climate science in a timeline
1	1600	Invention of thermometer
2	1653	Establishment of first meteorological network in northern Italy
3	1853	Commencement of metrological observations from ships
4	1873	Establishment of International Meteorological Organization (IMO)
5	1873–1881	Köppen's contributions to enhancing climatic data quality and statistics
6	1923	Commencement of World Weather Report
7	1938a	First global temperature time series related to CO_2 produced
8	1938b	First measurement of urban heat island
9	1950	Production of world temperature time series 1950–1845
10	1969	Production of first maps of monthly temperature anomalies
11	1970s	Spatial interpolation and weather stations averaging techniques introduced
12	1982	Integration of global satellite data into mainstream observations
13	1990s	Massive automation of weather data collection points
14	2000s	There over 400 million individual readings of thermometers at land stations and over 140 million individual in situ sea surface temperature observations

are by their very nature not incontestable. At the same time, scientists lack the power to make decisions on how to deal with climate change and its impacts. As such, practical solutions to climate change have become a Holy Grail that is constantly being sought by politicians, scientists, communities and intergovernmental institutions. It is common knowledge that scientists have been exploring the impacts of anthropogenic activities on the climate and it only recently that such knowledge is communicated to policymakers who often get summary for policy makers (SPMs). At the moment the culture of summary for communities is largely uncommon.

The major breakthrough and bridge between science and policy communities with regard to climate change is the establishment of the United Nations Framework on Climate Change (UNFCC). The establishment of this body seems to be one of the main achievements of the 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil. Since that remarkable achievement, the grounds for climate change negotiations were opened and several rounds of talks were held across different cities and continents. A summary of the various climate change Conference of Parties meetings is outlined in Table 3.

With some 195 parties, the UNFCCC is the largest political response to climate change.[3] Based on the Table 3, it is obvious that the COPs have virtually gone round all the global regions. However, the important question relevant to this analysis is why it has been difficult for the parties to arrive at all-encompassing, inclusive, legal, and responsibly binding agreements on how to avoid the global warming. COPs are avenue where scientists, policymakers, activists and many other stakeholders meet. Hence, the kind of messages, notes, and agreements being communicated paly critical role in shaping the success and future of such agreements.

Although the importance of climate change communication is highlighted in the above paragraphs, it is obvious that the crucial strategies are not being exploited appropriately in African countries. Even in developed countries, its advantages are not yet be fully developed and implemented to the benefit of mainstreaming climate change debate in policy, business, science, and community cycles.

5 An Overview of Climate Change Communication Strategies

According to Jeffery Sachs—one of the leading scholars on climate change science and policy, "the public must be able to interpret and respond to often bewildering scientific, technological, and economic information" which allows them to "take the pivotal actions needed to respond with urgency and accuracy"[4] to the challenges of

[3]COP—What's it all about? http://www.cop21paris.org/about/cop21.

[4]In: introduction to The Psychology of Climate Change Communication a Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public. CRED, New York.

Table 3 COP timeline from 1992 to 2016 complied relevant websites[a]

S/N	Time	Conference of parties	Held in
1	9th May, 1992	UNFCCC adopted	New York, United State
2	21 March 1994	UNFCC ratified	
3	28 March–7 April 1995	COP 1	Berlin, Germany
4	8–19 July 1996	COP 2	Geneva, Switzerland
5	1–10 December 1997	COP 3	Kyoto, Japan
6	2–13 November 1998	COP 4	Buenos Aires
7	25 October–5 November 1999	COP 5	Bonn, Germany
8	November 13–24, 2000	COP 6	The Hague, Netherlands
9	October 29–November 9, 2001	COP 7	Marrakech, Morocco
10	October 23–November 1, 2002	COP 8	New Delhi, India
11	December 1–12, 2003	COP 9	Milan, Italy
12	December 6–17, 2004	COP 10	Buenos Aires, Argentina
13	November 28–December 10, 2005	COP 11	Montreal, Canada
14	November 6–17, 2006	COP 12	Nairobi, Kenya
15	December 3–15, 2007	COP 13	Bali, Indonesia
16	December 1–12, 2008	COP 14	Poznan, Poland
17	December 7–18, 2009	COP 15	Copenhagen, Denmark
18	November 29–December 10, 2010	COP 16	Cancún, Mexico
19	November 28–December 9, 2011	COP 17	Durban, South Africa
20	November 26–December 7, 2012	COP 18	Doha, Qatar
21	November 11–23, 2013	COP 19	Warsaw, Poland
22	December 1–12, 2014	COP 20	Lima, Peru
23	November 30–December 12, 2015	COP 21	Paris, France
24	November 7–18, 2016	COP 22	Marrakech, Morocco

[a]Environmental and Energy Study Institute (http://www.eesi.org/policy/international); Centre for Climate and Energy Solutions (http://www.c2es.org/international/history-international-negotiations)

climate change. On the other hand, Corner et al. (2015) identified 12 tools for communicating climate change knowledge and outreach. These include the following:

- Manage your audience's expectation
- Start with what you know, not what you do not know
- Be clear about the scientific consensus
- Shift from uncertainty to risk
- Be clear about the type of risk you are talking about

- Understand what is driving people's views,
- The most important question is 'when' not 'if'
- Communicate through images and stories
- Highlight the positives of uncertainty
- Communicate effectively about climate impacts
- Have a conversation, not argument
- Tell a human story

Climate science communication has had some staggering movements even in developed countries. For instance, a study by Pew Research Center (2009) revealed that public perception of climate change in the US is at the bottom list of American priorities. However, a more recent study shows that perception of climate change generally varies with age of citizens in a country. In the US, a study shows that 89% of the millennials (persons born in 2000 and after) believed that climate change is human induced and is happening and no age group has as much perception as this young persons (Akerlof et al. 2016). In general, there is a positive change in respect of climate change perceptions in the US where 70% of the population believe climate change is happening and 67 said they feel concerned about climate change and global warming (Leiserowitz et al. 2016).

Communication is core to effectiveness of the goals of scientists and practitioners. For instance, in healthcare delivery system it is found that communication helps in supporting patients' self-management, adherence, satisfaction, and it enhances patient-physician relationship, supports management of emotions and decision-making (Ang et al. 2014; Zill et al. 2014). As per climate change, media is expected to play critical role in informing the public about the connection between climate change science and extreme weather events such as frequent flooding. However, some critical scholars are of the view that the media reportage on extreme weather event has not satisfactorily been able to engage the science of climate change (Gavin et al. 2009). In the west, documentaries are used as important outlets for engaging the public. A number of award-winning documentary films on climate change have been produced and probably enjoyed millions of views. Some of the popular documentary films are outlined in Table 4.

Besides documentary films production, one of the yielding strategies for whetting the public interest is through production of eco-fiction works. These are mostly prose works that focus on narratives that have ample consideration for environmental issues. At the height of climate change campaigns, a number of authors have written novels that narrate climate change through their characters and scenes. Table 5 outlines examples of the leading books on climate change.

The age of the Internet has also revolutionised how climate science and policy are communicated to the public. One of the most recent and effective internet climate knowledge dissemination tools is through massive online open courses (MOOCs). These are Internet based free courses organised by academic and research institution to offer introductory knowledge on topical issues such as climate change. Examples of some climate change related MOOCs are given in Table 6.

Table 4 Some of the leading documentary films on climate change

S/N	Year of production	Title of documentary film	Message
1	2006	An Inconvenient Truth	To raise public awareness on the dangers of global warming
2	2006	The Great Warming	Demonstrating effect so of climate change on communities
3	2007	The 11th Hour	Urgent call to respond to climate change
4	2009	Tapped	Dubius practices against the environment
5	2009	The Age of Stupid	Futuristic view on climate change
6	2010	Trading on Thin Air	Role of big businesses
7	2011	The Island President	Role of political leaders
8	2012	Chasing Ice	Melting of ice
9	2012	Revolution	Role of people in dealing with climate change
10	2012	Inconsistent Truth	Opposition to climate change science
11	2013	The Human Experiment	People's exposure to chemicals
12	2013	More Than Honey	The importance of bees in ecosystem and their vulnerability to eco-change
13	2014	Merchants of Doubt	Scepticism on climate change
14	2014	Cowspiracy: The Sustainability Secret	Cattle and the environment
15	2016	Gasland	Complexity of environmental change

In most cases, reputable scholars run the courses for a few weeks usually 2–8 weeks. Participants log into their websites at will to watch lecture videos, read materials and do assignments. Sometimes, certificates are offered to willing individuals at some cost.

It is obvious that most of the climate change communication strategies explained above are based on examples from Europe, US and other parts of the developed countries.

In general, it appears that individuals, universities, research institutions, civil societies and public institutions have played important role in disseminating knowledge on climate change science and policy. It is most probably, that this sustained efforts and innovations are responsible for the tremendous breakthrough achieved in the field of climate change communication which has significantly improved the level of public opinion in issues relating to climate change at least in big countries such as the United States. Nevertheless, we have also seen efforts by groups to use some of the strategies to refute or cast doubts on the integrity of climate change science and policy. It is important to note that, the paucity and or poor visibility of climate communication strategies for developing countries such as those in the sub-Saharan Africa region does not mean such knowledge and strategies are absent. The options and justifications for emphasising on the need for

Table 5 Some of the novels loaded with climate change issues

S/N	Year of publishing	Title of novel	Author
1	2012	Memory of Water	Emmi Itäranta
2	2012	Flight Behavior	Barbara Kingsolver
3	2012	A Being Darkly Wise	John Atcheson
4	2013	Odds Against Tomorrow	Nathaniel Rich
5	2014	The Bone Clocks	David Mitchell
6	2015	Nature's Confession	J. L. Morin
7	2011	The Twig Stories series	Jo Marshall
8	1987	The Sea and The Summer	George Turner
9	2015	Shackleton's Man Goes South	Tony White
10	2014	Climate Changed: A Personal Journey Through Science	Philippe Squarzoni
11	2013	Back to the Garden	Clara Hume
12	2016	Hot Season	Susan DeFreitas
13	2016	The Humanity Bureau	Dave Schultz
14	2016	Tree Volution	Tara Campbell
15	2016	Flip the Bird	Kym Brunner

climate change communication strategies in African drylands are discussed in the next section.

The stakeholders in the Sahel need to urgently embrace innovative strategies to foster mitigation and adaptation strategies. Against this backdrop, the narratives needed in this context are those that are multi-scalar in nature and climate change communication should be one of the most needed interventions.

In the case of the Sahel, Toulmin and Brock (2016) argued that after many years of failed narratives in the drylands, it is imperative to develop new narratives that fuse scientific and indigenous people of the Sahel. Indeed, one of the key challenges is the continued fragmentation of science and policy framings in the region. According to Mortimore (2016), governments and external (global) players and local scientists use different narratives in explaining the climate change. This fragmented, and incoherent posture of science and policy is a pointer to the lack of people focussed and holistic measures for dealing with crises in the Sahel. The crucial point here is that there is a wide gap in knowledge sharing and integration into policymaking. Again, it is understandable that there is problem in the use of narratives. For instance, international institutions and intergovernmental agencies feed national government with narratives that are not necessarily reflective of local knowledge and experiences. Hence, there are gaps and fragmentation in the way knowledge is communicated from all angles and this has always affected the effectiveness of intervention strategies in the Sahel.

Table 6 A selection of climate change MOOCS

S/N	Title of the MOOC	Organised by
1	Agriculture and the World We Live In	Massey University
2	Our Energy Future	University of California, San Diego
3	Global Warming II:	The University of Chicago
4	Our Earth's Future	American of Natural Museum of History
5	How to Change the World	Wesleyan University
6	Our Earth: Its Climate, History, and Processes	University of Manchester
7	Deception Detox	Erasmus University Rotterdam
8	Climate Justice: Lessons from the Global South	UNESCO/FUTURELEARN
9	Traitement médiatique du changement climatique	Université de Versailles SQ-Yvelines
10	Climate Change Leadership	Uppsala University/FUTURELEARN
11	Our changing climate: past, present and future	University of Reading/ FUTURELEARN
12	Climate Change: The Science	The University of British Columbia
13	Making Sense of Climate Science Denial	University of Queensland
14	Causes of Climate Change	University of Bergen
15	Monitoring Climate from Space	European Space Agency

Indeed, more and more researchers are shifting attention to resilience rather than desertification, this is because as Benjaminsen (2016) pointed out, desertification is a vague concept and what matters is to understand the dynamics between rainfall changes and the coping strategies of the people of Sahel. It is interesting to note that while desertification is a questionable concept, the increasing concern among the critical Sahel scholar is on the changing patterns of rainfall which is associated with global warming. As such, it becomes important to develop a framework that identifies the multiple scales and typologies of climate change communication needed in the Sahel. Any framework for climate communication for the Sahel should be able to integrate indigenous knowledge, findings of local scientific community as well as local and global policy response strategies to climate change in drylands. This is even as one is not oblivious of the dismal situation of climate collation and management in Africa. Climate data quality is important for all narratives that come out of the Sahel. It is worrying that the distribution ratio of weather stations in Africa is one per 26,000 km^2 or eight times lower than the world average (Algamal 2011). With such a huge deficit in real-time ground data, regional and local climate modelling cannot be overwhelmingly satisfactory.

However, it is pertinent to note that the most neglected aspects of climate change knowledge in Africa is indigenous knowledge about climate change and local adaptation strategies. African societies have used traditional environmental knowledge and environmental ethics which is often communicated to future

generations through oral narratives. In the modern age some of these environmental and climate related knowledge systems have been documented and mainstreamed into the global environmental knowledge systems (see Barau 2009 and Barau et al. 2016). One of the most widely read works of literature in Africa is Chinua Achebe's *Things Fall Apart*. This multiple award winning prose narrates some stories that tell a reader how Africans perceive climatic variability and particularly in relation to changing patterns of rainfall and how that affects livelihoods in the society. Although the half century old work was not conceived as an eco-fiction, it can be used as example of works that demonstrate some aspects of traditional climate change knowledge climate change. Thus, it can be used in communicating climate change knowledge for African society. Some of the relevant passages and sentences from *Things Fall Apart* are given below.

- *When they had eaten they talked about many things: about the heavy rains which were drowning the yams…* (Chap. 1, p. 5)
- *The first rains were late, and, when they came, lasted only a brief moment. The blazing sun returned, more fierce than it had ever been known, and scorched all the green that had appeared with the rains. The earth burnt like hot coals and roasted all the yams that had been sown… He had sown four hundred seeds when the rains dried up and the heat returned. He watched the sky all day for signs of rain clouds and lay awake all night.* (Chap. 3, p. 16–17)
- *But the year had gone mad. Rain fell as it had never fallen before. For days and nights together it poured down in violent torrents, and washed away the yam heaps. Trees were uprooted and deep gorges appeared everywhere. The spell of sunshine which always came in the middle of the wet season did not appear. The yams put on luxuriant green leaves, but every farmer knew that without sunshine the tubers would not grow.* (Chap. 3, p. 17)
- *All the grass had long been scorched brown, and the sand felt like live coals to the feet. Evergreen trees wore dusty coat of brown. The birds were silenced in the forests, and the world lay panting under the live vibrating heat. And then came the clap of thunder. It was angry, metallic and thirsty clap, unlike the deep liquid rumbling of the rainy season.* (Chap. 14, p. 91–92)

Besides creative works, there are certain scientific works on the drylands which included traditional environment knowledge and experiences of local communities on climate related knowledge and environmental management skills. For example, using information from field based personal communication with some respondents in the peri-urban Kano, Maconachie (2014) reported on the complicated relations between land use management, biodiversity and climate as quoted below:

> The *Kuka* is excellent because it doesn't have too many leaves. But the *Tsamiya* has very broad leaves and it will make too much shade on the plot, so it is not as good for the crops. The *Gawo* tree produces fruits that animals love. So under the *Gawo*, you will see lots of animals, and they will drop their *taki* and make the soil rich. When you see the *Marke* tree, you know the land is not rich. The land around this tree becomes very hot and dry, even in the rainy season.

This shows that the science community has recognised the importance of local knowledge. Perhaps, lack of its integration or communicating such knowledge into the mainstream policymaking and climate change debates at national, regional and global scales undermines its relevance. Interestingly, in some instances, the science community has also recognised local people's skills and knowledge on climate and crop dynamics in the drylands (see Ahmed 1998, p. 150) as given below:

> [O]n August, 28th 1996 the crops were stressed and farmers visited mosque to pray for rains … luckily it rained the next day for about an hour. The highest soil moisture increase at depth of was 5 cm was recorded at sites. The farmers explained that this is bad for crops because the higher moisture level at 5 cm would trap heat … this raises soil temperature and adversely affects plant growth. The farmers describe this as soil fever (*zazzabi* in Hausa).

6 Proposed Climate Change Communication Framework for the Sahel

In view of the immense challenges of climate change stress in the Sahel, it has become necessary to explore the potentials inherent in the indigenous knowledge, existing body of literature on climate change in order to develop an integrated framework that allows direct exchange and sharing of information. For climate change communication to be effective it is imperative to share information and knowledge between local, regional and global institutions such as the UNCCD, national and local governments, local scientists, international dryland scholars, and local livelihood groups such as farmers, pastoralists fishermen and women groups. Our proposed framework is interdisciplinary, cross-institutional, and cross-cultural in nature. As indicated graphically in Fig. 1, there are 18 variables that are essential for achieving effective climate change communication in the African drylands.

The selection of these variables was based on experiences as well as opportunities and lessons learnt from developed countries. In addition to that, the region's existing fragmented approach in climate change science, policy also warranted the identification of these variables. Climate change communication strategies ought to be integrated with local knowledge on climate, findings of climate research and climate science and policy. Our proposed framework is not absolutely different from what obtains in other places. Nevertheless, it prioritises some issues under each of the four components of the framework. For instance, one of the things that is identified as very important is the role local languages in communicating climate change science and policy. For any form of knowledge or innovation on climate change mitigation and adaptation, it has to be communicated in local, languages. Again, considering the rapid proliferation of social media in both urban and rural areas, it is crucial to disseminate climate change knowledge through such platforms

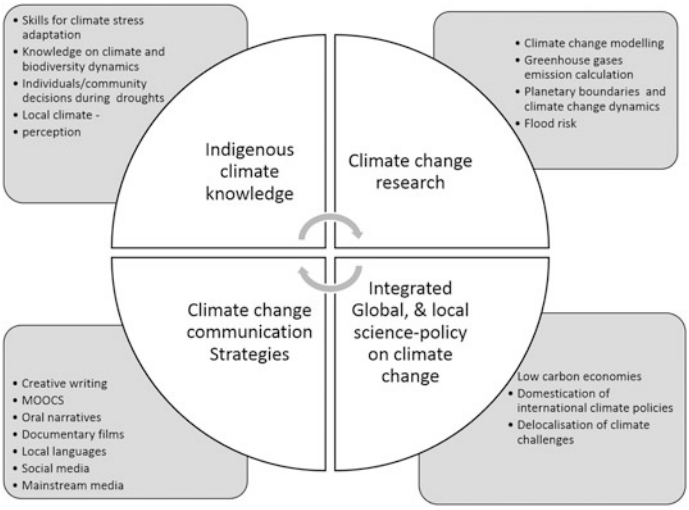

Fig. 1 An integrated climate change communication for African dryland

in local languages. This will go a long way in creating avenues where narratives from all stakeholders will build bridges of knowledge.

7 Conclusion

This chapter has been able to identify the situation of the Sahel region in the context of the public access to climate change information. It has shown that climate change science and policy is largely within access and consumption of scientists, policymakers and development organisations. Even within the ranks of these stakeholders climate change knowledge and policy remains fragmented and excludes critical stakeholders such as farmers and pastoralists who own priceless ecological knowledge and experiences that can be integrated into climate change communication for African drylands. What comes clearly out of this chapter is the fact that the changing climate has exposed African drylands and their people to hardships and fast degrading quality of life and livelihoods. It has also explored the potentials of educating, involving and disseminating state of the art knowledge of climate change communication to local people, policymakers and scientists in the most cost effective, multiscalar and interdisciplinary manner. For decades, the African drylands have seen local and foreign interventions that basically do three things. One is deployment of scholars who try to understand the dynamics of the environment-people relationship in a world of changing climate. Secondly, humanitarian assistance has become a defining feature of the region. Such

interventions aim at dealing with hunger and malnutrition that usually come with drought incidence. Thirdly, development assistance for countries in the dryland also used as a means of helping governments and NGOs to combat poverty, illiteracy and other underdevelopment challenges associated with the dryland.

Against the backdrop of the missing links between all the three forms of interventions, this chapter has identified the critical need for all the stakeholders in the region to embrace climate change communication as a bridge across divides that have traditionally disconnected local communities, scientists, policymakers and local and global stakeholders. This chapter puhe public through innovative tools such as MOOCs. In spite of the promising features of this integrated approach, this work is limited by the fact that the model it has proposed in Fig. 1 has not been empirically tested. Similarly, the paper has not identified the gaps between the means of disseminating local knowledge systems in Africa and contemporary science and media supported communication strategies practiced with some level of success in some of the developed countries. Nevertheless, by using this approach, it will immensely help in supporting informed decision on what works best for people, institutions and the environment. It is hoped that the modest contributions of this chapter will jump-start interdisciplinary studies and projects between universities and media and communication practitioners to design models of climate change communication for African drylands.

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