

CLIMATE CHANGE PERCEPTION AND CHANGING AGENTS IN AFRICA & SOUTH ASIA

Edited by

Suiven John Paul Tume

Green Care Association, Cameroon

&

Vincent Itai Tanyanyiwa

Zimbabwe Open University, Zimbabwe

Series on Climate Change and Society



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Suiven John Paul Tume, *Green Care Association, Cameroon*

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Contributing Authors

Abraham Matamanda (Zimbabwe) holds a Master of Social Ecology from the Centre for Applied Social Sciences and a BSc Honours' degree holder in Rural and Urban Planning. Both degrees were obtained from the University of Zimbabwe. He is a registered full-time PhD student in the Department of Urban and Regional Planning at the University of Free State in South Africa. Currently, Abraham's PhD focuses on emerging human settlement forms and urban dilemmas nexus such as water, sanitation, public transport and security issues.

Anup K C (Nepal) received his Master's Degree in Environmental Science in 2012 and in Economics in 2014 from Tribhuvan University. He currently works as Assistant Professor of Environmental Science at Amrit Campus, Tribhuvan University, Nepal. Since 2005, he has been involved in the teaching sector in various institutions. Since 2009, he has also been involved in different development sector projects (water and sanitation, education, hydropower, transmission line, solar energy). He has conducted research on cost-benefit analysis, community forest management, carbon sequestration, ecotourism, hydropower development and climate change in different regions of Nepal.

Innocent Chirisa (Zimbabwe) is a full Professor teaching Urban and Environmental Planning courses in the Department of Rural & Urban Planning at the University of Zimbabwe. Currently, he is serving as the Deputy Dean of the Faculty of Social Studies, University of Zimbabwe. He is also serving as the Acting Chairman of the Department of Rural & Urban Planning at the University of Zimbabwe. Professor Chirisa was recently appointed as Research Fellow in the Department of Urban and Regional Planning at the University of Free State, Bloemfontein, South Africa for the period 2016 to 2020.

John Mutambwa (Zimbabwe) is a Lecturer in the Department of Linguistics at the University of Zimbabwe. His research interests include development communication, academic writing, professional communication skills, climate change communication and English language teaching methodologies. He holds a Master's of Education in Language Education, with specialisation in English, from the University of Zimbabwe.

Lun Yin (China) received his MA in Social Anthropology Studies from the Ecole Des Hautes Etudes en Science Sociale in Paris and his PhD from Minzu University of China in Beijing. He is also the Deputy Director of Centre for Biodiversity and Indigenous Knowledge (CBIK). His major field of interest is Indigenous Knowledge among mountain ethnic groups in Yunnan, which links watershed management, environment, and biodiversity. His work is dedicated to the adaptation and resilience of climate change in support of sustainable livelihoods of the mountain indigenous peoples in Yunnan province and Eastern Himalaya Mountain, China.

Mbuya Dora Nyukighan (Cameroon) holds a Bachelor's Degree in English Language from the University of Buea (1996), a Post Graduate Diploma in Education from the National Teachers' Institute Kaduna, Nigeria (2009) and a Master's degree in African Literature from the Ahmadou Bello University in Zaria, Nigeria (2012). She is a PhD research fellow on 'Gender Representations in Cameroon Drama of English Expression' at the University of Yaounde I. She is a Lecturer in the Department of English and Literary Studies, Federal University Lokoja, Nigeria.

Misiani M. Zachary (Kenya) is a Meteorologist, GIS and Remote Sensing expertise at Kenya Meteorological Department. He holds a BSc degree in Meteorology from the University of Nairobi and is an MSc GIS and RS candidate at Jomo Kenyatta University of Agriculture and Technology in the Department of Geomatic Engineering and Geospatial Information Systems (GEGIS). Before starting another Master of Meteorology at Nanjing University of Information Science & Technology NUIST, school of Atmospheric Sciences, Misiani worked previously in the Regional Center for Mapping of Resources for Development (RCMRD) in Monitoring of Environment for Security in Africa (MESA) and Data Management and Dissemination Sections and the National Meteorological Centre office (KMD Headquarters).

Moye Eric Kongnso (Cameroon) holds a Bachelor's Degree in Geography and Environmental Management (2007) and a Master's Degree in Geography (Applied Agro-climatology, 2011), both from the Dschang. He is currently a PhD fellow researching on climate change and livelihoods in the Ndop Plains of the Bamenda Highlands of Cameroon. He is a member of a number of professional and research groups in environmental issues.

Njodzeka Gilbert Njodzeka (Cameroon) has a Diploma in Tree Nursery and Soil Conservation (1997) from Rural Training Centre (RTC), Mfonta. He is the Coordinating Manager and the Head of Project Development at Green Care Association, Shisong-Cameroon. He is a crusader in combating environmen-

tal degradation through tree planting, apiculture, water catchment protection, developing renewable energy and animal husbandry through non-conventional livestock. He has won several international awards such as Bui Family Union, New Jersey Chapter–Appreciation of Service, 2010; United Kingdom-Commonwealth Mid-Career Fellowship (2010) and United Kingdom-World Environment Radio-First Prize, Best Feedback (2008).

Nyuykongadzem Emma Dindze (Cameroon) holds a Bachelor's Degree in Geography from the University of Buea and a Master's Degree in Geography and Planning from the University of Bamenda. Her research over the years has been on the vulnerability of agro-hydrological systems to climate change in the Bamenda Highlands of Cameroon. She is also engaged in community capacity building for self-reliance in potable water supplies and health care delivery in rural areas. She is currently undertaking a professional teachers' training course in Geography at the University of Bamenda.

Rejoice Madobi (Zimbabwe) is an environmentalist with broad research interests in water resources management, poverty, and gender issues as well as climate change. Rejoice has been involved in university education for six years.

Suiven John Paul Tume (Cameroon) has a Bachelor's Degree in Geography, a Postgraduate Diploma in Education and Master's Degree in Geography all from the University of Buea. He is currently a PhD research fellow working on indigenous adaptations to climate change in the agro-hydrological systems of the Bamenda Highlands of Cameroon. He volunteers at Green Care Association, Shisong–Cameroon as a researcher on indigenous climate change adaptation. He is also a consultant and volunteer researcher at Green Future Consulting where he works on climate change vulnerability and adaptation. He is a part-time instructor in the Departments of Geography and Environmental Studies at the Catholic University of Cameroon (CATUC), Bamenda.

Susy Wandera (Kenya) holds a Bachelor's Degree in Economics from the University of California, Irvine and a Master's Degree in International Studies from the Claremont Graduate University, California. She is the Secretary of the Board and the Climate Change focal point at the Sustainable Environmental Development Watch (SUSWATCH), Kenya. She is also the Convener of the Road to COP (Conference of Parties) group in the Kenya Climate Change Working Group (KCCWG). She was a member of the *We Have Faith* COP17 campaign, where she organised the committee, provided technical support and travelled with truck 6 from Nairobi to Durban.

Takudzwa Leonard Mathende (Zimbabwe) holds a Bachelor of Social Work Honours Degree from the University of Zimbabwe and an MA in Social Impact Assessment from the University of Johannesburg. He is currently working as a Social Worker in a UK local authority. Previously, he worked in the Child Protection sector both in Zimbabwe and South Africa. His interests include social development policy and social impact assessment.

Tatenda Goodman Nhapi (Zimbabwe) possesses frontline social work experience. He has an interest and experience in social development having practised development work both for state and non-state actors. His research interests are in applied social research and social policy. At present, he is practising social work in a UK local authority. In 2015 he graduated with an Erasmus Mundus Masters in Advanced Development Social Work.

Vincent Itai Tanyanyiwa (Zimbabwe) is an Environmental Geographer/ Sustainability Practitioner with broad research interests in ecosystem services, climate change, water issues, rural-social differentiation and urban sustainability. At the most fundamental level, he is interested in understanding people's interaction with their natural environment. This broad intellectual project is undertaken, conceptually and empirically, by examining how humans live in their natural environment with non-human species in a world that is highly human-dominated. Vincent has been involved in university education over the last 12 years.

Acronyms

°C	Degree Celsius
ACT!	Act Change Transform
ADB	Asian Development Bank
ADF	African Development Fund
AfriYOCC	African Youth Conference on Climate Change
AGDP	Agricultural Gross Domestic Product
AGN	African Group of Negotiators
AN	Above Normal
AR5	Fifth Assessment Report of the Intergovernmental Panel on Climate Change
ASALs	Arid and Semi-Arid Lands
ASDEP	Association for Sustainable Development and Environmental Protection
ASEC	Association for Environmental Education-Cameroon
AUC	African Union Commission
AWGGCC	African Working Group on Gender and Climate Change
AYICC	African Youth Initiative on Climate Change
BN	Below Normal
CAEPP	Community Agriculture and Environmental Protection Project
CAFOD	Catholic Agency for Overseas Development
CAHOSCC	Committee of African Heads of State and Government on Climate Change
CAMGEW	Cameroon Gender and Environmental Watch
CAMTRACC	Cameroon Traditional Rulers Against Climate Change

CAP	Community Adaptation Planning
CARE	Cooperative for Assistance and Relief Everywhere
CAs	Communal Areas
CBOs	Community Based Organisations
CBS	Central Bureau of Statistics
CC	Climate Change
CCA	Climate Change Adaptation
CCD	Climate Change Directorate
CCRN	Climate Change Radio Network
CEC	Committee of Executive Committee Members
CEPCSI	Centre for Environmental Protection and Community Support Initiatives
CFS	Climate Field Study
CIG	Common Initiative Group
CIRAN	Centre for International Research and Advisory Networks
CIRMAD	Centre for Indigenous Resources and Development
CoG	Council of Governors
COMINSUD	Community Initiative for Sustainable Development
COP	Conference of Parties to the United Nation Framework Convention on Climate Change
CORDAID	Catholic Organisation for Relief and Development Aid
CRIC	Committee for the Review of the Implementation of the Convention
CRM	<i>Changieni Rasilimali</i>
CRTV	Cameroon Radio and Television
CSOs	Civil Society Organisations
CYPCC	Committee of African Heads of State and Government on Climate Change's Youth Programme on Climate Change
DDC	District Development Committee

DFID	Department for International Development
DHM	Department of Hydrology and Meteorology
DRR	Disaster Risk Reduction
ED	Earth Day
EEA	European Environmental Agency
EIA	Environmental Impact Assessment
EJN	Earth Journalism Network
EMA	Environmental Management Agency
ENSO	El Nino/Southern Oscillation
ESPACE	European Spatial Planning: Adapting to Climate Events
EU	European Union
FCZ	Forest Company of Zimbabwe
FECOFUN	Federation of Community Forestry Users Nepal
FGDs	Focus Group Discussions
GCA	Green Care Association, Shisong-Cameroon
GCMs	Global Climatic Models
GEF	Global Environmental Facility
GHGs	Greenhouse Gases
GoK	Government of Kenya
GoZ	Government of Zimbabwe
HBS	Heinrich Böll Stiftung
HS & G	Head of State and Government
I/NGOs	International Non-governmental Organizations
IASSW	International Association of Schools of Social Work
ICCA	Institute for Climate Change and Adaptation
ICSW	International Council of Social Welfare

ICT	Information Communication Technology
IDBD	International Day for Biological Diversity
IDNDR	International Day for Natural Disaster Reduction
IDPEEAC	International Day for Prevention of the exploitation of the Environment in Armed Conflicts
IDPOL	International Day for the preservation of the Ozone Layer
IDRC	International Development Research Centre
IES	Institute of Environmental Science
IFSW	International Federation of Social Workers
IGBP	International Geosphere-Biosphere Programme
IIED	International Institute for Environment and Development
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
ILO	International Labour Organization
IMD	International Mountains Day
INDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
ITK	Indigenous Traditional Knowledge
KAPSLMP	Kenya Agricultural Productivity and Sustainable Land Management Project
KCCWG	Kenya Climate Change Working Group
KCF	Kenya Climate Change Forum
KICD	Kenya Institute for Curriculum Development
KIIs	Key Informant Interviews
KYCN	Kenya Youth Climate Network
LAPA	Local Adaptation Plan for Action

LDCs	Least Developed Countries
LDN	Land Degradation Neutrality
LEK	Local Ecological Knowledge/ Local Environmental Knowledge
LK	Local Knowledge
LTK	Local Traditional Knowledge
LWP	Lima Work Programme
MECCOD	Media Synergy for the Promotion of Biodiversity Conservation and Community Development against Climate Change
MENR	Ministry of Environment and Natural Resources
MEWC	Ministry of Environment, Water and Climate
MIFACIG	Mixed Farming Common Initiative Group
MOPE	Ministry of Population and Environment
MSD	Meteorological Service Department
MSDZ	Meteorological Services Department, Zimbabwe
NAP	National Adaptation Plan
NAPA	National Adaptation Programmes of Action
NCA	Norwegian Church Aid
NCCAP	National Climate Change Action Plan
NCCCK	National Climate Change Consortium of Kenya
NCCRS	National Climate Change Response Strategy
NCCSP	Nepal Climate Change Support Programme
NDC	National Determined Contribution
NEST-Cam	Network of Environmental Stakeholders Cameroon
NGEC	National Gender and Equality Commission
NGO	Non-Governmental Organisation
NIMBY	Not In My Back Yard

NSAs	Non-State Actors
NTNC	National Trust for Nature Conservation
NYCCC	National Youth Conference on Climate Change
OECD	Organisation for Economic Co-operation and Development
PACJA	Pan-African Climate Justice Alliance
PANERECC	Parliamentary Network on Renewable Energy and Climate Change
PAPNCC	Pan-African Parliamentarians Network on Climate Change
PPCR	Pilot Programme for Climate Resilience
RD	Rural Development
RDC	Rural Development Councils
RDPs	Rural Development Programmes
REDD	Reduced Emissions for Deforestation and Forest Degradation
RuWCED	Rural Women Centre for Education and Development
RYCCC	Regional Youth Conference Climate Change
SADC	Southern African Development Community
SARCOF	Southern African Regional Climate Outlook Forum
SBI	Subsidiary Body of Implementation
SCFs	Seasonal Climate Forecasts
SDG	Sustainable Development Goal
SHUMAS	Strategic Humanitarian Services
SIRDEP	Society for Initiatives in Rural Development and Environmental Protection
SPCR	Strategic Program for Climate Resilience
SURUDEV	Sustainable Run for Development
SUSWATCH	Sustainable Environmental Development Watch
SYFA	Save Your Future Association

TCPL	Total Consumption Poverty Line
TEK	Traditional Ecological Knowledge/Traditional Environmental Knowledge
TIMB	Tobacco Industry Marketing Board
TK	Traditional Knowledge
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UZ	University of Zimbabwe
VDC	Village Development Committee
WB	World Bank
WCD	World Cities Day
WDCDD	World Day to Combat Desertification and Droughts
WED	World Environment Day
WFD	World Food Day
WHD	World Habitat Day
WMD	World Meteorology Day
WMO	World Meteorological Organization
WOD	World Oceans Day
WTD	World Tourism Day
WWD	World Water Day

WWF	World Wide Fund for Nature
ZERO	Zimbabwe Regional Environment Organisation
ZIMVAC	Zimbabwe Vulnerability Assessment Committee

Definitions

Africa is the world's second largest and second most populous continent with a land area about 30.3 million km² with 1.2 billion people. Africa is surrounded by the Mediterranean Sea to the north, both the Suez Canal and the Red Sea along the Sinai Peninsula to the northeast, the Indian Ocean to the southeast and the Atlantic Ocean to the west.

Agro-pastoralism is a form of social organization based on the growing of crops and the raising of livestock as the primary means of economic activity.

Cameroon is a country in Central Africa, bordered by Nigeria to the west; Chad to the northeast; the Central African Republic to the east; and Equatorial Guinea, Gabon and the Republic of the Congo to the south. The capital of Cameroon is Yaoundé.

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC,2007).

Climate Field School (CFS) a group formed by local experts and normal villagers with traditional knowledge in Kenya

A **climate model** is a numerical representation of the climate system based on the physical, chemical, and biological properties of its components, their interactions and feedback processes, and accounting for all or some of its known properties.

Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability) [IPCC, 2007].

El Nino is the widespread warming of the upper ocean in tropical Pacific. This results in increasing rainfall in the eastern Pacific and decreasing rainfall over the western Pacific and Southern Africa.

El Nino Southern Oscillation (ENSO) denotes a coupled atmospheric system that links change in atmospheric pressure and sea temperature over the southern Pacific Ocean

Environmental change is the disturbance of the environment mainly caused by anthropogenic influences and natural ecological processes resulting in disasters etc.

Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds.

Indigenous knowledge is a cumulative and complex body of knowledge, practices, and representations that are maintained and developed by peoples with extended histories of interactions with the natural environment (Hiwasaki *et al.*, 2014)

Intergovernmental Panel on Climate Change (IPCC) is a technical and intergovernmental body under the auspices of the United Nations, set up and dedicated to the task of providing the world with an objective, scientific view of climate change and its socio-economic and political impacts.

Kenya is a country in East Africa bordered by Tanzania to the south and southwest, Uganda to the west, South Sudan to the north-west, Ethiopia to the north and Somalia to the north-east. Kenya covers 581,309 km²

Livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Chambers & Conway, 1991).

Mass communication is the transmission of information and ideas to a largely dispersed, heterogeneous audience simultaneously (Okenwa, 2002)

National Climate Change Action Plan (NCCAP) is a body in Cameroon aimed at building the capacity of socio-economic actors to adjust to climate change (UNDP, 2009)

Nepal whose capital is Kathmandu is a landlocked central Himalayan country in South Asia. It borders with China in the north and India in the south, east, and west. Nepal is the largest sovereign Himalayan state.

Not in My Back Yard (NIMBY) is a colloquialism signifying one's opposition to the locating of something considered undesirable in one's neighborhood.

Seasonal climate forecasts (SCF) are produced operationally in tercile-probabilities of the most likely categories, e.g., below-, near- and above-normal rainfall. Inherently, these are difficult to translate into information useful for decision support in farming.

South Asia is the southern region of the Asian continent and is made up of countries lying between the Himalaya range of mountains and the Indian Ocean (north to south) and between the Ganga and Indus river valleys (east to west).

The **Conference of Parties**, known as COP, is the decision-making body responsible for monitoring and reviewing the implementation of the United Nations Framework Convention on Climate Change made up of the 197 nations and territories – called Parties – that have signed on to the Framework Convention. The COP has met annually since 1995.

The **Eastern Himalayan region** refers to the area lying between 82.70°E and 100.31°E longitude and 21.95°N to 29.45°N latitude, covering a total area of 524,190 sq.km. The region extends from the Kaligandaki Valley in central Nepal to northwest Yunnan in China, also encompassing Bhutan, the northeastern states and north Bengal hills in India, southeastern Tibet, and parts of northern Myanmar.

The **Inter-Tropical Convergence Zone (ITCZ)** is an expanse of air where the northeast and southeast trade winds converge and characterized by much convection activity resulting in rainfall during summer months in Southern Africa.

Tibet is a region covering a greater of the *Tibetan* Plateau in Central Asia. It is the homeland of the *Tibetan* people and other ethnic groups such as Monpa, Qiang, and Lhoba peoples. It is also occupied by Han Chinese and Hui people.

Vulnerability refers to the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard (UNISDR, 2007)

Zanba, a staple food of Tibetan people, is *Zanba*, a kind of dough made with roasted highland barley

Zimbabwe is a landlocked country located in southern Africa, between the Zambezi and Limpopo Rivers, bordered by South Africa, Botswana, Zambia, and Mozambique. The capital and largest city is Harare.

Chapter One

INTRODUCTION

Suiven John Paul Tume, *Green Care Association, Cameroon*

Vincent Itai Tanyanyiwa, *Zimbabwe Open University, Zimbabwe*

Climate change is a socio-ecological system which cannot be understood and evaluated by relying on physical sciences. This is mainly because its effects trickle down to the lowest level of society, particularly in rural communities of developing countries. This stems from the fact that rural communities rely on climate-sensitive sectors that include agriculture and other primary activities for their livelihoods. Agriculture in most rural areas of Sub-Saharan Africa and South Asia is rain-fed. Thus, the peoples' perceptions about the changing climate and environmental conditions form the basis for their decision-making with regards the agricultural calendar and seasonal changes in water resources. Climate variability and change at the local level gives rise to the attainment of insights into the experiences of local people that are hardly reflected in hard-core scientific studies and models. The significance of indigenous climate perceptions is critical to understanding the socio-cultural context within which environmental change occurs. Local climatic changes are a prelude to global climatic processes. Many stakeholders complement indigenous perceptions to make informed choices in order to improve on livelihoods of the affected communities. Amongst these stakeholders in the climate-environmental communication chain are local media outlets such as community radios, newspapers, Common Initiative Groups, Non-governmental Organisations, community-based organisations, socio-cultural groups, municipalities and or councils and government departments.

The situation of climate change is clear and urgent. This is evidenced by the increasing heat-trapping gasses in the atmosphere and the associated heat waves, forest fires, and heavy downpours, sea level rise among others. There is a need for effective action especially in the way in which climate science is disseminated in order to curtail the profound and irreversible consequences, especially in developing countries. The actions we take (or do not take) now will impact all life on earth for thousands of years to come. If we fail to act quickly, we risk leaving our children a problem they cannot solve. This especially important if we take into consideration the adage;

We Do Not Inherit the Earth from Our Ancestors;
We Borrow It from Our Children

We have to undertake to cherish and not damage the environment in which we live, not because we are duty-bound by the dictates of humanity but because we care and love those who will live beyond us. Climate change is already underway hence the need for current and future generations to adapt to some extent. Obviously, this depends on the level of imminent warming. A business-as-usual approach will lead to self-destruction and will result in perilous climate change and potentially calamitous impacts. There is a need for effective communication, as well as policies and technologies to adapt to climate change. It is high time we get started to disseminate climate change information in a way that is easily understood by common people.

Humanity is having a profound impact on climate change. There is an urgent need to bring about significant and lasting changes in our economics and societies. Understanding how people and societies develop awareness is essential for the design of effective communication strategies on this issue. In order to tackle the climate change challenge on time, communication research is exploring the core of public awareness engagement. The once simplistic models of communication construed as a one-way process (from messenger to a passive audience) are evolving. Decades of environmental activism and communication have contributed to a more sophisticated understanding of communication processes which takes into account underlying factors at the basis of individual and or communal decisions and actions, such as experiences, mental or cultural models, and relational dynamics.

Global Climate Change

Climate change analysis assesses the likelihood that a particular extreme weather event has been made more or less likely as a result of anthropogenic causes (Budimir and Brown, 2017). The Earth's climate is driven by interactions between the atmosphere, oceans, lithosphere, terrestrial and marine biospheres (Chakraborty *et al.*, 2000; International Geosphere-Biosphere Programme-IGBP, 2008). The increasing build-up of greenhouse gases (GHG) in the atmosphere and escalating concentrations of natural and anthropogenic aerosols have detectable effects on the climate system (Sivakumar *et al.*, 2005). Changes in atmospheric composition due to increasing concentrations of greenhouse gases (mainly carbon dioxide, methane, nitrous oxide), changes in land cover and unsustainable agricultural practices are responsible for warming the earth's surface (Intergovernmental Panel on Climate Change-IPCC, 2007; Collier *et al.*, 2008; Yanda and Mubaya, 2011; Omambia *et al.*, 2010). Although there are debates among scholars with regard to whether climate change is induced by anthropogenic activities or is as a result of natu-

ral climate variability, the balance of scientific opinion is that changes in the composition of the atmosphere are mainly attributed to anthropogenic activities (IPCC, 2001; 2007; 2014).

The total anthropogenic GHG emissions have continued to increase from 1970 to 2010, with the highest amount noted between 2000 and 2010 (IPCC, 2014). This report further notes that the release of CO₂ into the atmosphere from the burning of fossil fuels and industrial activities contributed about 78% of the total GHG emissions from 1970 to 2010, with a similar increase from the period 2000 to 2010 (IPCC, 2014). Rising temperatures heat the land mass and the surrounding oceans, causing increases in surface temperatures and changes in precipitation, which are important drivers of global climate change (Collier *et al.*, 2008; Challinor *et al.*, 2007; Boucher, 1999). In spite of the fact that trends and patterns of climate change projections are generally consistent, they are subject to varying degrees of uncertainty due to limitations in measurements and knowledge of the interactions between earth-atmosphere systems (Adger *et al.*, 2003; Challinor *et al.*, 2007).

Global temperatures near the earth's surface increased by 0.74°C from 1906 to 2005 and are estimated to increase by about 6.4°C on average during the 21st century (IPCC, 2007; Boucher, 1999). Recent evidence and predictions from computer models indicate that climate change is accelerating and will lead to wide-ranging shifts in climate variables (IPCC, 2007; Chaudhary and Aryal, 2009). The global climate models (GCMs) project an increase in the global mean temperature of between 1.5 and 5.8°C by the end of 2100, which is attributed to population growth, energy use and land cover changes (Elum *et al.*, 2017). The IPCC (2014) argues that the previous three decades, from 1983 to 2012, are most likely to be the warmest periods of the last 1,400 years in the Northern Hemisphere, whereas the global average surface temperature data for the land and sea combined show a warming of 0.85 [0.65-1.6] °C, over the period from 1880 to 2012.

Increased temperature affects ecosystems and biological communities (Chaudhary and Aryal, 2009; IPCC, 2014; United Nations Environment Programme-UNEP, 2010; Seddon *et al.*, 2016). Some of the effects include droughts, floods, frequent fires, species shifts and sensitive diseases increase (IPCC, 2001; 2007; 2014). Researchers suggest that with the warming conditions, precipitation patterns are likely to change, with increases up to 20% projected in some parts of the world, although drought conditions will also be exacerbated, particularly in Africa (Rosenzweig *et al.*, 2001; Collier *et al.*, 2008; Hulme *et al.*, 2001; Collins *et al.*, 2013; Toulmin *et al.*, 2005; Toulmin and Huq, 2006). Changes in temperature and precipitation are also projected to influence extreme weather events (floods, drought), food production and prices;

water availability and access (FAO, 2014; IPCC, 2007; Omambia *et al.*, 2010; Mathews *et al.*, 2016; Collins *et al.*, 2013).

Socio-economic impacts of climate variability are noteworthy and will impact humans through a variety of direct and indirect ways (Heltberg *et al.*, 2009; IPCC, 2007; Elum *et al.*, 2017). Generally, the impacts of climate variability and change are projected to have enormous and devastating global consequences, but the most adverse impacts are predicted to occur in developing countries due to their fewer resources and technological challenges to cope with and adapt to the changing conditions (Elum *et al.*, 2017; Omambia *et al.*, 2010). This is due to their location at fragile, marginal and vulnerable environments and over-dependence on agriculture, which is a climate-sensitive sector (Stern, 2007; IPCC, 2007; Omambia *et al.*, 2010; Oppenheimer, 2014). Vulnerability to climate variability and change, in turn, poses multiple stresses to economic growth and poverty reduction strategies in Africa (IPCC, 2007; Stern, 2011; Elum *et al.*, 2017). This calls for vigorous adaptation strategies.

Climate change adaptation (CCA) is managing the inevitable (United Nations Framework Convention on Climate Change[UNFCCC] (UNFCCC, 2006, 2011; IPCC, 2007, 2014). It is the adjustments of ecological and socio-economic systems in response to actual or expected climatic stimuli and their effects (Peloquin and Berkes, 2009; IPCC, 2007). Climate adaptation is the change in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change (Smit and Pilifosova, 2001; IPCC, 2007, 2014). Adaptation activities span through observation of climate change impacts, assessment of impacts and vulnerability, planning for adaptation, implementation of adaptation plans, monitoring, and evaluation of adaptation actions (UNFCCC, 2011; Oppenheimer, 2014). Climate adaptation takes the following directions: anticipatory (proactive), planned, reactive, autonomous (spontaneous), private and public (IPCC, 2007, 2014; Snow and Prasad, 2011; Töpfer and Hunter, 2002; Rhodes *et al.*, 2014; OECD, 2009). Individuals and nature itself often adapt to climate change impacts without any external help (Töpfer and Hunter, 2002). In many cases, people need to plan how to minimise the costs of negative impacts and maximise the benefits from positive impacts. Planned adaptation can be launched prior to, during or after the onset of the actual consequences of climate change (IPCC, 2007; UNFCCC, 2006).

Understanding of the magnitude of the adaptation challenge at a local or global scale is often constrained by a limited understanding of how adaptation is taking place (Eisenack and Stecker, 2013). This is because many studies report on vulnerability assessments of natural systems and not adaptation actions (Philander, 2008). Climate change is rarely the sole motivator for ad-

adaptation action because extreme events such as floods and droughts are important adaptation stimuli across sectors (Smit and Pilifosova, 2001; Kolawole *et al.*, 2014; FAO, 2013; Mathews *et al.*, 2016). Pro-active adaptation is the most commonly reported adaptive response (IPCC, 2007). Adaptation action is more frequently reported in developed nations unlike in middle and low-income countries mainly due to poor climate change communication strategies. There also is limited reporting on adaptations for vulnerable people such as women, the elderly or children (Berrang-Ford *et al.*, 2010).

Stakeholders in Climate Change Communication

Communication of extreme weather events in the immediate aftermath of an event provides a window of opportunity to inform, educate and affect a change in attitude or behaviour in order to cope, adapt and or mitigate or prepare for climate change. Prompt access to information can help decision makers to ensure that appropriate adaptation and investment decisions are taken. Effective communication of climate change information is critical to ensuring that decision-makers at all levels do indeed understand and are able to act upon such information (Budimir and Brown, 2017).

Climate change communication has lately become conspicuous in society from movies to grassroots movements (Nerlich *et al.*, 2009; Ward and Menezes, 2008). It is a global problem with widespread impacts. It is crucial that climate change messages are communicated effectively by different stakeholders including the media, Non-governmental Organisations (NGOs), socio-cultural groups, municipal councils and government institutions (European Spatial Planning: Adapting to Climate Events-ESPACE, 2007). Climate change communication and its impact on the general public have proliferated in communication and related disciplines since the 1990s (Nerlich *et al.*, 2009). In spite of this, society remains vulnerable to climate variability and change. This raises questions about the effectiveness of communication efforts and the ability of audiences to implement adaptation in response to these communications (Moser, 2010; Monroe *et al.*, 2015). This concerns persuasiveness of the messages, the structure of society and considerations of the extent to which the public is receptive to make an effective change (Nerlich *et al.*, 2009; IPCC, 2014; UNFCCC, 2006). The combination of natural and human-induced factors accelerate climate change, and consequences abound [interruptions in agriculture, surges in the frequency of droughts and floods] (Filho, 2009). Since human-induced climate change first emerged on the public agenda in the mid-1980s, public communication of climate change and more recently the question of how to communicate it most efficiently have witnessed a sharp rise (Moser, 2010; Monroe *et al.*, 2015; Nerlich *et al.*, 2009).

The Fifth Assessment Report (AR5) of the IPCC is widely recognised by academics, journalists, communications experts, governments and civil society organizations to have marked strides in the approach the IPCC communicates its agenda (IPCC, 2016). The communication of AR5 saw both greater professionalism at all stages of the process and greater breadth and diversity in the subsequent outreach accomplishments. The results of this can best be seen in the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) reached at the Conference of Parties in December 2015 (COP-21). This agreement is based on assessments that the IPCC communicated to negotiators through the Structured Expert Dialogue and UNFCCC meetings. The IPCC has also experienced growing calls from policy-makers and other users to do more with its communications. Some improvements to IPCC communications came not from the communications team but from the authors of AR5-the use of headlines statements in the Working Groups I, II & III contribution to AR5 and the Synthesis Reports. Other improvements for AR5 included:

- Responding to media questions before completion of the reports; Media workshops to clarify the workings of the IPCC and how it produces assessments; Making IPCC communications more professional by working with external communications specialists; Media training for bureau members and authors; Systematic planning of interviews with a range of authors, both face-to-face and remotely; Arranging facilities for broadcasters; Production of scientifically rigorous but compelling videos, overseen by the working group co-chairs and IPCC Chair; Ambitious programme of outreach activities all over the world; Cooperation with third parties producing versions of the report targeting specific sectors in specific regions; Use of social media to publicise IPCC findings and outreach activities.

This gives the IPCC a strong foundation to build on for its future climate change communications.

Climate Change Agents

The poor must be able to sustainably manage and benefit from the rich and abundant natural resources to address poverty and promote inclusive growth (Manjengwa, 2012). Moreover, the Human Factor approach usage is relevant for discourse analysis in this book. The main claim of the Human Factor approach as propounded by Mararike (2014) is that no nation or country can sustain its development activities without people who are patriotic, reliable, committed and disciplined. For this social workers are competently fit for this purpose as change agents with core competencies to make tailor-made rural

development programmes. Indigenous Knowledge Systems (IKS) need to be harnessed comprehensively to facilitate social workers led pro-poor rural development interventions mitigating climate change. IKS 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 (Bhatasara and Mandizadza, 2014). Though diagnostic than prognostic, indigenous indicators, such as trees physiological behaviour, behaviour of frogs and sounds of birds, are related to the response of certain animals and plants to the already prevailing weather from indigenous knowledge for climate forecasting. Whilst IKS has been a source of resilience; climate change provokes serious threats to both livelihoods and the nature of indigenous climate knowledge inherent within a given locality (Bhatasara and Mandizadza, 2014).

Indigenous Knowledge Support for Decision-Making

Indigenous knowledge is a cumulative and complex body of knowledge, practices and representations that are maintained and developed by peoples with extended histories of interactions with the natural environment (Hiwasaki *et al.*, 2014; Macchi *et al.*, 2008; Egan, 2013; Nakashima *et al.*, 2012; Kolawole *et al.*, 2014; Rhodes *et al.*, 2014., Tanyanyiwa & Chikwanha, 2011). These systems are part of a complex that includes language, attachment to place, spirituality and perception of worldview (Macchi *et al.*, 2008). Notwithstanding a variety of terminology used to refer to local environmental knowledge (LEK), such as traditional local knowledge (TLK), aboriginal knowledge (AK), folk knowledge (FK), traditional wisdom (TW), traditional science (TS), people's science (PS), traditional ecological knowledge (TEK), indigenous knowledge (IK), local knowledge (LK), rural peoples knowledge (RPK), ethno-biology/ethno-botany/ethno-zoology, ethno-science; folk science (FS), traditional knowledge (TK); indigenous traditional knowledge (ITK), indigenous technical knowledge (ITK), traditional environmental knowledge (TEK), rural knowledge (RK), indigenous science (IS) (Hiwasaki *et al.*, 2014; Kolawole *et al.*, 2014, 2016; Fernández-Llamazares *et al.*, 2015; Mwaura, 2008; Hiwasaki *et al.*, 2014; Nakashima *et al.*, 2012; Krishna, 2011; Briggs, 2005; Thompson and Scoones, 1994; Senanayake, 2006; Beckford and Barker, 2007; Scoones, 1998; Ellen and Harris, 1996; Odero, 2011; Nakashima *et al.*, 2012), all the terminology has similar meanings and is used interchangeably to refer to the local environmental or traditional knowledge and skills held by indigenous people, developed outside the formal scientific domain, embedded in culture and steeped in tradition through oral tradition (Sen, 2005; Beckford and Barker, 2007; Odero, 2011).

Indigenous environmental knowledge is built up by a group of people through generations of living in close contact with nature (Centre for International Research and Advisory Networks-CIRAN, 2001; International Labour Organization-ILO, 2017). It is the knowledge used by local people to make a living in a particular environment (Kolawole *et al.*, 2014). However, indigenous knowledge is much more complex (Mwaura, 2008). Land management under indigenous knowledge involves a number of farming technologies that have repercussions across the whole spectrum of conservation (Mwaura, 2008). These include such practices as slash-and-burn, shifting cultivation, use of grass strips, intercropping, selective cultivation, and a number of other technologies and practices that seek to optimize food production under varying environmental conditions (Emgeru *et al.*, 2012). In addition, many of the communities surveyed combined cultivation with livestock rearing (Rhodes *et al.*, 2014).

The idea that LEK can provide strategies for adaptive management in the face of Global Environmental Change (GEC) Macchi, 2008; Hiwasaki *et al.*, 2014). LEK is gaining worldwide credence and recognition not only in academic circles but also at the political level (Fernández-Llamazares *et al.*, 2015). For instance, various agencies and bodies of the United Nations (UN), including the IPCC, recommend investigating local people's place-based knowledge for increasing resilience in a changing global environment (Macchi, 2008; Hiwasaki *et al.*, 2014; Wong-Parodi *et al.*, 2010; Fernández-Llamazares *et al.*, 2015). The intricate interaction between local peoples and their surrounding environments has resulted in detailed LEK that has proved to be pivotal in allowing societies to subsist in a wide range of environments and to adapt to social-ecological changes (Briggs and Moyo, 2012). LEK is contended to be '*adaptive*' because it reacts to the ever-changing nature of social and environmental conditions (Fernández-Llamazares *et al.*, 2015).

Traditional societies in many cases have built up knowledge over long periods about changes in the environment and have developed elaborate strategies to cope with climate variability and change (Macchi *et al.*, 2008; Hiwasaki *et al.*, 2014; Kolawole *et al.*, 2014; CIRAN, 2001). Traditional knowledge systems in mitigation and adaptation have for a long time been neglected in climate change policy formulation and implementation (Emgeru *et al.*, 2012; Gyampoh *et al.*, 2009; Waha *et al.*, 2013). It is only recently that indigenous knowledge has been taken up into the climate change discourse (Miller *et al.*, 2014). Traditional and indigenous peoples have survived over long periods to many kinds of environmental changes, including climate change, have valuable lessons to offer about successful and unsuccessful adaptations which could be vital in the context of climate change (Nakashima *et al.*, 2012; Rhodes *et al.*, 2014).

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