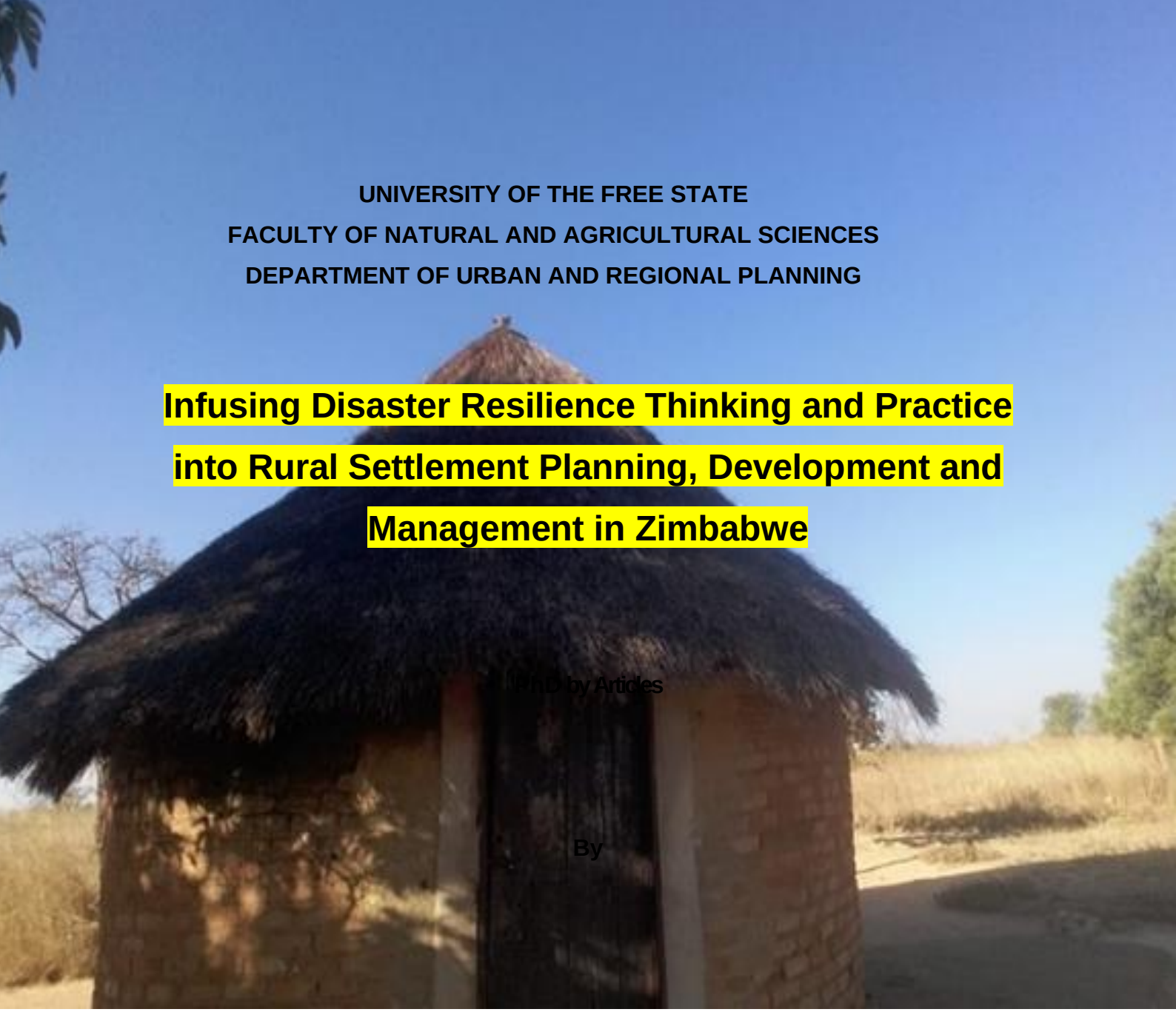


**UNIVERSITY OF THE FREE STATE**
**FACULTY OF NATURAL AND AGRICULTURAL SCIENCES**
**DEPARTMENT OF URBAN AND REGIONAL PLANNING**

# Infusing Disaster Resilience Thinking and Practice into Rural Settlement Planning, Development and Management in Zimbabwe

PhD by Articles

By

**Innocent Chirisa (2019833983)**

Submitted in fulfilment of the requirements in respect of the doctoral degree qualification in Urban and Regional Planning in the Department of Urban and Regional Planning in the Natural and Agricultural Sciences at the University of the Free State

**2021**

Promoter: Professor Verna Nel
Co-promoter: Professor James Chakwizira – North-West University

# SECTION A: PRELIMINARY PAGES OF THE THESIS

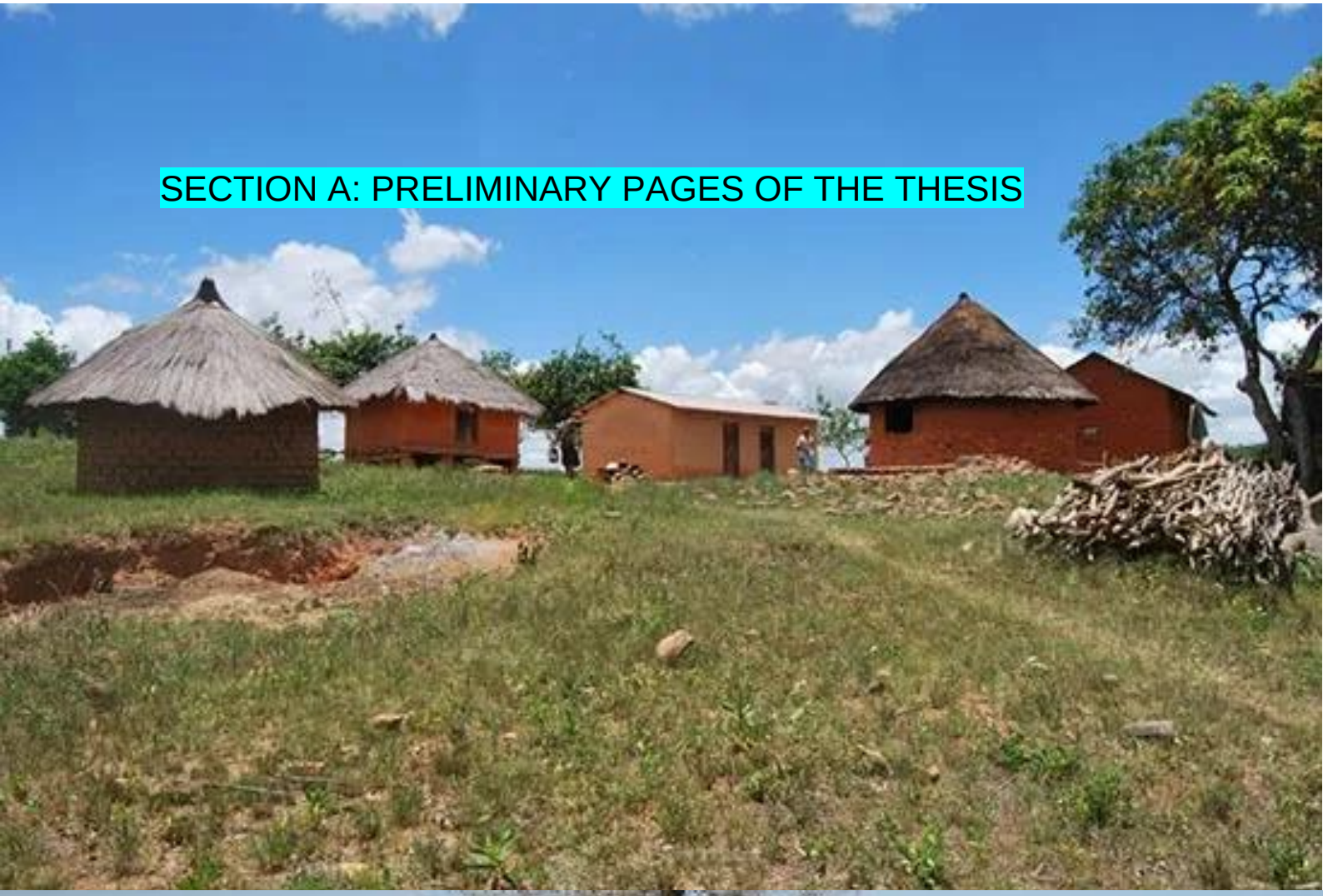


Table of Contents

List of Figures

List of Plates

List of Tables

List of Boxes

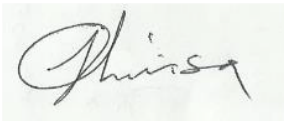
# DEDICATION

To Professor dr Paul Mapfumo, Vice Chancellor of the University of Zimbabwe (2019 to date) who always categorically said, "*Tingasekana hedu nekwatinobva, kumarizevha kwedu, asi kwose kwangofanana. Matambudziko acho mamwe chete*" (We can all laugh at each other with regards to our communal home areas, but they all have similar challenges".

To my late grandfather, VaMuvirimi (Snr) Chirisa who would say, "*Vakomana chenjererai kuti muchifamba negejo, musarima muota chani*". (Be careful that you don't damage the water channel as you use the plough!"

# DECLARATION

I declare that the thesis hereby submitted by me for the Doctor of Philosophy degree at the University of the Free State, South Africa, is my own independent work and has not been previously submitted by me at another university or institution for anydegree, diploma, or other qualification. I furthermore cede copyright in favour of the University of the Free State.

Signature:  Date: 30 November 2021

Innocent Chirisa

# ABSTRACT

Rural areas in Zimbabwe, as elsewhere, are undergoing various transformations, some induced by natural processes and others by human interventions. One has to acknowledge the increase anthropogenic actions on the Earth since the 1950 that have partly triggered the challenges facing the planet. Infusion implies a deliberate mainstreaming with debates, practices and policies of an agenda. In this case, in education, health, social policy directions and related matters, resilience thinking needs to be the bottom line of discussion. That away positive results are expected. This thesis contributes to the debate on planning, development and management of rural settlements under the impact of environmental disasters largely induced by climate change. The thesis suggests measures towards the infusion of disaster resilience thinking and practice in rural settlement planning. Publications in the study are informed by various methodologies, including literature review, archival, fieldwork, interviewing and surveys. The thesis is structured into four major sections. The first section, Section A covers Preliminary Pages of the thesis that include Dedication, Preface, Executive Summary and Abstracts of Publications and Acknowledgements. The second section, Section B is Introduction, Literature and the Study Local Context and covers three chapters, Chapter 1, the Introduction, Chapter 2, Natural Disaster Resilience, Rural Settlement Planning and Housing: A Literature Review and Chapter 3, Understanding Zimbabwe: Disaster Resilience Thinking and Practice and Rural Settlement Planning, Development and Management. The third section, Section C (see also Appendix 1) contains the articles and publications. Under this section, three categories of publications are presented, A, B and C. A are those papers that speak to the situation analysis regarding the incident of climate change and environmental challenges as they reflect in the rural areas. B speaks to those papers that try to speak to measurement and indicators of climate resilience plus global and regional experiences in the same. The C category speaks to possible options and initiatives that can be done for rural disaster resilience practice enhancement. The last section is Section D entitled Study Synthesis, Conclusion and Options. Quite apparent in the foregoing discussion and thesis is the acknowledgement that disasters and risks with the paraphernalia of their impacts are growing to be part and parcel of life at a global scale. As such resilience thinking is the way to. The buffeting shall continue but systems have to be proofed and designed that the readiness is always in place. Preparing for disasters and risks begins by the general awareness, followed by a deliberate step in putting ‘cushions’ in place. A collaborative approach is required. In the thesis, the study has demonstrated that the players are many and includes individuals, organised (and unorganised communities, divided by aspects of gender, age, professionalism, spatial boundaries, etc, government (local and central) and non-state actors (community – based organisation and corporates). There have different capacities and contributions to the debate and practice of resilience, mitigation and adaption. These players should have a principal agenda of tapping on the diversity to bring solution to different scales of intervention – site, community, district or precinct, regional, national or even international. They have to live above besetting politics towards creating consensus for wise action. The study proposes an 8Ss Model for inculcating resilience thinking and practice in rural settlement planning and management as a strategy for managing disaster risk.

# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ‘A’ Level | Advanced Level |
| ‘O’ Level | Ordinary Level |
| AfDB | African Development Bank |
| Agritex | Agricultural, Technical and Extension Services |
| AIDS | Acquired Immuno-deficiency Virus |
| ANC | African National Congress |
| APEC | Asia-Pacific Economic Cooperation |
| ARDA | Agricultural and Rural Development Authority |
| ASM | artisanal small-scale mining |
| ATNESA | Animal Traction Network for Eastern and Southern Africa |
| AWF | Africa Wildlife Foundation |
| CAMPFIRE | Communal Areas Management Programme for Indigenous Resources |
| CBNRM | community-based natural resource management |
| CCMT | Centre for Conflict Management and Transformation |
| CDEMA | Civil Defence and Emergency Management Act |
| cf. | onfer/conferatur (in Latin) both meaning 'compare’ |
| CPU | Civil Protection Unit |
| CPU | District Civil Protection Unit |
| DDF | District Development Fund |
| DFID | Department for International Development |
| DNA | Department of Native Agriculture |
| DOI | Digital Object Identifier |
| DPP | Department of Physical Planning |
| EBSCO | EBSCO Information Services |
| EMA | Environmental Management Agency |
| EMI | Earthquakes and MegaCities Initiatives |
| *et al*. | and others (in Latin) |
| FAO | Food Agriculture Organisation |
| FC | Forestry Commission |
| FEMA | Federal Emergence Management Agency |
| FEWSNET | Famine Early Warning System Network |
| FNC | Food and Nutrition Council |
| FTLRP | fast-track land resettlement programme |
| GDP | Gross Domestic Product |

| | |
|---|---|
| GFDRR | Global Facility for Disaster Reduction and Recovery |
| GMB | Grain Marketing Board |
| GoI | Government of India |
| GoZ | Government of Zimbabwe |
| GSRD | Gokwe South Rural District |
| GSRDC | Gokwe South Rural District Council |
| GTC | Gokwe Town Council |
| HIV | Human Immuno-deficiency Virus |
| *ibid.* | ibidem |
| ICA | Intensive Conservation Area |
| ICDS | Integrated Child Development Services |
| IIED | International Institute for Environment and Development |
| ILO | International Labor Organisation |
| IPCC | Intergovernmental Panel on Climate Change |
| KZN | KwaZulu Natal |
| LED | Local economic development |
| LUP | Land-use Plan |
| MBBL | Model Building By-laws |
| MENRM | Ministry of Environment and Natural Resources Management |
| MLGPNH | Ministry of Local Government Public Works and National Housing |
| MLNRRM | Ministry of Lands, Natural Resources and Rural Development |
| MRDC | Mbire Rural District Council |
| MRRWD | Ministry of Rural Resources and Water Development |
| MSU | Midlands State University |
| MUD | Ministry of Urban Development |
| NCCRS | National Climate Change Response Strategy |
| NGO | non-governmental organisation |
| OCHA | Office for the Coordination of Humanitarian Affairs |
| OECD | Organisation for Economic Co-operation and Development |
| PESSDDAC | Poverty Eradication and Social Services Delivery Development Action Committee |
| RDC | Rural District Council |
| RDCA | Rural District Council Act |
| RIP | Rest in Peace |
| RORDP | resilience-oriented rural development planning |
| RTC | Rusape Town Council |
| SADC | Southern African Development Corporation |
| SC(UK) | Save the Children-United Kingdom |

| | |
|---|---|
| SDG | Sustainable Development Goal |
| SI79 | Statutory Instrument 79 |
| SIRDC | Scientific and Industrial Research and Development Centre |
| SLF | Sustainable Livelihoods Framework |
| Snr | Senior |
| SPI | Standardised Precipitation Index |
| TEMA | Tennessee Emergency Management Agency |
| TILCOR | Tribal Trust Land Development Corporation |
| TLA | Traditional Leaders Act |
| UCA | Urban Council Act |
| UFS | University of the Free State |
| UK | United Kingdom |
| UKAID | United Kingdom AID |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNECA | United Nations Economic Commission for Africa |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Educational Fund |
| UNWFP | United Nations World Food Programme |
| UZ | University of Zimbabwe |
| VIDCO | Village Development Committee |
| WADCO | Ward Village Development Committee |
| WFP | World Food Programme |
| WRD | water-related disasters |
| WRSI | Water Requirement Satisfaction Index |
| ZANU-PF | Zimbabwe African National Union – Patriotic Front |
| ZCC | Zion Christian Church |
| ZCCYN | Zimbabwe Climate Change Youth Network |
| Zimparks | Zimbabwe Parks and Wildlife Management Authority |
| ZIMSEC | Zimbabwe School Examination Council |
| ZIMSTATS | Zimbabwe Statistical Authority |
| ZIMVAC | Zimbabwe Vulnerability Assessment Committee |
| ZJC | Zimbabwe Junior Certificate |

# PREFACE

When Cyclone Idai hit the country in March 2019, I had a rude awakening to the sustainability of rural infrastructure and superstructures that house people, primarily and their livestock and poultry. Of course, the immensity of the Cyclone showed that little could survive its path. I saw the precariousness linked with what we called rural housing. I wrote, in the column that I scribed in the local newspaper, The Sunday Mail[1]:

> "At this point, we do not have any option and a Department of Rural Planning is needed in the Ministry of Local Government. If creating another department is burdensome, then let us have a Department of Physical Planning section that looks into these issues. Its role should be to create and approve plans at business centres and growth points but to check on individually submitted house and huts plans, in terms of where they are located and the building materials used on them. The context is that the effects and impacts of climate change and variability are real. Unless we stop thinking these issues are distant to us, we may relax and continue to suffer serious blows. From a professional point of view, walls and silos have to be hurled down so that the hard and soft issues in infrastructure, superstructure and settlement planning are rigorously thought through and measures put in place collaboratively."

In 2019, I went to Gokwe South Rural District on a study to find solutions to land-use conflicts induced by the expansion and encroachment of rural business centres onto abutting villages. In the process, we also visited Defe Dopota, Zion Christian Church (ZCC) centre and observed the explosion of rural development it was inducing. Mid-2019, I was engaged by the Africa Wildlife Foundation to do a study to help resolve land-use conflicts between humans and wildlife in Mbire District. The ordeals narrated by the rural dwellers of the two areas converged with problems that I was familiar with in Sadza – flooding, drought experiences, dwindling energy resources, diminishing grazing resources, reduced arable land, pressure on various environmental resources, to mention just a few. Indeed, the challenges of most communal farming areas in Zimbabwe add to the same thing. Required, therefore, was "a resilience thinking" among the rural dwellers. This thinking turned into practice. I had already seen it before from Master Farmer, my grandfather.

[1] https://www.sundaymail.co.zw/cyclone-idai-time-for-holistic-planning?

## DEFINITION OF KEY TERMS

***Exploration:*** refers to a thorough investigation of a subject or area of study usually treated as unfamiliar or peripheral with a view to bring novel insights and views.

***Natural Disaster***: refers to "a natural event, such as a flood, earthquake, or hurricane that causes great damage or loss of life." (Oxford Dictionary)

***Resilience***: is the capacity or elasticity of a place, community or organisation to recover quickly from difficulties or to spring back into shape.

***Zimbabwe***: the country between the Limpopo and Zambezi rivers that was under British colonial rule from 1890 to 1979 and attained independence in 1980.

**Housing:** refers to "… much more than just the physical dwelling units - it must be seen not only as an integral part of the physical environment, but also as a process within the socio-economic fabric of society. [It…] must be an indicator of social development for it provides a vehicle through that people can improve, in absolute terms, their material condition and their social and psychological well-being […] a means of job creation, employment stimulation, training and so on and not merely as a shelter" (Chenga, 1986:44).

**Rural**: refers to "a rural area is any geographic space located outside a town or city" (Pendall, Goodman, Zhu and Gold, 2016: 7). It is also referred to as the country or countryside.

**Rural Housing:** refers to a programmatic approach towards the production and maintenance of dwelling units for rural households towards improvement of their structures, livelihoods and welfare. Traditionally, rural housing is a spontaneous process as people choose to dwell where they wish in spite of the vagaries of nature defining that place.

***Rural Settlement***: The programme, plan or scheme of laying out sites and places for human habitation (like villages or small towns), related services (for example, educational, health and administration) and institutions to ensure the smooth running of affairs and lifestyles in the countryside.

***Settlement Planning***: The futuristic process of seeking to producing coordinated places (sites and regions) that are functional and with defined land-uses zoned for purposes, including arable, forestry, grazing and habitation.

# ACKNOWLEDGEMENTS

This thesis is a product of a good number of minds and hands assisting me. For the inspiration and drive, I owe it to Professor Verna Nel, my promoter. She allowed me to venture while steering silently the ship to the desired destination.

When, in 2018, I had become a Research Fellow in 2016 at the Department of Urban and Regional Planning, University of the Free State (UFS), Abraham (now Dr Abraham R Matamanda) whispered to me that I should consider pursuing a PhD by articles. I shared this idea to the Head of Department, Professor Maléne Campbell. Her response was an emphatic "why not?" The bulk of my publications had had an urban bias. I had to think of a topic that speaks to the other side of the world, the rural. Then in 2019, the year I registered, something cataclysmic happened: Tropical Cyclone Idai, with its trail of unprecedented losses of property and lives. The idea of linking the rural vulnerability to disaster resilience was accepted as a good topic for exploration. I want to thank the entire Departmental Board at UFS that deliberated and agreed that I could pursue this study.

In the same year, 2019, I got involved in two rural projects – the Gokwe South Land Conflict Management sponsored by the Centre for Conflict Management and Transformation (CCMT). Thanks to Mr Guardiner I Manikai who linked me up to the relevant contact person so I could facilitate and research in this domain. Thanks to Xavier Mudangwe, Margaret Chaikosa, Wonder Phiri and Shadreck Vengesai. The relationship unfolded to meanumber of challenges that rural dwellers suffer from – deforestation, overgrazing, displacement, etc. I thank the appointed and elected officials in Gokwe South Rural District Council (GSRDC) who openly spoke to my research team over various issues. Specifically, I want to thank the late Chief Executive Office of the GSRDC, Mr Velapi (RIP) and our guide to various corners of Gokwe South, Mr Mbire (Mukanya), RIP. Other names were Headman Mazvimbakupa and Chief Njelele. I want also to thank Chief Mutendi and the officials at the Defe Dopota Zion Christian Church (ZCC) that assembled two groups in the area that we interacted with. The enumerations were made easy though the services of Mr Thomas Karakadzai, Mr Henry Gurajena, Ms Queen Chinozvina and Ms Miracle Mabvundwi.

In May 2019, the Africa Wildlife Foundation under the leadership of Mrs Olivia Mufute and her team Mr. Collen Matema, Mr Newly Mabhandi and Mr Raymond Mhlanga appointed me to lead a team that would draft the Mbire Land-use Plan. This project made me learn that a plan is not just a matter of putting lines and circles on paper, but it is a highly socio-political process involving participation and negotiation. The process involved community engagement and our four teams went around all the 17 wards of Mbire District. We were also to have series of dialogues with the appointed and elected officials of the district and, those officials from various government departments – Agritex, Forestry Commission, Zimparks and Environmental Management Agency. I want to thank my teammates (Dr Kudzai Chatiza, Dr Rob Cunliffe and Dr Henry Ndaimani) and our support and technical sub-team comprising Mr Aaron Maphosa, Mr Samson Mutarisi, Mr Kudzai Mupakairi and Mr Tiisetso Dube).

Since this is a thesis-by-publication, I would want to express my sincere gratitude to the various journal editors and anonymous blind and peer reviewers who worked on various manuscripts that eventually got rejected or published by them.

I also convey my gratitude to Dr Edwin Mhandu and Ms Primrose Ndaayashata (Moyana) into the language editing assistance that they gave me in putting together both the thesis and articles making up this present work.

Last, I want to thank my wife and children whose support was evergreen when I was putting together the thesis and the papers.

# SECTION B: INTRODUCTION, LITERATURE AND THE STUDY LOCAL CONTEXT

**2**

[2] https://www.herald.co.zw/rains-trigger-state-of-disaster-%E2%80%A2homes-bridges-schools-destroyed-%E2%80%A2livestock-crops-washed-away/

# CHAPTER 1: INTRODUCTION

"Cities and villages are an organic whole. Both must be developed sustainably to support each other." – Liu and Li (2017: 277).

## 1.1 Setting the Tone

I was born on Saturday, Christmas Day at Sadza Hospital in Chikomba (former Charter) District in the then Midlands Province during the War of Liberation (Second Chimurenga of 1966-1979) of Zimbabwe. From the hospital, I was taken into the traditional hut of my maternal grandparents (VaMushapi, c.1919-2001(Plate 1.1) and VaMuvirimi, (Mirimi, as inscribed on his national identity card, c.1909-2006 (Plate 1.2).

For the next 18 years, as I pursued my academic education, creche[3], primary[4] (Sadza Primary School), secondary[5] (Neshangwe Government High School) and high[6] (Harare High School) and university[7] (University of Zimbabwe), the hut (Plate 1.3) was my boomerang place. It symbolised all that was me. Behind the hut was a *mushamba/mugan'acha*[8] tree planted by Grandfather and it still stands all there silhouetted against the sky.

It only dawned to me later, when I enrolled into the University for a Bachelor of Science Honours in Rural and Urban Planning in 1999, that my grandmother had a cow named *Mapurani* (Plans) during the time I was in Creche. (It never occurred to me that, one day, I would end up a specialist in (spatial) planning. For my grandfather, when the meaning of

[3] This was a rural-based crèche and one would be enrolled there when they were between 4-6 years of age, when they could not walk longer distances. In my case, the distance was some 6km from home. Creche was a place to familiarise the learner with the school environment. For me, the major aspect that was attractive was the bread from the grocer's shop (*chingwa chekumasitoro*) that we would take with some juice (Mazoe Crush or Raspberry). In the year, I was in creche, we were also given a supplementary instant mahewu drink, donated by the donor community because of the drought that had recently struck the country. We were taught basic counting. Except for the meals, I do not ever remember being able to read and write after creche. Creche was preschool.

[4]Seven years of primary education, Grade 1 to Grade 7 in Zimbabwe.

[5]This was four years, divided into two. The first two years constituted what was called the Zimbabwe Junior Certificate (ZJC). The last two constituted what was called Ordinary Level (shortened 'O' Level). For my 'O' Level I covered eight subjects: English Language, Shona, Mathematics, Science, Extended Science, Geography, History and Principles of Accounts and the examination board was the Cambridge University, before the now local examination board, in full first-time use (ZIMSEC) was in place.

[6]This, to me, speaks of the Advanced Level (shortened 'A' Level). It is two classes of doing Form Six (divided in Lower Six and Upper Six). I did "A" level at Harare High School. Neshangwe Government School, then, did not have such classes. Harare High School is in Mbare, the oldest black (African) township established in 1897. The school was started in 1958 being an extension of education to blacks during that time. Every December or April school holidays, I would find time to go back to the rural areas, for refreshing and social ties. In Zimbabwe, 'A' Level qualifies one for normal entry into the University. University entry is either through one of the three entries: a) normal entry (after A Level), b) special entry (having attained a relevant diploma in a given area, or c) mature entry (a consideration of whether one has attained 25 years of age and they pass a set examination entry into a degree programme of their choice.

[7] I qualified by normal entry into the University of Zimbabwe and enrolled for a BSc in Rural and Urban Planning (1999-2003), MSc in Rural and Planning (2003-2005), and Doctor of Philosophy (DPhil) (2008-2013). During vacations, I would find time to go back to the rural areas.

[8] https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=136520

*Mapurani* was inferred to him, it was about him being a good planner, a good organiser, one who could engage rationality in engaging in any activity that he embarked on. Indeed, as a master farmer, as he wanted to be known, he would not alow the seasons to relapse without adequate preparations.

**Plate 1.1: The late Mbuya Mushapi Chirisa, 1919-2001**

**Plate 1.2: The late Sekuru Muvirimi Chirisa, 1909-2006**

A. Under old thatch (July 2021)

B. Under new thatch (November 2021)

**Plate 1.2: My Grandmother's Hut (Photography 2021)**

When I was growing up, I would often return to my grandparents' hut, their homestead was my homestead. There were many structures at that one-acre homestead[9], besides the orchard that my grandfather planted (with all sorts of fruit trees, loquat, orange, guava, peach, avocado, mango, grape, pawpaw, to name but these few). The landmark features on this homestead were the traditional kitchen-hut, I have already alluded to, my cradle, the granary (*hozi*) that stood right in front of the hut, founded on six big rock boulders with some huge beams of deadwood I never bothered to find out what type they were and what source they had been hewed from.

The *hozi* had partitions (*matura*), six in number, three on each side of some 80 centimetres of passage. The partitions could contain a different grain type – maize (*chibage*), *mapfunde* (sorghum), or finger millet (*zviyo*/*rukweza*). I never saw my grandfather grow *mhunga* (millet) and other types of crops like groundnuts (*nzungu)* and roundnuts (*nyimo)*. My grandfather grew sunflowers, but I never remember him putting them in the *hozi*. The sunflower was a cash crop; once harvested, we shelled it off, packed it into bags (*masaga*) and whisked it away to the market. Of course, the Grain Marketing Board (GMB) would send cheques to Sadza Primary School. We had to be attentive as the Headmaster called out names of who would come and

[9] I wish I had taken photographs of the bulk of the structures when they were still intact, and in situ; now only one remains standing, the kitchen-hut.

collect their cheques My grandfather's name was always called in the two market seasons – the sunflower season and later, the maize season.

A GMB cheque in the home symbolised 'rural prosperity,' replenishing the 'pantry' with teas, milk, wheat flour for bread (*chimondimwi* or *chimodho*[10]), sugar and cooking oil. I would also see grandfather restock his livestock, buy additional two cows or two oxen. He would also prepare for the next season, buy seed and fertilizer, the most common ones being Compound D and Compound N, for topdressing. He would buy a field harrow and some shares (*muromo neshaya dzegedyo*).

Apart from the *hozi*, a very temporary structure was made of wood and grass with some fences. This temporary structure was designed with wooden beams and pillars (*matanda*), that we hewed from the Chikanya Mountains or Chengwe Hills. Seeing that he could use the *mutiti* tree, an indigenous tree that could sprout again after being put into dug holes, my grandfather embarked on a mission to put poles on the temporary structure and these became corner poles. He was greening the environment. The *mutiti* trees are also found in the present day as the fence poles-cum-trees around his vlei garden located a kilometre east of the homestead. The *vlei* garden is also the source of one of the tributaries of the Chikunzvi Stream that feeds the Save River. Grandfather also planted the *mutiti tree* around his communal farm, some of the trees have survived, whilst others failed to survive due to termite bites (*mujuru*).

The temporary structure was called *ngarani* (for drying maize before shelling the cobs). In some places, it is called *dara*. But also there are five types of *matara* (pluralised *dara*) – the *ngarani*, which was a *dara* to dry maize grain, the *dara* for drying the small grains, *zviyo* or *mapfunde* and the *dara*, normally situated by the cattle pen or kraal (*danga*), that was used to keep the dry maize stalks that would be used as 'hay', to supplement cattle feeds especially deep into the Spring season when the grass in the *vlei* had diminished. The *ngarani* was made out of purlins (*mbariro),* fence and grass, which allowed for free flow of air as grain had to be dried naturally from April to July. After the maize was dried up, it would be threshed, packed into bags for the GMB and the remainder put into the *hozi*. The fourth type of *dara* was for drying firewood. It was sited on raised ground to allow the natural seasoning of the firewood

[10] Home-made bread

we fetched largely from the Chikanya Mountains (*Makomo ekwa*Chikanya). The fifth type of *dara* was that one for drying up washed plates.

Under the *hozi*, was the opening that also allowed for aeration. The opening, we called it *gudzururu*. The use of *gudzururu* was multipurpose. We kept some of our hoes; some firewood for drying especially in the rainy season; and, chickens would hide under when running away from slaughter, for temporary respite. *Gudzururu* was also the place where some wet crops – cowpeas (*nyemba*), beans, sweet potatoes (*mbambaira* or *mabura*) and pumpkins (*manhanga*) would also be temporarily kept before cooking. Sweet potatoes would also be dug down into some holes to keep them fresh after harvest and that would preserve them for some time.

Apart from the kitchen hut, the *hozi*, the *ngarani* and *matara*, my homestead also had a grass-thatched shed that we grew up calling *shedhi*. The *shedhi* was the storehouse for all farm implements – the scotch cart (*chikochikari* or *ngoro*[11]), the ox-drawn ploughs (*magejo*), harrows (*hara*), cultivator (*karivheti*), ox-yokes (*majoko*), chains (*ngetani*, *cheni* or *matirenzi*). We also stored some axes (*matemo*), hoes (*mapadza*), adze (*mbezo)* and crowbars (*migwara*). The *shedhi* was almost an open structure of brick under thatch (*yakapfirirwa*). The roof could have been corrugated iron sheets but my grandfather preferred thatch.

Beside the shed (*shedhi*) was a three-roomed house (one bedroom, one spare bedroom and one sitting room) under corrugated iron sheets. The house symbolised modernity in the locality and was a reference point as house under corrugated iron sheets (*imba yamarata)*; all others began copying from this to have such houses, as my grandfather told me. My grandfather had worked in two urban areas before retiring to Sadza. He once worked in Bulawayo, which was the manufacturing city of Zimbabwe. He then moved to Salisbury (now Harare) where, among the stories he told us, he was a cook working for a white mistress (*misisi*) and later worked as a newspaper delivery man at The Herald and he would say, "*Ndaishandira Herodhi*" (I worked for The Herald). He also told us he was a malt trader (kutengesa chimera), selling on a bicycle from Njanja (Sadza) to white men around Bromley in present-day Mashonaland East. He told us how he would cycle nearly 200 kilometres from Harare to Sadza (of course, we would not believe him). His scotch cart had a faint white-label of *Mabhindauko*[12], meaning piece jobs. It

[11] Ox-drawn cart

[12] Knacks – meaning an acquired or natural skill at doing something

was from these urban and piece jobs that he built his modern house. It was a symbol of his diligence and the peripatetic quest for a better life.

On the same homestead were four other structures, a one-roomed square hut under thatch, sponsored by my aunt (my mother's elderly sister). It graduated from having cow dung floors to granolithic floors in my tenure being a homesteader there. It also got plastered inside. It was a guest house (*imba yavaenzi*) in the absence of my aunt who stayed in Harare, most of the time. There was another rounded hut. Over time, it has grown to be a storehouse. That is where my grandfather kept his old bicycle that I would try to resuscitate during my spare time to no avail. He also kept his fertilisers and seed in there. Later on, he built another *hozi*, this time like a modern house with granolithic floors. He always complained about it because it seemed not to serve the purpose. It caused the grain to rot; it was not naturally ventilated like his traditional hozi, set on beams sitting on rock boulders with a *gudzururu*[13]. The last structure of importance was a hen pen (*chirugu*). It was roughly built with brick and mud, surrounded by a mesh wire fence. We always picked a few eggs from it.

Besides, the structures there were the open spaces between structures, *chivanze*[14]. A lawn had been planted on it. On this lawned *chivanze* we played our plastic balls soccer (*bhora rechikweshe*). If we were not in the fields or the garden with my cousins when they visited, the lawned chivanze was our soccer field during the school holidays. We would play until dusk, sometimes forgetting about looking for cattle that needed to be herd into the pens. The other side of *chivanze* was not lawned and would be used as a ground for winnowing grain or other businesses defining the existence of the homestead and its dwellers.

The chivanze would be kept clean by sweeping it. The collected unwanted stuff (*marara*) would be put in a 5m x 8m x 2 m (width, length and depth, respectively) pit (*gomba remarara* or *durunhuru*). It was dug to be loaded with different materials that would eventually layer up to a compost heap. The ash (*dota/madota*) that we scooped from the kitchen, before setting a new fire would be thrown into the compost heap (kombositi). Apparently, every homestead in our village had that pit; ours was behind the *ngarani*. We would make sure that the dota that

[13] Space below a raised building; yard or court,
[14] We called it "the yard" defined as "a small usually walled and often paved area open to the sky and adjacent to a building: court" (https://www.merriam-webster.com/dictionary/yard).

we took to the gomba did not contain any live coals of fire lest they flared up and cause a fire outbreak. We were always careful not to cause fires.

To the northern side of the *chivanze* and bordering our homestead with our neighbours, there was a hedge on the fence there. The fence was greened with some thorn sisal plants that we called *konji*. It had grown thicker of the years and nothing could pass. We used the konji for four basic things. First, we used the fibre for creating whips for driving cattle. Second, the dried leaves of konji were good in starting a fire as they burnt 'fast and furious'. Third and as I was growing up, one day Grandfather turned the dried and thick root-bases into hand-sawn stools; this was the stool I used in reading for my 'O' Levels. Last, the matured sisal (*konji*) was turned into some beams (*mapango*) that we used for especially the *danga* or *ngarani*.

When I reflect on the structures that remain standing on my grandparents' homestead, only my grandmother's kitchen hut remains standing. It is a simple round structure (*rondavel*) under thatch. It is made of brick and mortared with mud dug from some ant-hill. I did not ask for its location. The structure remains intact as long as efforts are put to change the thatch from time to time, usually in intervals of not less than five years. I have seen that as long as someone maintains the structure by being there, heating and sweeping, it can go for decades if not centuries. The structure must be six decades old.

So many modern houses have had their roofs blown away by winds, but this kitchen hut has stood the test of times. Some of the newer huts have gone down due to lack of maintenance hence *mujuru* nesting on the floors, climbing on walls and mauling the roofs and eventually succumbing to natural pressures. Ever since my grandparents passed on, there has always been someone caring for the hut; that is the secret of its resilience, call it resistance.

Stretching out from my grandparents' homestead are fields, where we used to grow various crops. Some of the fields were converted into homesteads for my five uncles. When we were growing up, we ran short of land and no space was left uncultivated. Now that most of my uncles have moved to other districts, the same fields are not cultivated and most have revegetated. Pooled together, all the fields and homesteads constitute not less than 15 hectares

of land. The fence that my grandfather had tried to put around 'his farm' was gone. The kraal is gone. Yet, the *vlei* garden remains, with its *mutiti*[15] hedge.

My grandfather had three siblings born to her mother and father. Of these three, one was a brother and two were his sisters. The brother around the late 1960s moved to Wedza, Zviyambe in now Mashonaland East Province area to the African Purchase Areas (*matenganyika*). (Until 1992, Chikomba District was under Midlands Province). Both sisters were married in the villages within the vicinity of our homestead. In 1952, one of the sisters died. The year was remembered for the great floods (*murove*) that happened. Grandmother would narrate the ordeal that faced the extended family at that time:

> "In that year, Aunt passed on. We had abundant rains that season such that there were floods of water everywhere. When it came to finding a suitable burial ground, the family had a hard time finding it. The only option was to dig right on top of that anthill near *mutamba* down there in that field."

We had asked why, in a field with a juicy *mutamba*[16] tree, they had decided to bury someone. For us, as children, graves were a repellant feature. We were socialised never to point at them as that would result in the pointing fingers rotting and eventually falling off. In the same place, we were told there were two graves in the same place– that of grandfather's sister and the other of his mother. The two were now just embroiled in one mount with some protruding stones on them. It seems no cement was ever used to make them.

One interesting thing to note was the location of most homesteads in the entire village and surrounding villages. They were placed on a raised ground. Particularly, my grandparents' homestead was built some average of 500 metres away from Rwenje River that flows from the north down to the south where Sadza Growth Point is located (Figure 1.3 and 1.4). Behind the homesteads was a scotch cart road that led to the mountains where we fetched wood and now leading to the growth point for buying and selling. The linear pattern echoes my grandfather's words that "We were staying in the mountains; the white people decided to move us in the lines (*maraini*) around 1947". The linear settlement pattern has now been distorted by resettlement as people were allocated land in the fields.

[15] https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=131450
[16] Spiny monkey orange tree

I now recall what my grandfather used to speak highly of was respecting and reserving the water channel, which he called the '*otachani'*. When the land administrators came on settling people *mumaraini*, they demarcated certain areas that they said should not be violated by allowing cultivation. These would allow for the smooth flow of runoff into the natural rivers, during the rainy season. We would also ensure good drainage of stormwater of the fields by digging out or dredging the contours (*makandiwa*, *madhunduru* or *madhireni*). My grandfather earned, in 1965, a certificate that hung in his sitting room – the Master Farmer Certificate. He always wanted to be exemplary in communal farming, in conserving the environment. His *vlei* garden, had in it the spring (*chisipiti*) that made Chikunzvi Streamflow, as one of its tributaries. Within the *vlei,* the garden was someone's acre of wetland that was kept pristine. Sekuru would say,

*Maerodhio vakauya vakatiudza kuti musazokanganisa nzvimbo iyi; musairima*. (The land development officer (LDO[17]) instructed us strictly to preserve this space and never to cultivate on it).

[17]A summation of who these officers were, is by Nyandoro (2019: 126) who argues, "Agricultural demonstrators and land development officers were among the colonial officials appointed in the pre- and post-settlement eras; not only to facilitate the administrative process, but to establish state-approved farming systems and to provide essential agricultural extension advice to the newcomers." (Nyandoro, M. (2019). Land and agrarian policy in colonial Zimbabwe: Re-ordering of African society and development in Sanyati, 1950-1966. *Historia*, 64(1), 111-139.)

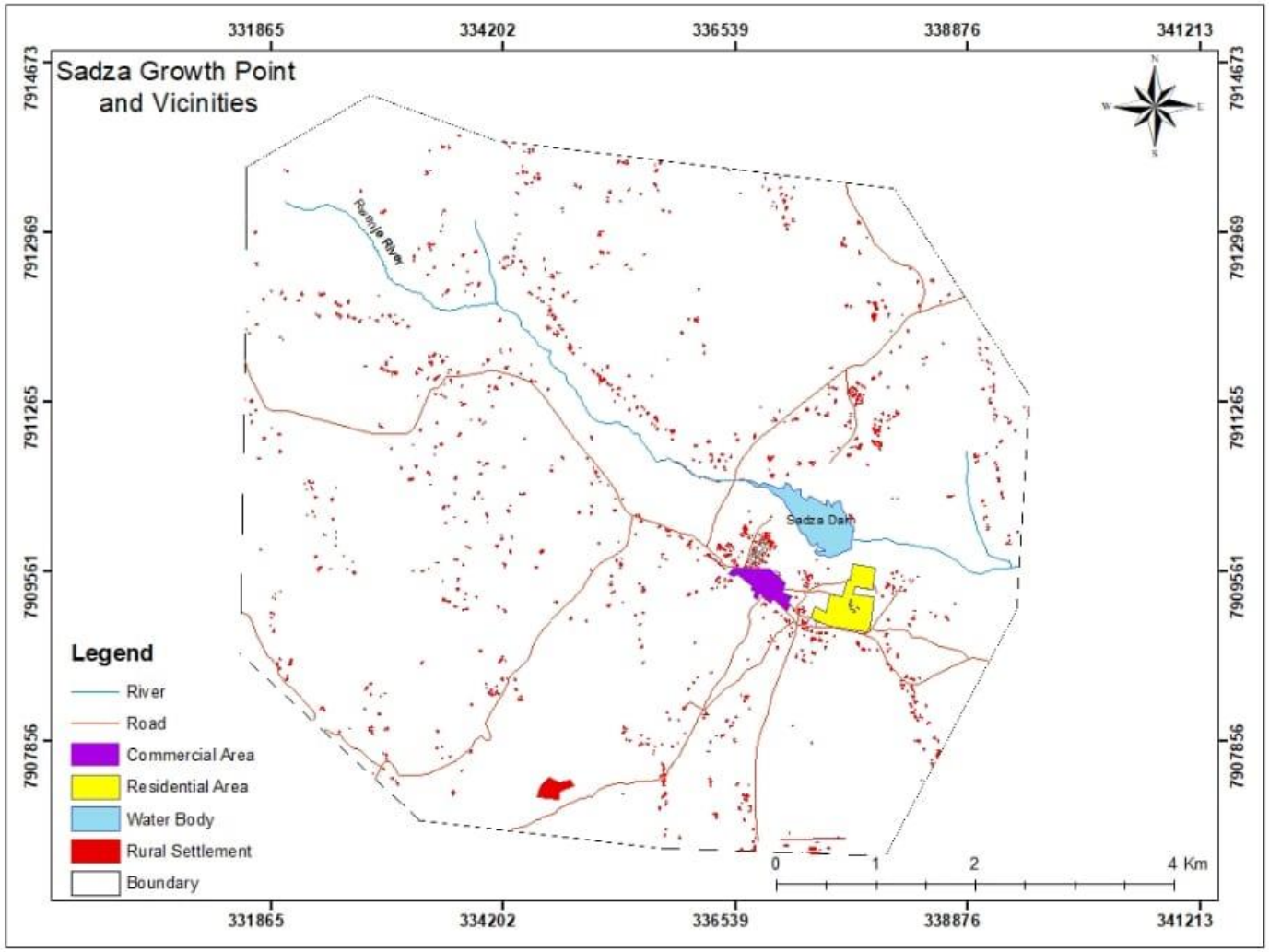



**Figure 1.1: Map of the Sadza Growth Point and its Vicinities (Author, 2021)**

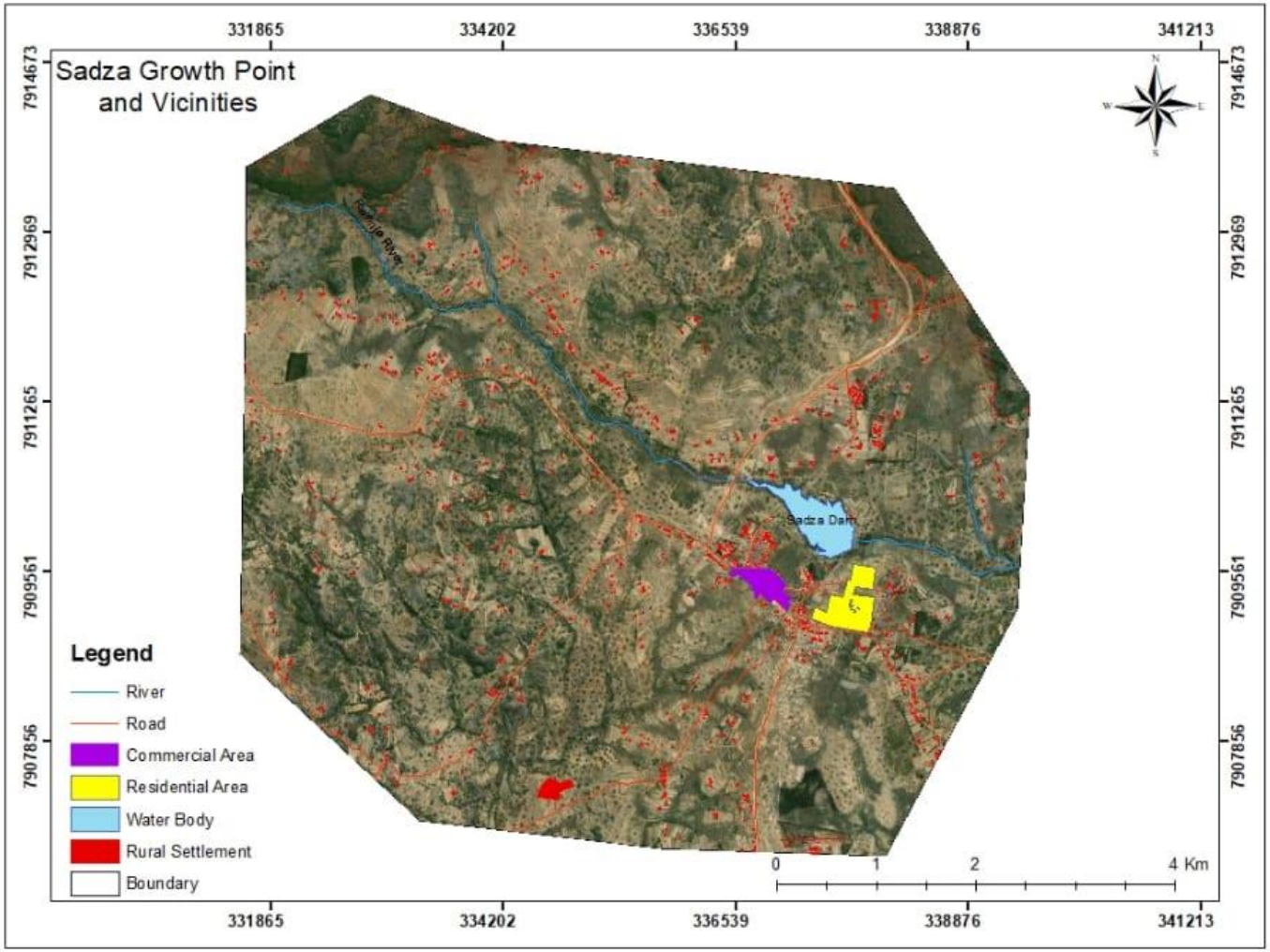



**Figure 1.2: Sadza Growth Point and Vicinities- Remote-sensed View (Author, 2021)**

Downstream was the local area dip tank with water supplied from the wetland. Grandfather spoke of the team of land administrators that educated him not to disturb the wetland in his garden as it was the source of life downstream. We harvested water for drinking and grass for cattle pens during the wet season to prevent them from getting muddy and uncomfortable for the livestock from the wetland.

Apart from ensuring that all the arable space was well-contoured, Sekuru (Grandfather) planted two woodlots of gumtrees (*Eucalyptus*). I am not sure whether it was a mistake or deliberate; the gumtrees turned for trees for firewood (*Eucalyptus camaldulensis*) and not for poles (*Eucalyptus Grandis*) when we expected them to be mature and harvested. Whether a mistake or not, the need for both – poles and firewood – was quite apparent. Wood remains a challenge in most rural areas. Sekuru was conscious of this prodigious need.

When Cyclone Idai hit Zimbabwe in 2019, the incident left me devastated to the bone. It shook my pedagogical understanding of what I learnt, in the university, urban and regional planning. Specifically, the destruction of Ngangu, a small rural town of Chimanimani made me rethink the efficacy of planning as an instrument of achieving planned settlement development. In planning, the siting of settlements and facilities is a major activity of professional prowess. Road and transport infrastructure in Chimanimani, Chipinge, Buhera and Chikomba (where I was raised) was heavily destroyed, apart from the loss of life that was experienced especially in Chimanimani. The Cyclone changed course and Harare was spared. My interest had always been urban and peri-urban planning.

For me, the rural space was a space, we needed not much to bother about. In my master's class, I was taught on rural development planning (with emphasis on livelihoods' enhancement to counter rural poverty and participation by the rural dwellers in the rural development processes). We focused on modernization, particularly the development of road infrastructure, markets, rural electrification and communication enhancement. We never bothered about rural planning (as the direct other side of town/urban planning), stressing the organisation of settlements and sustainability in the housing structures. The way we spoke of infrastructure was merely about the siting of utilities, including dip-tanks, footbridges and educational and health centres. The idea was of advocacy around the promotion of the centrality of services and

accessibility by the rural populations. In the livelihoods debate, stress was on access to natural resources, especially pasturelands, forests and fisheries, less mining resources.

I learnt many other things from my grandfather, apart from planting indigenous trees, like preparing fireguards, to avert wild veld fires in and around our properties. He also used to have a sledge[18] and by the time we were born, he was a candid critic of such and he encouraged everyone to invest in a scotch cart. If we talk about resilience in rural settlements, the small steps and the small actions are done over time will lead the desired path. Consistent actions by communities achieve holism.

My grandfather, indeed, lived resilience in the rural setting. He epitomises disaster resilience thinking, practice.

Long live, *Gushungo*!

### 1.2. Putting the Study to Context

Globally, rural areas are declining and under threat due to the forces of climate change and urbanisation (Liu and Li, 2017; Francis, 2019; Chirau *et al*. 2020). Since 2002, in Southern Africa, in general and Zimbabwe in particular, the recurrence of natural disasters and environmental risks has led to the development of new scholarly and policy interest and debate. The frequent occurrence of disasters points to the urgent need for disaster preparedness and resilience building and practice. More often, rural resilience has been studied in relation to ecological and economic processesthan with human settlements' production and maintenance (McManus *et al*. 2012; Scott, 2013; Zhao *et al*. 2019; Hu and Wang, 2020; Sujuan, 2020). In most African countries, the current planning legislation is limited in terms of controlling and guiding proper housing development in rural communities. There is a modicum of control in rural service centres where standardised developments have long taken shape (Grant, 2006; Alterman, 2014). Post-colonial Africa is characterised by anti-urban policy bias practices that

[18] The best description of a sledge is one provided by Shetto (1971). He argues that it is: "… a "V" or "Y" shaped wooden plank cut from a forked tree branch or trunk. The two trailing planks are joined with short pieces of timber to form a loading platform. The single end of the "Y" trunk is then hitched to the animals by means of a chain. Sledges slide on the soil surface as the animal pull, leaving rutted tracks on the ground. These sledge tracks act as waterways when it rains, accelerating soil erosion. Sledges are a common sight in most rural areas especially in Tanzania where, almost every household owning a pair of oxen, owns a sledge too. In some SADC countries, such as Botswana and Zimbabwe, sledges are banned completely as they are considered an erosion risk." (Shetto, 1999). Indigenous soil conservation tillage systems and risks of animal traction on land degradation in Eastern and Southern Africa. Conservation tillage with animal traction. A resource book of the Animal Traction Network for), Eastern and Southern Africa (ATNESA Harare)

appear to have conspired against the charting of planning legislation for housing and settlement planning in rural areas (Nwaka, 1989; Yankson and Owusu, 2007; Fox, 2014).

Rural settlements are continuously exposed to threats as a result of the policy bias and unforeseeable weather calamities as evidenced by the widespread damage by natural disasters (Andharia, 2020; Funk, 2021). For example, Cylone Idai destroyed the natural environment and caused deaths in parts of Southern Africa (Mashula *et al*. 2021; Nhamo and Chikodzi, 2021). In Zimbabwe, the huge loss and damage to the ill-sited social infrastructure and housing in the affected areas of Chipinge, Chimanimani and parts of Masvingo Province, serve as wake-up call for the introduction of and the need to comply with the rural housing construction and related infrastructure planning standards (cf. Huning *et al*. 2011). Zimbabwe has been hit by a number of cyclones since 2000, such as Cyclone Eline in 2000 and Cyclone Japhet (2003) and Cyclone Dineo (2017) (Gwimbi, 2007; Matyas and Silva, 2013). The most devastating cyclone was Cyclone Idai (2019) whose induced destruction far exceeded that of previous cyclones (Devi, 2019). In effect, Cyclone Ida was described by the United Nations (UN) as,

> "… one of the deadliest storms on record in the southern hemisphere, caused a total death toll of more than 1000, including 602 people in Mozambique, 344 people in Zimbabwe and 59 people in Malawi" (Devi, 2019:1585).

Cyclonic disaster trends point to the need to rethink resilience strategies. There is need to take action that is fully informed by critical scholarship.

This chapter presents an exploration of the planning and maintenance of Zimbabwe's rural settlements under the impact of environmentally-induced disasters in a bid to build strong resilience and sustainability. The study adopts the definition of resilience by Cutter *et al*. (2008) as the ability to respond and recover from disasters. This is possible through the creation of essential conditions that enable social systems to absorb impacts during and after the event has occurred. Resilience also involves adaptive processes that facilitate the ability of the social system to re-organise, change and learn in response to a threat.

Resilience is associated with debate in relation to the integration of resilience theory and practice in the development and planning of rural human settlements. This study is largely focused on social, economic and ecological concerns (e.g., Adger, 2000; Sallu *et al*. 2010;

Brown and Schafft, 2011). There is evidence that resilience is biased towards urban areas. In cities hazard and disaster risk reduction are considered as key resilience focus areas. The recovery of cities in relation to natural disasters is key. However, the resilience concept is broad and overarching; it includes several sectors and ought to be considered multi-dimensionally (Mazel-Cabasse, 2017).

The application of resilience within the planning and development of settlements could have undergone various changes and affected decision-making in different countries across the globe (Scott, 2013). Due to the recurrence of environmental disasters in Southern Africa it has become imperative for a deliberate scholarly discussion on how environmentally-induced shocks are changing the thinking on human settlements and habitats. Of importance is: How could human settlements and habitats be made more resilient than they are now? (Dilley and Heyman, 1995; Dilley, 2000; Holloway, 2003). Rural resilience is defined as

> "… the capacity of a rural region to adapt to changing external circumstances in such a way that a satisfactory standard of living is maintained. This also includes the capacity to recover from management or government mistakes" (Heijman *et al*. 2007:383).

Rural areas are better perceived in regional terms, where they are not merely plains of uniform landscape architecture but have nodes, connections and farms or hinterlands (Huggett and Perkins, 2018; Hawken and Fletcher, 2021). It is in the landscape, where settlement and production (arable farming, grazing, mining, forestry and service activities that define settlements) occur. The rural landscape is subject to vagaries of change that may be harmful, including ecological, economic and social hazards. The hazards have a bearing on standards of living of the inhabitants (Sultana, 2018; Zywert and Quilley, 2020).

Resilience then comes in as a window of hope, that after the striking of a disaster, the lives of the people and their production systems are able to bounce back to allow for what could ordinarily be deemed as normalcy (Useem *et al*. 2020). The capacity lies in the ability of the community to re-organise structures and processes towards stability and normalcy (Traczykowski, 2017; Toniolo, 2018; Vasbinder *et al*. 2018).

Sustainable Development Goal (SDG) - Goal 11 pertains to making cities "inclusive, safe, resilient and sustainable". Although it points to urban centres as the growing hubs of population

concentrations, it does not mean that rural areas have reduced in significance (Zoomers *et al.* 2017). Kaika (2017) offers a rather radical viewpoint, which is contrary to policy by consensus. Rather, she opts for what she calls "dissensus". She views the new urban agenda as one that must be made to fit a new framework.

A way must be found to put resilience and sustainability at the core of discussion and intervention (Salvia and Quaranta, 2017). As such, following a new urban paradigm within this old framework acts as 'immunisation', meaning it vaccinates citizens and the environments to take larger dosages of inequality and degradation in the future (Kaika, 2017). In keeping with Kaika's argument, divergence among stakeholders is very health as it wields potential in achieving 'unity in diversity' (cf. Moallemi *et al*., 2020). Indeed, mapping resilience and making it work effectively happens in a framework where divergent views are allowed to operate. Brodsky and Cattaneo (2013) argue that in the resilience concept is a wealth of potential for scholarship and intervention. This, in turn, helps the marginalised and underprivileged people and communities improve their experiences and outcomes. Thus, resilience as a theme and a concept requires deliberate connection to the practice of empowerment of the vulnerable groups.

Disaster planning and disaster resilience have increasingly occupied the centre stage of global concern (Cutter *et al*. 2008). Kibreab (2009:401) has categorically asserted that,

> "The claim that climate change causes population displacement is based on the wrong assumption that displacement is partly mono-causal and climate change can be isolated from other inextricably interwoven drivers of migration or displacement."

The combined interest in disaster planning and resilience has mobilised research underpinning the creation of adaptive designs and policy frameworks to address the growing socio-economic and spatial problems (Paton and Johnston, 2017). Rurality is an elusive concept with no single definition (Cloke and Little, 1997; Cloke, 2006; Murdoch and Marsden, 2013). The problem is that patterns of spatial occupation are culturally and historically determined and vary among regions of the world. Rurality is defined by exclusion, as that which is not urban, where urban is defined on the basis of population agglomerations (Anríquez and Stamoulis, 2007). The operations of the rural dwellers in the given rural precinct determines the business, work and outcomes that define rural development. Critical aspects in rural development include

infrastructure (or lack of it), modalities of operation (including participation and livelihoods. Livelihoods in the rural economies are predominantly hinged on natural capital (Lacroix, 2011; Van der Ploeg *et al*. 2012; Muzah, 2018).

Rural livelihoods are disrupted by economic and environmental systems including climate change and metrological hazards (droughts, floods, temperature extremes), geological hazards (earthquakes, landslides, tsunamis, volcanic eruptions)) and biological hazards (tsetse flies and wildlife) (Mavhura, 2017; Newton and Benzeev, 2018; Yang *et al*. 2018).) For example, in some of the coastal areas, such as Maputo and the low-lying regions of Tete in Mozambique, flooding has become rampant (Kay *et al*. 2017). In areas prone to active earthquakes, innovative strategies regarding earthquake adaptation have become popular while in the countries prone to mud slides, similar threats are addressed accordingly (Thomas and Griffiths, 2017). Cyclones have become more frequent and intense globally and, the loss to cyclonic disasters of properties worth trillions of dollars is common (Payo *et al*. 2017). Consequently, the systematic crafting of resilient responses to disasters, such as cyclones, in the affected rural areas, by implication, has become one of the global SDGs.

In Zimbabwe, rural areas are communally defined (formerly called “reserves” or “tribal trust lands” in the colonial days). They consist of villages, wards and districts. There are 55 rural districts in the country in contrast to the 32 centres defined statutorily as urban (local boards, towns, municipalities and cities) (Kinsey, 1983; Weiner *et al*. 1985; Cheater, 1990; Masilela and Weiner, 1996; Kinsey, 1999). The settlement hierarchy of the human settlement in Zimbabwe includes the immediate post-independence resettlement models (Models A, B, C and D) (Rukuni *et al*. 2006). Rural settlement development and planning in Zimbabwe is confronted by a myriad of natural and man-made challenges and shocks. Among these are socio-economic and environmental disasters, mainly attributed to the changing climate, for example, the droughts that characterised the years, 1982-3, 1992-1996, 2000-2015 (Matarira, 1990; Maphosa, 1994; Owens, Hoddinott and Kinsey, 2003; Hoddinott, 2006; Mabaso and Manyena, 2013; Mashizha, 2019).

Droughts in rural areas have increased the vulnerability of people. There is continued reliance on donor aid for survival. Creating a resilience framework during and after droughts is imperative for rural communities (Jaka and Shava, 2018; Ncube *et al*. 2018; Chigavazira and

Zandamela, 2021). The realisation that rural areas are very vulnerable when disaster strikes, especially the carnage on infrastructure and superstructures constructed, brought the concept of resilience much attention in Zimbabwe. For example, a discussion has occurred around the contribution of the Zimbabwe Vulnerability Assessment Committee (ZIMVAC), described by Murisa (2010) as

> "…a sub-committee of Poverty Eradication and Social Services Delivery Development Action Committee (PESSDDAC). This Committee is chaired by the Food and Nutrition Council (FNC), that is part of the Scientific and Industrial Research and Development Centre (SIRDC) and is also composed of the UNWFP [United Nations World Food Programme] , FAO [Food Agriculture Organisation], UNICEF [United Nations Children's Educational Fund], OCHA [Office for the Coordination of Humanitarian Affairs], FEWSNET [Famine Early Warning System Network], SC (UK) (Save the Children - United Kingdom] and the University of Zimbabwe. It has produced field-based analyses in the past years." (Murisa, 2010:19).

The Civil Protection Unit (CPU) under the Ministry of Local Government, Public Works and National Housing is a vehicle for managing disasters. However, it is underfunded (Murisa, 2010). The problem with ZIMVAC is that it depends on donor-funding, rather than on budgeted money from the national purse. This has a bearing on the aspect of focus that may need to cover a range of issues that the funder must not find as necessary for its interests. The issue of resilience must be considered beyond just the ecological definition to include the human settlements factor that also defines how the people and the place link up, in this case communities in rural space.

The thesis is informed by a human settlement perspective with resilience as the rallying point for discussion where disasters, politics and issues to do with climate change become substantive issues that one may explore to assess the nature, impact of and success/failure of rural resilience. A study by Rasmussen (1990) in Gutu, observed that injecting large amounts in

> "up-to-standard" urban development in small towns and rural business centres by building sewage processing works, urban roads, industrial estates and housing might make the town appealing and solve some pressing problems. However, effects of economic development should only be expected for the additional work given to local enterprises, that rarely happens even in donor-financed projects. Investments in mobile markets are more likely to generate effects on the rural economy, because of their much wider coverage. When these markets gradually become permanent as a

> consequence of local needs, assistance to infrastructural development in such centres would not hurt" (Rasmussen, 1990: 126).

In the early 1980s, on the question of the feasibility of growth point policy, Sibanda (1985:176) noted that growth points will need a deliberate policy of professional selection, planning and channelling of investments into these centres to grow.

In the National Human Settlement Policy document of 2012, a comprehensive approach to the issue of human settlements was presented, although it narrowly focussed on urban housing. The policy considers housing in different sectors, including mining. It also investigates the issue of territorially and it has a broader focus that considers urban, peri-urban and rural housing. Among the pillars considered in influencing sustainable human settlements' delivery are land, infrastructure, finance, disaster mitigation and participation (GoZ, 2019). Hence, communities are able to sustain human settlement centres that ensure the resilience of the providers, users, structures and governing institutions. It is unfortunate that the current picture of the delivery is rooted in colonial influences. If the subject of resilience is to find root in sustainable human settlement policy in the country, it must also seek to correct and redress the mistakes by past governments.

Colonialism brought the western perspective to the order of settlements. This came in despite the already existing settlements defined by the Africans themselves. Africans were focused on land for growing, cropping, grazing their animals, and keeping their harvest, livestock and poultry safe. They also needed hunting and gathering grounds (Murombedzi, 2003). The traditional African spatial management systems ensured that public health was strongly promoted and enhanced. In traditional African societies it was considered a taboo to defecate or dump in water bodies, such as lakes and rivers. The protection of the environment led the ruling elite to issue edicts that further treated such behaviour as criminal (Njoh, 2010).

Disasters in rural areas had partially been addressed by colonial laws through dealing with the problem of overgrazing, deforestation, soil erosion and the siltation of water bodies. The 1959 Land Husbandry Act summarises a mandate by government to contain environmental disasters. These laws and regulations were effective only as long as they remained repressive. However, at independence the populist agenda saw it fit to repeal a number of the repressive laws

(Drinkwater, 1989; Phimister, 1993). The remnants of such laws are regarded as moribund and ineffective, considering that climate change has brought new challenges that were not anticipated before. Hence there is need for resilience in rural planning. Chirisa and Bandauko (2015:194) have argued that physical planning is "… an aspect of spatial planning and it involves the designs of shelters that suit the needs and requirements of the local communities."

The strategic interests of the different systems may be summarised as comprehensive, spatial (physical planning), economic and financial (development planning), agricultural land-use (land-use planning) and natural resource management (water, environmental, national parks and forestry planning). Therefore, as Zimbabwe got a foothold from the colonial grip in 1980, there were bound to be changes. Such changes were expected in various spheres – economic, institutional, political and even physical. In the physical sphere, town planning and settlement development were part of the menu for transformative development.

Rural settlement planning in Zimbabwe has evolved over time and space (Robbins, 1984). In each case, the nature of planning is largely influenced by the ideology of the state. The colonial era was marked by the white supremacist ideology translated through segregationist approaches to spatial development. The existing planning framework in Zimbabwe is fundamentally outdated, non-developmental in outlook and inefficient (Musandu-Nyamayaro, 2008). This might be explained by the deep-rooted nature of colonial ideological entrenchment as determined by the laws that were promulgated by whose effects can be felt today.

The Land Apportionment Act of 1930, Land Husbandry Act of 1951 and the Land Tenure Act of 1971 were among the laws promulgated to promote the ideology of separate development, spatially and otherwise (Njoh, 2009; Chirisa and Dumba, 2012). The colonial period was an era of dualistic policy with palliative stabilising measures for the Native Reserves, to establish and maintain their buffering role in the system of labour migrancy and capital accumulation (Moyana, 1975, 2002). The classic settler labour-reserves policy was followed later by colonial authoritarian reformism designed to subordinate the development of the communal areas (Bush and Cliffe, 1984; Gasper, 1988; Johnson, 1992).

With particular reference to post-1945 Matabeleland in particular and the whole country in general, Robins (1994: 97-98) argues, the African landscape was "to be ordered by promoting

the following repertoire of modernizing initiatives: linear settlement patterns consisting of ten households per "line" ("centralisation policies")". Recently, a study by Williams (2015) in South Africa has pointed to similar thinking and rationality with communities of the Xhosa. Williams explores the post-1996 'betterment' policies of the South African Government in the Xhosa area of interest. He argues for the benefit of a cultural landscape already in existence to allow for the cause.

Communal areas in rural Zimbabwe were subjected to the fabric of institutionalised systems by successive colonial governments. The demarcation of villages into arable, grazing and residential "blocks", the substitution of pole and *dagga* structures by rectangular brick structures and the termination of intercropping were some of the measured put in place. In addition, the planting of maize seeds in neat rows, the implementation of rotational grazing systems using fenced paddocks and the construction of compulsory contour ridges by means of modern surveying equipment were all part of ordering the African landscape.

The colonial governments contemplated on producing settlements that were Eurocentric and, which conformed to the European climate. They failed to realise the contribution of such factors as livelihoods' support. It is argued that the government put Africans in the labour reserves into linear type of settlements largely to facilitate the easy collection of taxes. They discouraged the so-called haphazard settlement that however, ensured resilience in times of environmental challenges and other difficulty. As put across by Moore (2005:84), in Southern Africa's settler colonies, "…colonial administrators had long advocated concentrated linear settlements for the purposes of surveillance, control and the collection of taxes and labour." Zinyama and Whitlow (1986) describe how, in Southern Rhodesia (Now Zimbabwe) the British South Africa Company (BSAC) did not intend to use many human and financial resources in managing the reserves.

A 'responsible government'[19]was put in place in 1923 to mark the end of company rule. In 1926, "… a Department of African Agriculture [was set up] under a man called Alvord to provide basic extension services to improve the standards of husbandry and conservation in the reserves''. At this time, the reserve landscape was characterised by small, dispersed

[19]This was a government that was to account to the Crown in the United Kingdom (Soames, 1980; Mcwilliam, 2003) unlike the government of the British South Africa Company (BSAC) that was running the affairs of the country (1890-1922) like it were a private business.

settlements and irregular patches of crop land whose fertility was maintained by long periods of fallow…. Alvord saw this basic pattern of settlement and land-use as inefficient and set out to effect spatial reorganisation of the reserves according to simple planning procedures.… The planning process was known as 'centralisation' but the term 'rationalization' is more appropriate to describe the extensive changes in land-use and settlement brought about by Alvord's approach. In particular, rationalization resulted in the emergence of a more permanent and distinctly linear pattern of settlement…" (Zinyama and Whitlow, 1986:375). Alvordism is the major influencer of the spatial organisation of communal areas in Zimbabwe. Whether, this planning is sustainable or not, has not been academically challenged.

### 1.3 Statement of the Problem

In developed countries, particularly those in Europe, resilience-oriented rural development planning is at an advanced stage (for example, Plieninger and Bieling, 2013; Egan, 2007; Nelson *et al*., 2007). However, in less developed countries, such as African countries, the concept is still at infancy and experimental stages. In Zimbabwe, policy directives relating to most rural settlement planning are poorly integrated to resilience theory and practice (Mabaso and Manyena, 2013). In Zimbabwe, despite several efforts put forward through policy announcements, resilience, has, in reality, been a reactive afterthought, after disaster strikes. It is, therefore, imperative to have an integrated framework that can accommodate a wide range of concepts, strategies and models of resilience that are both reactive and proactive to promote sustainable development. Zimbabwe is characterised by a general dearth of scholarly studies in rural settlement planning and resilience as most of the available literature is biased towards urban planning.

It is imperative to explore the dimensions that constitute rural resilience and to produce knowledge that has a critical influence of rethinking policy and practice. Regional planning for rural development in most Southern African countries has largely focused on economic development (Murata *et al*. 2019). The recurrence of cyclones and other natural disasters which are caused by climate change point to the importance of planning for disaster resilience. It calls for systematic planning of rural settlements in Africa. In Zimbabwe, rural planning is associated with piecemeal planning and economic development. Incremental development of rural communities leads to development on environmentally sensitive areas that increase susceptibility to natural disasters. However, this rural vulnerability can be reduced by the

development of planning standards and land-use regulations, hence promoting the sustainable, safe and resilience of rural settlements. It is argued that building resilience and reducing vulnerability "… is not a simple task for one entity but a process with broad-based participation, that enables households and individuals to function in their environments" (Mashizha, 2019: 5).

Walsh-Dilley and Wolford (2015:174) observe that resilience is "… a 'boundary object'". This view is critical in the study as it opens up new spaces for discussion and knowledge formation across and outside of traditional disciplinary formulations. With particular reference to rural local authorities in Zimbabwe, it is acknowledged that "…local authorities are an indispensable component in building disaster resilient communities" (Manyena, 2006:818). Informing rural resilience is crucial in helping Zimbabwe to become an upper middle-income country (MIC) by 2030 and attaining the Africa Agenda, contributing to rural planning discourse that has traditionally been dominated by works on growth points, natural resource management and decentralisation.

## 1.4 Purpose of the Study

The purpose of this study is to explore natural disasters and resilience thereto, as a concept and a potentially defining factor in rural human habitats and settlements in Zimbabwe.

### *1.4.1 Aim of the Study*

The study investigates, explores and discusses the global, regional, national and site factors, considered by the builders and users of the human habitats with a view to inform settlement planning for resilience in terms policy and practical and everyday interventions under the impact increased disaster risks induced especially by environmental and global climate change.

### *1.4.2 Objectives of the Study*

Using the broader context first, and then the particular Zimbabwean and the country's selected rural districts, as case studies, the specific objectives of this study are:

1) To map environmentally-induced disasters or simply disasters as they affect rural human settlements and habitats under the impact of climate change.
2) To explore resilience as a theoretical and practical aspect for rural human settlements planning and management.
3) To examine the institutional, policy and statutory and infrastructure frameworks for rural settlement planning and maintenance across international and local regions.
4) To suggest options for resilient and sustainable rural settlements and habitat's production and management in Zimbabwe.

### *1.4.3 The Main Research Question*

In a world with a marked increase in disaster risk posed by climate-induced changes on the Earth's landscape, with special reference to the rural landscape (appearing more exposed and vulnerable, how does resilience-thinking manifest and work, for the sustainability of human settlements and their dwellers?

### *1.4.4 Specific Research Questions*

In both broader and the defined context specific cases,

1) How is resilience understood and interpreted as a theoretical and practical aspect for rural human settlements planning and management?
2) What are the resilience considerations for rural human settlements and habitats under the impact of climate change?
3) What policy frameworks (institutional, policy, statutory and infrastructure) exist for the infrastructure for resilience to environmentally induced disasters and risks across international and local regions? (What meanings do these frameworks carry?)
4) What options can be suggested for resilient and sustainable rural settlements and habitats production and management in Zimbabwe?

## 1.5 Rationale for the Study

The subject at hand is not an easy and straightforward one. However, exploring into the dimensions that constitute it is bound to produce knowledge that has a critical influence of rethinking policy and practice. By and large, regional planning for rural development in most Southern African countries has traditionally focused on economic development (Murata *et al*. 2019). The importance of planning for disaster resilience on the African sub-continent has

increased relative to the damage wrought by cyclones, volcanic eruptions and earthquakes, among others (Devi, 2019). In most rural areas in Africa, the systematic planning of settlements common in the global North is absent.

Rural settlement planning in Zimbabwe is closely associated with piecemeal planning. Rural communities grow incrementally. This absence of any concrete planning framework for rural settlements has left some rural dwellers living in precarious sites, like water ways and steep slopes. Compliance with revised planning standards and land-use regulations will help with guaranteeing the sustainable layout and environmental amenity and safety regarding the place-specific characteristics of the different rural settlements over time and space. By extension, these planning standards will determine the kind of designs and materials appropriate for region-wide housing construction. In Zimbabwe, the regularisation and upgrading of rural human settlement will assist in reinforcing compliance with building standards. The mainstreaming of climate change considerations in all land-use planning and infrastructure development in rural areas is long overdue. It is argued that building resilience and reducing vulnerability "… is not a simple task for one entity but a process with broad-based participation, that enables households and individuals to function in their environments" (Mashizha, 2019: 5). Overall, the study contributes to the country's vision of becoming an upper middle-income country (MIC) by 2030. It refers to the Africa Agenda and it contributes to the rural planning discourse in Zimbabwe that is dominated by works on growth points, natural resource management, decentralisation etc.

## 1.5 Research Methodology

This study was largely a qualitative one. It deployed an exploratory research analytical over-arching technique. It employed document review and analysis guided by thematic and content analysis. This was about the review of related literature and documents, including reports and newspaper articles focusing on rural poverty, vulnerability and resilience-building strategies in Zimbabwe. Key issues discussed are rural construction, legislation for rural housing and resilience in rural housing in Zimbabwe. To understand and entrench resilience thinking, context really mattered. As such, some of the material engaged was not merely recent; rather, historical material was also referred to at critical moments.

### *1.5.1 The Research Process*

The research process, also known as the 'scientific method) happens within a context in which steps are defined (Abdallah *et al*. 2019; Fisher and Bloomfield, 2019; Repko and Szostak, 2020). For example, it is argued that every research begins with an observation. Turning an observation into a scientific problem might be most critical step and it involving linking the observation to existing literature", engaging in deep conceptualisation and the research is full designed and executed. This, in its own right is not a very straightforward process. Berends and Deken (2021:143) argue that,

> "A particular challenge for writing up qualitative process research is to maintain the temporal coherence of the empirical data, which cannot be fully captured in abstracted presentations or isolated chunks of data. Ultimately, composing a qualitative process paper involves making trade-offs in how we as authors sequence the presentation of the findings."

When I was sparked into interrogating the meaning of the climate-induced to rural settlement planning, the happening of Cyclone Idai and its damages was a point of observation. It bankrolled me to revisit my area of technical expertise and training, urban and regional planning and began to see what I saw as glaring gaps. I observed the poor huts and poorly built structures in most rural landscapes that I was familiar with in the country. I then formulated a question, so rudimentary like: If a cyclone of a similar magnitude was to again ravage the land, how many rural houses would stand?

I started reading through existing literature in the land and saw that the discussion to answer my posed problem was marked by critical paucity if not silence. This saw me interested in wanting to plug the gap in knowledge so as then to channel the generated knowledge to policy and ultimate practice. There were many dots not connecting. Yet there were places and territories that had experienced similar challenges with minimal loss of life. For example, the case of Hurricane Katrina in the Americas. The topic on disasters, resilience and rural human settlements interfacing each other became the cog around which I then began to formulate my papers for publication.

### *1.5.2 Philosophical Positioning of the Candidate/Thesis*

Research philosophy can be examined from two axes. Axis 1 is when one considers the four aspects of epistemology, ontology, axiology and methodology (Berryman, 2019; Varpio and MacLeod, 2020). Epistemology is about how one ends up knowing and articulating on the

problem which largely might be experiential rather than just abstract and non-effectual. Ontology is the research philosophy of articulating the phenomenon under scrutiny in terms of its nature and disposition. On the other hand, axiology revolves around establishing the value of pursuing the study. Methodology is the philosophy of asking exactly how the problem with be structured, approached and answers be formulated. Perhaps, Axis 1 can partly best be summarised by Berryman (2019: 272) who argues that:

> "Research and cooking are not as dissimilar as one might think. The vegetarians' kitchen may look a lot like the omnivore's kitchen, but open the cupboards and the refrigerator or look in the recipe files and the differences will soon be apparent. The two cooks will define the world of edible food quite differently. Each carefully chooses recipes, ingredients, and cooking methods that fit his or her view of "good" food well prepared. In research, these are called ontology, epistemology, methodology, and methods."

Axis 2 is when the research considers the 'science' of articulation to a research issue, whether the problem can be tackled through positivism, interpretivism (or constructivism), pragmatism or realism. The fact that rural communities within the bounds of my country had had some of their houses destroyed and I happen to be trained in physical planning, created an impression that maybe my profession had let down the communities by not providing the much need answerers before the disaster struck. This constituted a critical epistemology for the study by me hence the construct of a thesis. The issues have to be well analysed and each subset of aspect well structured hence answering the ontological question. In terms of axiology, such a study was of much value in terms of providing answers to the rural communities that I saw as nothing but very vulnerable. I saw the whole territory of rural landscape of Zimbabwe is very exposed and the next issue was then what methodology to apply. Knowing the fuzziness of the issue at hand, I did not see value in approaching the study from a positivist lens. Rather, it had to be very pragmatic, with the qualitative constructivist approach being of critical emphasis.

### *1.5.3 Research Approach and the Selection of Case Studies*

I designed my research so that I first understood the broader aspects of rural settlement resilience beginning with the general scan of how different localities within both the global North and the global South had been affected and responded to cyclones (also known as hurricanes) (Nhamo and Chikodzi, 2021) and related extreme whether events. When contexts and resource levels could vary, at least, we could draw some lessons. As a trained spatial and

physical planning, I wanted also to understand the tools at disposal including master and local planning and how they could be deployed in the provision of relevant infrastructure to hedge against environmental damages. This gave me passage to exploring various literature around the subject that led me composing and publishing papers and chapters in this. This was didactism at play as I gathered a much evidence and data that could help me understand possible missing strands within the local scene.

At the time, when I enrolled, I had no budget lined for me to carry the study. Opportunities arose towards me doing some consultancy work in two places that I strongly understood to be exposed to threats of environmental vulnerabilities – Gokwe South Rural District and Mbire Rural District. I made sure that, besides the work at hand, I would also make parallel studies without compromising the input to the primary agendas of my presence in the districts. The two case study areas unravelled a number of issues that, upon reflection, could relate to other rural areas in the country. For instance, I saw other pressures faced by rural populations – the threat of urbanisation and expansion emanating from the designated growth points and business centres, fire outbreaks, diminishing grazing land, to name but a few. The two case studies made me to question other areas I felt similarly or more vulnerable than these. Those I could not reach out to, impelled me to write cases about them, for example, Binga, Chimanimani, Chiredzi and Beitbridge. It also made me interrogate the institutional responses through document review and archival methods. I also began to reflect on my experience as a rural dweller before I was ever 18 years of age.

### *1.5.4 Methods of Data Collection and Operationalisation*

The thrust of the thesis is on disaster management in Zimbabwe's rural areas (cf. Wiryomartono, 2022). In a bid to provide critical insight into the issues at hand, the candidate used various research methods and data collection tools. Since the thesis in question is through publication, the candidate used appropriate research tools for each article (Table 1.1). However, an overview of these data collection tools in various articles show that there is convergence in how they were used in different contexts. Cutting across all articles is secondary data collection which came handy in the review of literature. It was also extensively used by the candidate in the interrogation of theoretical frameworks provided in the various articles.

**Table 1: Methods Engaged in the Articles Published**

| Category | Title of Publication | Methodological Approach(es) | Scope |
|---|---|---|---|
| **A1:** | Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems | literature and document review and content analysis. | Global and Regional |
| **A2:** | Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe | archival data and case studies | National and local |
| **A3:** | Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District? | Key informant interviews, observations (backed by photography), focus group discussions and thematic analysis | Local case study |
| **A4:** | Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe | Interviews, observations (backed by photography), life histories and desktop research, content analysis | Local case study |
| **B1:** | Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements | Literature review | Global |
| **B2:** | Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions | documentary and literature reviews from initiatives undertaken at regional, national and local levels | Global |
| **B3:** | Resilience Thinking in the Rural Human Settlements' Development and Management | multi-case study approach | Global |
| **C1:** | Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe | Literature review | Global informing local |
| **C2:** | The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe | cases all around the country | National |
| **C3:** | The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: Challenges and Prospects for Doing It Right | case studies of selected wildlife zones, communal, resettlement and commercial farming areas in Zimbabwe | National |

Above all, the candidate has several articles that are based on desktop research (see Articles A2, B1, B2 and C2) which in most cases dealt with global issues on climate change. Indeed, such global insight can only be obtained through this research method given the variety of countries that were used for precedent studies. However, the provision of supporting evidence

for local contexts in Zimbabwe was achieved by gathering primary data using various research instruments. Appropriate tools were used for various people who were engaged such as key informants and interviews of households. Hence, research instruments such as focus group discussions, interview guides and historical narratives (Appendix 2 and 3) are among the research tools that were widely used for this study. The candidate used ideal sample sizes where necessary underpinned by scientific principles – for instance, participants in focus group discussions ranged between 8 and 15 people (see Article A3). These research methods and tools are a direct response to the objectives and to the type of analysis done which is mainly thematic.

### *1.5.5 Method of Data Analysis*

The study engaged, for data analysis, thematic and content analyses. the study was able to discuss a timeline of events from within Zimbabwe and across the world to discuss how they were affected and dealt with issues related hereto. Indigenous knowledge systems were also analysed through indigenous architecture housing methods.

### *15.6 Reflexivity and Positionality of the Candidate*

Considering reflexivity, as not merely essentialist and static, Soedirgo and Glas (2020: 531) argue that

> "… being actively reflexive means engaging in the dynamic, continual, and fluid practice of interrogating our own assumptions of positionality, how positionality is being read by others, and the impact of these assessments throughout the research process."

The candidate was dealing with well familiar case studies. Reflexivity is demonstrated in this study and it is argued that, "with this approach,

> "we see the value of reflexivity in its ability to bring epistemological, methodological and criteriological challenges to the forefront as a means of recognising how we, as qualitative researchers, shape the research we do, the knowledge we produce and its subsequent political effects" (Corlett and Mavin 2018: 387).

Social science research begins in a particular context and ends in the same context. The extent of the phenomenon under investigation in such a context coupled with an analysis of issues from different perspectives provides a solid platform for contribution to new knowledge. The

candidate in this regard emerges as the “forerunner” in articulating and documenting issues of disaster management in the Zimbabwean context in a scientific manner. He has provided adequate literature not only to understand the phenomenon, but also to guide other researchers and policy makers on these critical issues. Hence his work can be perceived as a reference point for those researching in the Zimbabwean context and beyond. This is particularly important given that climate change and disaster management is a new subject and many scholars are struggling to find literature that outlines principles and intervention models that contribute towards addressing prevailing problems.

The thesis is a story of the Zimbabwe rural landscape under immense vulnerability and risk. As someone who grew up in a rural setting, the power of reflexivity worked immensely. A study becomes scientific because there is a deliberate interrogation of matters despite familiarity.

### *1.5.7 Ethical Considerations*

Research ethics define what the researcher must do or not do with respect managing the research process as they interact with participants alongside the data generated from them. With respect to entry into communities, the research rode on the protocols already defined by the projects that they were doing in Gokwe South and Mbire rural districts. The research also has to package, for the thesis and the work defined by the clients. Interviews were anonymised to protect the participants from any harm. A study is conducted for its benefit to stakeholders. This was the very essence for which critical questions were asked from stakeholders.

## 1.6 Organisation of the Thesis

The thesis is organised as follows:

| **Section A: Preliminary Pages of the Thesis** |
|---|
| • Dedication<br>• Preface<br>• Executive Summary and Abstracts of Publications<br>• Acknowledgements |
| **Section B: Introduction, Literature and the Study Local Context** |

- Chapter 1: Introduction
- Chapter 2: Natural Disaster Resilience, Rural Settlement Planning and Housing: A Literature Review
- Chapter 3: Understanding Zimbabwe: Disaster Resilience Thinking, Practice and Rural Settlement Planning, Development and Management

**Section C: Articles and Publications**

- A1: Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems
- A2: Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe
- A3: Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District?
- A4: Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe
- B1: Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements
- B2: Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions
- B3: Resilience Thinking in the Rural Human Settlements' Development and Management
- C1: Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe
- C2: The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe
- C3: The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: Challenges and Prospects for Doing It Right

**Section D: Study Synthesis, Conclusion and Options**

- Chapter 4: Conclusion

## 1.7 Chapter Summary

The chapter has managed to situate the problem at hand by bringing the out the challenge the global and local territories are experiencing. It discussed the issue from the reflexity and positionality of the researcher whose epistemology of the rural homestead has made it possible to bring out salient issues including the vulnerability-resilience imbroglio that defines rural settlements as exposed. The author has gone on to define the methodology that he engaged to get the results that came through the various publications that he produced. It then set out the layout of the study composed of four critical sections (A, B, C and D). The next chapter is literature review important nuancing the study within the framework and kaleidoiscope of existing scholarship.

# CHAPTER 2: NATURAL DISASTER RESILIENCE, RURAL SETTLEMENT PLANNING AND HOUSING: A LITERATURE REVIEW

## 2.1 Introduction

The world is suffering from natural disasters that have posed social, economic and environmental effects to indifferent countries worldwide. Though being hit by these catastrophic events, these countries respond differently (Burton, 1993; Alexander, 1997; Mirza, 2003; Loayza *et al*., 2012; Chakraborty and Maity, 2020). More than 400 natural disasters occur yearly around the world affecting millions and costing billions per year (Prasad and Francescutti, 2017). Of the 200 million people per year whose lives are affected by disasters, about 46 million are forced to leave their homes. Many disasters are a result of climate change. They occur more regularly and with greater intensity all over the world. Earthquakes and other perils cost human lives, livelihoods and well-being. They also have knock-on effects for primary production and productivity, tourism and capital investment (Kofinas and Chapin, 2009; Gowan *et al*. 2015). The exposure to environmental and geo-risks and hazards have significant implications for the country whose trade-oriented agricultural economy is already sensitive to climate variability and extremes (Cradock-Henry, 2017).

Work on disasters since 2010 is progressively focused on the capacity of disaster-affected communities to recover and this is done without necessarily considering settlement planning and rural housing (Gyawali *et al*. 2020). Specifically, the years 2010-2020 experienced an unprecedented increase in natural disasters in different countries (Dube *et al*., 2021). Much effort (including the issuance of early warning systems, insurance on crops and the cultivation of drought-resistant crops like sorghum and millet) has been put in place to enable rural communities to adapt to natural disasters (Arnold *et al*. 2021). Despite these efforts, there is a dearth of literature on the contribution of planning rural settlement and housing as these have an impact on natural disaster resilience in various ruralities.

The chapter explains the natural disaster resilience of rural areas considering the housing and settlements in a bid to suggest appropriate measures. The study identifies the adequacy of rural housing. When one considers the ‘vernacular architecture’ that emphasises ‘local wisdom’ in the design and construction of rural homes across regions (Karahan and Davardoust, 2020; Naing and Hadi, 2020; Sadhu and Srikonda, 2020; Arnold *et al*. 2021), one can see that there are possible opportunities in buttressing the structures towards improving them or sustainability

and greater resilience (Ling and Chiang, 2018; Blake, 2019). Without that, natural disasters can physically destroy or degrade essential services, housing and other community facilities and disrupt commercial activity. Data in this chapter were derived from secondary sources including books and peer-reviewed papers. Different sources were used to acquire data from studies that were done on natural disasters that occurred in different countries. Reports on natural disaster documents were used for information on the consequences of natural disasters. Documents used to gather information on settlement planning and rural housing in African countries and European countries were obtained online. This included material on the efforts taken towards natural disaster resilience and solutions in different countries. Furthermore, several texts and documents on disaster management in Zimbabwe were analysed. Texts with a substantial bearing on disaster management policy were interrogated and analysed.

## 2.2 Defining and Characterising 'Rural' and Rural Housing

The world is changing and the definition of 'rural' is becoming fluid (Ishimitsu and Goto, 1982; Daniels, 1999; Frey and Zimmer, 2001; Cloke, 2006; Lorimer, 2008). There are several definitions of 'rural' in common use. It depends on the areas within various countries. Although in a defined context, the following observation by Bennett *et al*. (2019: 1985) is critical for reference:

> "Regardless of the definition, researchers, policymakers, media and residents frequently ascribe particular attributes to rural and urban areas that might not be representative, inclusive, or even accurate. For example, there are different perceptions of demographic composition (such as composition by age, sex and race/ethnicity), social factors (marital status, education and political views) and economic structures (farming, logging, or mineral-dependent economies). It is not uncommon for the popular media to equate rural with white farmers, despite the large non-white farming contingent and the many rural areas that are not dependent on farming…"

The rural landscape is a matrix where there is usually a balancing act between culture and nature, quality of life, blight and a myth (Kellert, 2003; Selman, 2009; Steiner, 2012). The fact that the rural landscape is largely natural resource-based and the activities largely depend on the natural resources makes it a challenge. Much debate is on seeking to add value to these resources. Most of the areas are poorly connected in terms of utilities and infrastructure. Poverty is a major concern and the works of Robert Chambers summarise this reality (Chambers, 1981, 1982, 1986, 1995, 2010, 2013). The global population of rural areas has increased from 2017 to 2018.

In Ireland, Romania and Slovenia, the majority of the population live in rural areas (Mitrică *et al*. 2020). The rural areas in these countries quickly recover from the effects of the natural disasters because the countries are at an advanced development stage (Mathews 2019). They can fight the impacts of the hazards and bounce back within a short time. In Bosnia and Herzegovina, rurality is viewed as a less populated settlement and the dwellers own vast tracks of land. All settlements that are not classified as urban are rural. Inhabitants are more likely to engage in agriculture and live far from cities (Grodach, 2002).

Rurality is a condition of place-based communality where people with common ancestry live in culturally defined areas and share conviviality (Chigbu, 2013). There is no exact definition of rurality but for this chapter, it is viewed as the state of being rural as opposed to an urban. It is an attribute that people attach to a place, based on a set of perceptions. These may include low population density, an abundance of farmland or remoteness from urban areas. In some contexts, rural housing is usually characterised by homes of poor families that are ill-ventilated and houses built of pole and dagga (Kulshreshtha *et al*. 2020; Piwowar and Dzikuć, 2020; Dunn *et al*., 2021). These houses lack protection for the residents against wind, rain and cold (Schultz 2013). They provide inadequate light and fresh air. Rural housing is generally located in areas far from the cities where there is easy access to health care facilities, quality roads and better settlement patterns that promote safety in times of disaster (Golding and Winkler, 2020).

Rural planning is an aspect of urban and regional planning involving 'zoning' of land-use for different purposes in the rural areas – arable farming, grazing, forestry, to mention but a few (Le Bivic and Melot, 2020; Silva *et al*. 2020). A standing debate, however, arises when one focuses on developing countries; emphasis is more on rural development planning than rural planning. Rural development planning stresses projects and programmes to make the life of rural dwellers better while rural planning is largely design-oriented at tends to take place at designated centres in the form of town planning (Koopmans *et al*. 2018; Píša and Hruška, 2019). Increasing urbanisation is becoming a major game-changer in so far as definition of rural, and rural development and rural planning aspects (Scott *et al*. 2019; Jain and Korzhenevych, 2020).

Despite their remoteness from the cities, rural areas also require efficient planning. According to Dalal-Clayton *et al*. (2003), planning is the ideal tool to prepare for the future through setting

goals and the strategies for goal achievement. Despite the location, there is a need to plan at all levels from villages to government authorities. Rural planning is focused on land use planning, resources management and allocation. Development is therefore essential (Le Bivic and Melot, 2020). It is equivalent to regional planning as the major focus is on sustainable development and growth (Harrison *et al*. 2021; Berisha *et al*. 2021).).

Overall, and regarding African countries, rurality is measured in terms of the environmental state, population size and settlement type (Burger *et al*., 2020). In this context, rurality is defined according to the state and nature of the area. Generally, the African rural area lacks more basic services (including roads, health care, education, water and sanitation) as compared to developed countries (Homewood *et al*. 2012; Eppler *et al*. 2015). Rural areas that are disaster-resilient can be successful if corruption is curbed, there is the promotion of public participation to devolve power from the central government and a substantial increase in the funding towards settlement planning and housing construction (Alam and Rahman, 2018; Patel *et al*. 2020; Ajani and van der Geest, 2021).

### 2.3 Disasters and Climate Change

A disaster is conceptualised as an event concentrated in time and space, where a social-ecological system (social and human systems, including the economy) undergoes severe losses to an extent that the fulfilment of its essential functions is prevented or disrupted (Chen *et al*. 2012). A natural disaster is generally a major adverse event resulting from the natural processes of the earth. Natural disasters are also defined as catastrophic events with atmospheric, geological and hydrological origins. For instance, severe storms with damaging winds, firestorms, dust storms, floods, cyclones/hurricanes, landslides and drought are some of the calamities that societies ought to brace for in terms of preparedness and resilience. These events can cause fatalities, property damage and socio-economic devastation and environmental disruption. Therefore, the creation of strategies and maintenance mechanisms to overcome and cope with the hardships induced by disasters is imperative (Hallegatte *et al*., 2020).

Usually, a natural disaster induces serious disruption of the functioning of a community, or a society involving human, material or environmental losses and impacts that exceed the ability of the affected community to cope using its resources (Amarasinghe, 2020; Bănică *et al*., 2020; Hallegatte *et al*. 2020). Disasters result from insufficient capacity to reduce the potential

negative impact of hazards. They often result in mortality, morbidity, destruction of infrastructure, poverty and homelessness. The consequences of natural disasters have a significant impact on the health and well-being of the population affected. These negative impacts can be direct or indirect. Direct impacts include death and injuries and the affected people indirectly suffer from malnutrition and an increase in infectious diseases (Onyango and Uwase, 2017). In the aftermath of the natural disaster occurrence, health issues are compounded by the damage done to the health systems and facilities, water and sanitation infrastructure and the displacement of communities in the areas affected.

Climatic variability is a major problem for Southern African societies and economies where the majority of the population is still largely rural and directly and indirectly dependent on rain-fed agriculture (Berhanu and Wolde, 2019; Braun, 2020; Meza *et al*. 2021). Usually, the resultant droughts and floods significantly reduce farmers' income and affect the lives of vulnerable groups, particularly the elderly and children (Keja-Kaereho and Tjizu, 2019). For instance, in Nigeria, children are a particular group in society that need unwarranted attention within the continuum of disaster management. This group is affected by the occurrence of disasters within the rural areas. The children in Nigeria are more vulnerable to natural hazards. They suffer from the aftermath of increased mortality and morbidity (Rufai, 2020). Children's vulnerability to hazards and disasters are not addressed by most government systems (Perera *et al*. 2020).

Measures should be put in place to protect children from hazards and disasters that can create unsafe environments for children, those living with disabilities and the elderly. For this to happen, the challenges facing the vulnerable groups, in light of hazards and potential disasters need to be investigated and an appropriate, targeted disaster management mechanism needs to be set up (Morrow, 1999; Peek, 2008; Fothergill and Peek, 2021). Investigating these vulnerabilities will increase the capacity of disaster managers to ensure that mechanisms are in place as part of disaster management.

## 2.4 Experiences and Some Steps in Managing Disaster Risks: Insights from Regions Across the Globe

The impacts of disasters in urban areas may be felt at confined and specific spots; in rural areas, the impact might be spread. In this regard, understanding rurality is critical (Fulkerson and

Thomas, 2019; Singh, 2019). Globally, planning to enable rural areas to regain their function after facing calamities, safe and sustainable requires SDG 10 to be considered. Sustainable Development Goal 10 emphasises the reduction of inequalities that is within and among countries (United Nations 2017). SDG 10 supports development in less developed countries, focusing partly on rural areas, in terms of infrastructure, especially in the Global South. The reduction of the inequalities includes promoting connectivity in rural areas that are in a remote state and isolated. Remote rural areas have struggled to access technology and better housing, healthy and road infrastructure for the past years in a bid to achieve a 'smart countryside'. The lack of access to resources such as financial and physical assets has a serious impact on the community's coping means as it limits the provision of support programmes through banks and other financial institutions (Bosworth *et al*., 2020). Planning in a bid to achieve resilient rural communities' access to better infrastructure can promote safe rural areas even if natural disasters occur (Le Bivic and Melot, 2020).

SDG 11 is about sustainable communities, implying that communities are to be renewed in the way they are arranged, not only in the cities but the rural communities too. Human settlement is to be planned in a way that offers opportunities for survival and comfort for all the people. This settlement planning involves access to basic services, energy, housing and transportation. Safe and adequate homes are a foundation for resilience in rural areas (Shafqat *et al*., 2021). Sustainable Development Goal 11 aims at building human settlement that is inclusive, safe, resilient and sustainable (Eurostat, 2021).

Natural disasters inflict damage on built environments and distress populations (Marshall *et al*., 2020). This has led to the loss of many lives in the process and some of the aftermath sufferings. Densely populated areas are affected more by natural hazards (Naing and Hadi, 2020). Long ago, people used to live together in one place. Now, the people are settled sparsely and this has reduced the number of lives that are lost in case of a catastrophic event. Increased density increases its vulnerability to a disaster (Bailey *et al*. 2021).

Disaster studies indicate that Asia has the highest frequency of natural disasters. Rural communities are heavily impacted by natural disasters and have different healthcare systems (Hall 2017). Elderly populations in rural communities are at the highest risk with a heavy

medical burden and many health needs. The 2008 China Sichuan (Wenchuan) earthquake, the 2013 Typhoon Haiyan and the 2015 Nepal earthquake-affected rural communities and lives were lost with many left homeless. In several Asian countries, many rural communities are transitional as they are always on the move, induced by natural disasters such as heavy flooding (Busby *et al*. 2018; Ling and Chiang, 2018; Luetz, 2018; Squires and Qi, 2018).

Tsunamis, including the 2004 Indian Ocean Tsunami and the 2006 Pangandaran Tsunami, gravely affected Indonesia especially the smaller offshore islands (Aruga, 2017; Chan *et al*. 2019). The response to the Tsunami that was experienced in Asia in 2004 was well-funded so that, relief agencies developed ambitious programmes (Cook and Chen, 2020; Daly *et al*. 2020; Isaac, 2021). The operational agencies considered the rights of the people who experienced the floods (Hall, 2017). Among them, the right to proper housing was included. Indonesian islands that had embedded the experiences of historical tsunamis and floods into their local culture showed that communities with repeated exposure to disasters recognised hazard signs and took relevant actions to prevent injury (Putri *et al*. 2019; Tickamyer and Kusujiarti, 2020; Kurnio *et al*. 2021). The Asia Foundation is helping local communities including rural areas to strengthen their environmental resilience to natural disasters and climate change by supporting the communities to plant more trees in the rural areas (Ghai, 2000; Boyle and Shneiderman, 2020; Prasada, 2020).

In India, a rural scheme started in 1996 to develop free houses. These houses were meant for the rural labourers and the poor who were living below the poverty line (Sungh 2020). This was done to promote the safety of the rural people who were more vulnerable to catastrophic events. It is observed that nearly 70% of the Indian population lives in rural areas, hence good houses are constructed. The housing projects were mostly funded and the roads were all-weather roads with better drainage systems (*ibid*.).

In China and Japan, earthquakes are more dangerous in settlements that are densely populated. Although spatial location does not necessarily differentiate vulnerability, the houses in which the people are living determine the level of vulnerability (Zhou *et al*., 2021). Houses built with poor quality materials are easily destroyed by dust storms or floods. China has encouraged equal access to better materials for building durable houses. The local authorities have improved their early warning systems (Eurostat, 2021).

Natural disasters that most frequently affect Australia are floods, storm cyclones, tsunamis, storm surges, bushfires, earthquakes and landslides (Handmer *et al*. 2018; Paul, 2020). Between 1967 and 1999 bushfires, tropical cyclones, floods, severe storms, landslides and earthquakes killed 565 people and injured 7296 in Australia. Heatwaves killed 4,500 people between 1803 and 1999. From 1980 to 2005 the number of disasters per year is increasing and this is leading to the decrease in the total population.

The New Zealand Kaikōura earthquake of 2016(although not climate change-related), prompted renewed calls for greater attention to the need to better understand, prepare for and respond to hazardous events at a regional level (Allstadt *et al*. 2018; Yao *et al*. 2021). While aspirations of a "resilient New Zealand" have underpinned government policy since the Civil Defence and Emergency Management Act of 2002, recent experience with earthquakes, floods, snowstorms and wildfires have highlighted the country's continued exposure.

Taking the case of North Canterbury that was hit by an earthquake on New Zealand's South Island. The epicentre of the quake was a rural district that is approximately 60 km to the southwest and inland of the popular tourist destination of Kaikōura. The earthquake included the rupture of 21 faults across a span of approximately 180 km (Stevenson *et al*. 2017). It was caused by widespread landslides estimated between 80,000 and 100,000 separate slips and it resulted in uplift of the seabed by an average of 2 m along a stretch of the east coast of the South Island. As a result of this experience, communications, electricity, water and sewerage infrastructures were severely disrupted. Throughout the region, there were significant damage to homes, businesses, farm facilities and land and stock losses and business interruption or reduced productivity (Stevenson *et al*. 2017; Fountain and Cradock-Henry, 2020; Fountain *et al*. 2021).

Settlements that are established on the banks of rivers increase the vulnerability of their inhabitants. The settlements located in the coastal areas in European countries are at the highest level of natural disaster risks. Settling on the banks of the river makes the settlement vulnerable to damage by floods. In European countries, environmental resilience is strengthened by mitigating the use of fossil fuels that alters the atmosphere and result in climatic change. The provision of rural housing is considered inadequate in the United Kingdom (Chen 2021). Lack

of affordable housing is one of the issues that are critical in the rural areas of the UK. Different programmes are put into place as a way of providing better quality houses.

In planning settlements, the people who speak the same language should be settled together. This promotes effective communication among the people as the early warning systems are communicated and understood. The Latino population in the United States of America is vulnerable to disasters because of its language variations (Donor and Rodrigues 2016). The commonly used language is English, all the disaster warning systems are at times misunderstood by Spanish-speaking individuals. The way they recover after being hit by a natural disaster is very low because they are being affected to the extremes.

Not only are the residents of poor regions exposed to the vicissitudes of natural disasters, but rural areas in developed countries are also at risk as some of these areas are disaster-prone. Overall, weak economies place African countries at a higher risk of natural disasters. This hinders them from constructing better quality rural homes. Overall, Africa has ingredients for brewing natural disasters. These include poor and fragile economies hampered by poor infrastructure, weak environmental controls and limited enforcement of building standards. As a result, African rural areas are at high risk when disasters occur (Sungh 2020). Of 744 million Africans, 734 million live in disaster-prone countries. These include Mozambique, South Africa and Zambia. As a result, Africa has experienced around 60% disaster-related death. The precarious economy in many African states means that rural areas take time to recover from the destruction caused by various natural disasters.

Being hit by catastrophic events exacerbates the challenges. These developing countries remain rural for instance, in Rwanda, 28 % live in urban areas and the rest live in rural areas (Fan and Badiane 2017). The rural areas are less developed as they benefit less or none from the economic development.

Historic African towns were influenced by geographic structural contours, occupational orientation and kinship organisation. As highlighted by Hull (1976), the close family kinship in the African society and the extended families contributed to the general pattern of the town settlement. Private settlements were classified according to clan affiliations, unlike the mixed modern-day urban settlements. In Africa, planting many trees enables the environment to

recover from the stresses experienced. The design of dwelling structures also reflected the culture, religion, economic and political institutions. But, for modern-day urban areas, more emphasis is placed upon social relationships than geometric design. Hull (1976: 411) argues that,

> "Generally speaking, African architecture was not monumental. Most structures were built by peasants, living in centralised politically-segmentary societies. Because of this, their dwellings were refreshingly practical, serenely modest and unobtrusive. Most traditional structures were simple enough to allow every African family, even the poorest and most lowly, a home of their own."

Following the unanticipated floods that happened in Kenya, the government supported the adaptations towards environmental resilience. These included a reduction in carbon emission that affects climate change that increases flooding risks. Early and more proactive adaptation and building resilience are more effective than addressing the impacts (World Bank 2019). Consequently, money was channelled towards environmental resilience.

Locally, Cyclone Idai struck Zimbabwe in March 2019, affecting 270,000 people. The storm and subsequent flooding and landslides killed 340 people. Agriculture, schools and infrastructure all suffered heavy impacts; many people lost their homes. Chimanimani and Chipinge Districts were the hardest hit (Chatiza 2019). Housing, health, forests, irrigation and other agriculture facilities were damaged. Arable land was rendered unusable and 348 cattle, 17000 chickens and 222 goats and sheep were lost, alongside losses of stored cereals. However, had adequate spatial planning and settlement development been in place, the impacts of these disasters could have been lessened.

### 2.5 The Settlement Planning and Resilience Nexus: A Close Look

Natural disasters and exceptional circumstances events such as droughts have environmental effects. Recovering from natural disasters also requires restoration of the physical environment (Mugambiwa and Tirivangasi 2017). Environmental resilience is the capacity of an environment to respond to perturbations by resisting damage and recovering quickly. To achieve this, settlement planning is the link. Narrowly, settlement planning is about designing areas for rural people – the young and the old, males and females, rich and poor (Eurostat 2021). Broadly, settlement planning is about community, culture, livelihoods, access, health and safety- the whole bundle of what people need to survive and thrive. This should be done in a way that

provides the rural settlements with the capacity to limit the adverse effects of natural disasters and the capacity to adapt and recover. The planning of settlements does not encourage the one-size-fits-all approach. Settlement planning for each rural area is determined by its place-specific attributes and by the hazards it faces. This is done so that when a disaster or a crisis occurs, the places are not caught unaware.

The capacity of the environment to continue functioning despite the stresses or shocks exerted over it is enhanced through community participation (Agwu and Speranza 2018). Cradock-Henry (2017) defines resilience as the ability to recover and continue to provide main functions of living, agriculture and social gathering in the face of calamities and other hazards. Success in resilience implementation and sustainability starts with the way rural people are settled and their housing facilities. Resilience is also defined as positive adaptation. It has three main functions: bouncing back, maintaining function and maintaining function coupled with adaptation and learning (Seeliger and Turok, 2013, 2014; Davoudi *et al*. 2012).

Resilience is both a process and an outcome (Harris *et al*. 2018; Saja *et al*. 2019; Stainton *et al*. 2019). In this chapter, resilience is the capacity of a system or rural community to cope with, adapt, or "bounce back to its original state". The recovery is through resisting or changing to reach and maintain an acceptable level of functioning and structure in the light of disaster stress or shock (United Nations 2017). Recovery also deals with the full range of social, physical, environmental and economic effects of disasters on both communities and the individuals who live in them. There is a need to create skills and methods to cope with challenges in rural settings. The degree to which a social system or rural settlement is capable of organising itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures is a principal determinant towards sustainability of resilience. Brunetta *et al*. (2019) speak of achieving 'territorial resilience'. They argue that,

> "The implementation of resilience in a territorial system is based on the reduction of vulnerability, the pursuit of social and institutional learning capacity and the achievement of better territorial governance that increase the adaptation ability and reduce vulnerability. From this view, resilience is not the result of a conventional top-down process but is rather the effect of a proactive vision of socio-political and community systems to implement collective and individual actions, fostering self-adapting, innovation, learning capacity and the evolution of the system. Therefore, these are key aspects to consider since resilience increases the chances of achieving a sustainable future within an unpredictable evolutionary perspective…'' (Brunetta *et al*. 2019: 12).

Building disaster-resilient communities is one of the best strategies for reducing the impact of disasters in marginalised communities. Resilience strategies can enable countries to handle the situations faced in rural areas that are prone to disaster and may yield solutions that are sustainable (Bari *et al*. 2022; Shammin *et al*. 2022). Settlement planning involves the arrangement of the way people live considering the geological structure, ecology and topography of the area. It also considers adults who lack capacity, the rural individual who are receiving public benefits and individual disabilities. The way a settlement is planned determines its adaptation to the natural disasters that occur (Li *et al.* 2020; Huang, 2021; Liu *et al*. 2021; Sahle and Saito, 2021). Settlement planning, along with other initiatives should contribute to meeting the lifetime needs of the people in question. It also establishes and achieves safety, financial and social goals and the maintenance of the community goals (Sachs *et al*. 2019; Barua, 2020; Tyagi *et al*. 2021).

The rural communities can maintain their original state and minimise damage in the aftermath of the disaster occurrence. Disaster resilience measures include planning the settlement as one considers its topographical structure. It also considers the building of houses using bricks that are moulded to a better standard. Cumulatively, the coping mechanism will enable the rural areas to mitigate the effects of the natural disasters that occur. Resilience implies that the livelihoods of the rural people can be preserved and their livestock survives from the impact of the catastrophic events (McCabe and Quandt, 2019; Patel *et al*. 2020; Liru and Heinecken, 2021). The mortality rate, injuries and disease due to hazards in rural areas will be reduced, and the destruction of houses and road infrastructure will be minimised.

Taking note of these natural disaster experiences and trends, different groups in a society have different levels of vulnerability to hazards and subsequent disasters owing to different political, social, economic and physical orientations. It would, therefore, be inadvisable to approach disasters with a view that the same kind of disaster risk reduction initiatives, disaster response ideals and disaster recovery ideals apply to every member of an affected community. Demography in rural communities is often characterised by populations of extreme ages, living in remote areas with prevalent poverty and having low levels of education (Massey, 1996; Jones *et al*. 2018; Johnson and Lichter, 2019).

## 2.6 Planning and Architectural Considerations in Rural Dwelling

The location of the communities determines their vulnerability to natural disasters. Rural settlement is where displaced populations settle on land outside of cities and towns. The people especially in African countries, like Nigeria, often depend on agriculture unlike rural areas in the developed world where there are diversified livelihoods. The African rural settlements are affected mostly by natural disasters to an extent that they continue to live in poverty after the occurrence of the disaster. Usually, the rural settlement is dispersed and scattered and tend to have a small population. The people rely mostly on agricultural produce. If the area is hit by drought or floods, it will remain with no food for consumption. This shows that rural areas in developed countries are less affected in terms of food when a natural disaster occurs because most of them do not rely on agriculture.

In Zambia, settlement planning is done to mitigate rural-urban migration (Phokaides 2018). Settlement planning in the rural areas, such as Kafue, is financed by the government to respond to a serious lack of economic and social infrastructure. Some of the rural settlements are planned in a scattered way and some are well organised.

The popular and consistently maintained architectural design in African rural structures is the thatched cone on pole and dagga structures. According to Hull (1976), housing structures were often built using twig frameworks that were supported by mud. Cow dung is a popular flooring material. The use of sun-dried bricks came into common use during the 15$^{th}$ century and has become popular building material. The African continent had been held in the belief that circularity is a sign of primitivism as the rectangular architectural designs were foreign to the continent. The modern-day rectangular forms were popular in Europe and Asia and their use in the African continent can be attributed to such inspiration.

To guard against adverse weather conditions especially in areas where thatch was scarce, flat roofs were introduced. In Tanzania and Kenya, the structures are in rectilinear form. Colonialism brought with it many changes in the culture and architectural forms. The pre-colonial dwellings in sub-Saharan Africa were cone-upon-a-cylinder or beehive-shaped. These have slowly been overtaken by colonial designs. The Swahili, for example, now adopted the rectangular forms inspired by the Southern Arabian forms (Hull, 1976). Figure 2.1 illustrates the various architectural forms and their development in Africa.

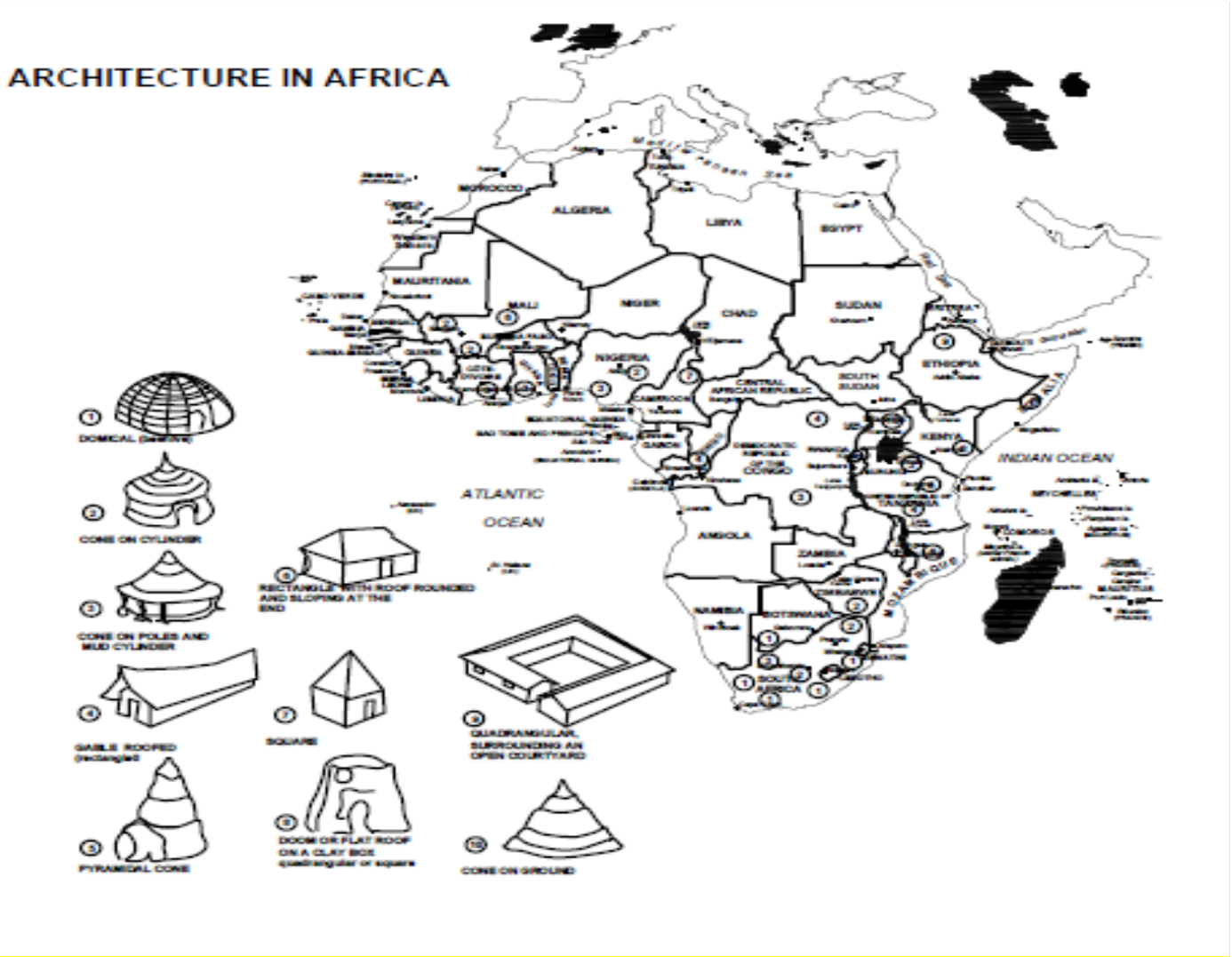



**Figure 2.1: Indigenous architectural forms (adapted from Hull, 1976:408)**

### *2.6.1* C*ontemporary Spatial and Settlement Planning in Africa*

In recent times, settlement planning in African countries is dominated by separation and inequalities. The rural settlements were intended for the blacks (indigenous population) and they became vulnerable to different catastrophic events. In South Africa, the rural areas were 'created' for the poor and disadvantaged (Mlambo, 2018; World Bank Group, 2018; Bennett and Van Sittert, 2019). These settlements have no better living standards as compared to the city. The way the settlements are arranged does not provide people with protection from different hazards (Jamshed *et al*. 2020).

Better spatial planning and settlement development are critical to resilience (Brunetta *et al*. 2019; Shekhar *et al*. 2019). Post-disaster recovery is constrained by pre-existing gaps in construction equipment. The constraints could be financial, technical or logistical as the staff with the requisite knowledge, the earth-moving machinery and tippers are dispatched in affected local authorities. In African countries, the reduction of inequality enables the cities to adapt to the situation for a long period. The development of a better communication system in rural areas, such as better network connectivity in the settlements enables the people to prepare and evacuate once an early warning system is made (Pentland *et al*. 2004; Chanak and Banerjee, 2020; Vitale Brovarone and Cotella, 2020). The development includes improved housing facilities since African countries such as Mozambique, South Africa and Zambia, have suffered from housing issues (Huchzermeyer, 2009; Nhamo and Chikodzi, 2021). Enabling access to better houses that are built with cement and better-quality bricks for all the people promotes safe rural communities thus giving a sustainable solution.

The vulnerability due to the different kinds of disasters is worsened by unequal access to sufficient resources for building better quality houses (Ford *et al*. 2020; Otto *et al*. 2020). The rural community should have equal access to hospitals. Often back-up systems are absent as infrastructure may be limited alongside other resources including human and financial. The health system in rural areas, including the medical care systems, must be prepared to resist disaster. Buildings and their contents must protect the health care professionals inside and they must be able to function in the aftermath of a disaster (Iglehart, (2018). Rural areas should have equal access to livelihoods that are sustainable and that can cope with the challenges even in the aftermath of the disaster.

Inequality in most countries has jeopardised the safety of the people in rural areas. If the country is faced with a natural disaster, the most affected areas are those without access to basic resources. In most cases, they continue to suffer the impact of the disaster for a long period. This results in extreme poverty within the rural society. Planning with the view of SDG 10 strengthens the natural disaster resilience in rural areas (Nhamo and Chikodzi, 2021).

## 2.7 Rural Zimbabwe in the Context of Disaster Risk, Settlement Planning and Resilience Picture

In Zimbabwe, rural areas depend on rain-fed agriculture and climate-sensitive resources. The rate of vulnerability is very high. Vulnerability is likely to increase with the importance of land, agriculture and related resources to Zimbabwe's politics and economics (Hall 2017). The country is disaster-prone, in terms of type and frequency, most disasters are triggered by climate change-induced hazards (Mugambiwa and Makhubele, 2021). Despite this, the technical, financial and logistical capacities of key institutions fall short of meeting current needs and are more reactive than proactive. Disaster risk assessments, early warning systems and planning in Zimbabwe remain inadequately resourced (Nharirire, 2018; Chatiza, 2019; Nhamo *et al*. 2021).

Cyclone Eline that occurred in 2000 caused great damage to roads, bridges, clinics and schools in the rural area (DCP 2015). In 2007, the government reported that about 200 families, approximately 1200 people were displaced by floods and 400 huts were destroyed in Chadereka in Muzarabani District. The worst floods were recorded in 2008, 2011, 2015 and 2017 (CRED 2018). Overall, natural disasters have resulted in significant social distress and suffering among many smallholder farmers in Zimbabwe. Chipinge in the Eastern Highlands experienced floods in 2019 and much poor infrastructure that is relied upon was destroyed. Many lives were lost resulting in significant stress in the rural population.

From 2000 to 2019, the affected population found it difficult to recover from the damage caused by floods. Chipinge took time to recover because the destruction was grave. But there are efforts to improve community safety. Communities have devised coping mechanisms to mitigate the impact of floods. These include promoting equal access to financial aid for the rural populace. The rural dwellers are discouraged from settling in areas that are prone to disasters and the construction of rural homes using durable construction materials is promoted.

The people in Chimanimani rural communities were discouraged from cutting down trees to reduce floods damage. Drought is a major threat to most rural areas in Zimbabwe that is exacerbated by climate change. Other efforts have centred on crop diversification, the growing of drought-tolerant crops and the sustainable use of wetlands (Musarurwa and Lunga 2012). People in drought-prone areas have also been encouraged to turn to small scale irrigation as an alternative to rain-fed cropping.

The construction of rural homes is seldom regulated in Zimbabwe. Developments are not guided by any area-specific siting and construction guidelines. Local authorities do not support relevant processes (Chatiza 2019). Traditional leaders do not follow due process when allocating land and overseeing local development. These factors pre-dispose place dwellers to disasters, detract from sustainable development and in turn exacerbate the effects of climate change-induced disasters.

In most Zimbabwean rural areas, inhabitants occupy large pieces of land, for instance, in the Binga rural area. More than half of the population consist of farmers (Sungh 2020). These rural setups often suffer from the absence of men, as they would have gone to the cities in search of greener pastures. The occurrence of natural disasters in these rural areas leaves them in a very poor state. The rural areas take time to recover and some may never recover fully. The infamous 1991-1992 drought and the flooding in the Zambezi Valley specifically Muzarabani and Dande by Cyclone Eline in 1999/2000 (Musarurwa and Lunga, 2013), destroyed livelihoods and it took time for the area to recover from these damages.

Matabeleland South Province is part of the upper Limpopo Basin stretching for 515 km within the Province from Plumtree to Chituripasi. This part of the Limpopo Basin is not only prone to floods but droughts are common. In Mt Darwin District, areas like Mukumbura, Kapiripiri and Kamutsenzere wards are located closer to tributaries of Mukumbura River. This makes the areas more vulnerable to flood attacks. These rivers increase community exposure to riverine floods. Throwbacks which are also known as backflow flooding that happen after intense precipitation are the most common type of floods in the region. The rural areas located in this area are more vulnerable to natural disasters (Mavhura and Mapuva, 2021; Mideksa *et al*. 2021).

Planning with the perspective of inequality reduction in Zimbabwe strengthens the disaster resilience in rural housing. Building disaster-resilient communities is one of the strategies for reducing the impact of disasters in marginalised communities. Access to better health facilities within the area enables people who live in rural areas to seek medical attention when injured during natural disasters. Providing resources for housing construction for all the people in areas like Uzumba-Maramba-Pfungwe and Chimanimani enables the community to be safe from disasters like dust storms, landslides and floods. The government does not need to do direct provision but to provide policy that caters for this so that the private sectors is at the centre of provision. The state has a role to ensure affordability and access to all.

Before Cyclone Idai in 2019, some affected populations had settled in unsafe areas. Chimanimani is a mountainous area and most of the villagers were settled in areas close to the slopes and lower grounds. This exposed them to landslides destroying infrastructure. The missing link on resilience in rural areas is on the location of the settlements and the creation of settlements that enable people to diversify in their livelihoods. Low-lying areas should be avoided for housing; instead, higher elevation areas are safer and give the community the capacity to recover in the aftermath of natural disasters.

## 2.8 Discussion

Disasters have escalated around the world, threatening the existence of humans and their livelihoods (Mugambiwa and Tirivangasi, 2017). Rural planning seems to be the major missing link. Normatively, it defines such aspects as the settlement location that promotes natural disaster resilience. The people should be settled far away from the coastal areas to mitigate natural disasters.

Poor rural households are highly exposed to shocks because their livelihoods depend on an increasingly deteriorating natural resource base and often volatile climatic conditions. They are also particularly vulnerable to shocks because they have few assets to fall back on and limited risk management strategies. Most of the rural people depend on agriculture for consumption and sale. This means that once a natural disaster hits their community, their lives become poverty-stricken. In light of this knowledge, planning in the rural settlement will enable a diversity of livelihoods.

The frequency and intensity of disasters also affect the demographic structure of the country. Rural housing units' set-up changes to sparsely populated patterns from the densification processes of the 1960s. Densification in rural areas increased vulnerability to the people. During the 1960s, the houses in most rural areas were built using poor resource quality. The rapid occurrence of the disaster caused changes in society. With equal access to resources, the rural homes were built using cement for strength and durability. Settlement planning also shifted from a top-down approach to planning with the people as a way of promoting safety and sustainability in rural areas. Rural housing is an important aspect in the efforts to strengthen natural disaster resilience. Houses in rural Zimbabwe are mostly made from poles and dagga and if there are bricks, they are made of clay soils with little or no cement. For instance, in Chimanimani, the buildings or houses were not properly built. The bricks were poor and they did not use cement. The floods carried away the buildings, the residents' belongings and valuables leaving the people homeless and wallowing in poverty.

The arrangement of people in their settlements is critical; low-lying areas should be avoided. Strategies for managing the risks and disasters in the area are improved. The strategies involve; setting up the early warning systems, education diversification, the building of houses using durable materials and the avoidance of settling in areas prone to risks and disasters.

## 2.9 Chapter Summary

The chapter has discussed existing literature in so far as it addresses resilience thinking and practice in human settlements planning and development. In all the efforts to create rural areas that are natural disaster-resilient, it is accepted that there is a need to take into consideration rural settlement and housing. That is the way they are planned, located and built. In the efforts made, the issue of inequality in the country should be reduced as emphasised by SDG 10. All the place dwellers, including those who stay in rural areas, should have access to equal house building resources for their safety. The health facilities should be built with backup systems and function during the disaster and aftermath. It is noted that many efforts were made towards natural disaster resilience. This was through the measures that were not effective and long-lasting. This chapter will enlighten the authorities on the development that should occur to achieve resilience in rural areas. Understanding that rural settlement and housing enable resilient, safe and sustainable rural areas will contribute to the reduction of problems caused by natural disasters. Private sectors are also allowed to invest in terms of innovation and

technology. The next chapter focuses on Zimbabwe as a territory for discussion in terms of concerns of rurality, settlement planning and development. It is observed that the rural space is much more than a static environment with different processes happening and defining the environmental and community needs.

# CHAPTER 3: UNDERSTANDING ZIMBABWE: DISASTER RESILIENCE THINKING, PRACTICE AND RURAL SETTLEMENT PLANNING, DEVELOPMENT AND MANAGEMENT

## 3.1 Introduction

The chapter makes an exploration of Zimbabwe as a country particularly regarding its demographic and climatic features. It begins by describing the general definitive characteristics of the country. The chapter also describes the country's experiences in rural settlement planning, development and management from the pre-colonial era to the present. Appreciating the context of the nation helps formulate practically workable solutions that enhance resilience and sustainability.

## 3.2 Description of Study Area

Zimbabwe is a landlocked country located in the southern part of Africa. It coversat least 39 million hectares of area space. The country was formerly named Southern Rhodesia from 1911 to 1964. It was renamed Rhodesia in the period 1964-1979 and finally, Zimbabwe at the attainment of independence in 1980 (MENRM, 2010). It shares approximately a 200km border with South Africa. It is bounded by Mozambique on the east and north-eastern part, Botswana on the west and south-western part and finally by Zambia to the north

Because of its geological and climatic characteristics, the country experiences various natural hazards in the form of flooding, cyclones and droughts. These occurrences are often seasonal like floods that often take place during the rainy season. Droughts often hit hard areas like Matebeleland and Masvingo and a few other areas which receive at most 350mm rainfall in a given 'normal' year (Mavhura, Manyangadze and Aryal, 2021). Most of the disasters that occur in Zimbabwe, such as drought are a result of human activities, rather than natural occurrences. Deforestation, poor land management, veld fires and overgrazing are worsening the severity of natural disasters. Apart from the natural disasters that affect the land, the nation is going through epidemics such as HIV&AIDS, diseases and pests that are affecting both humans, animals and crops. Economic deterioration can also be classified under disastrous occurrences. The popular 2008 hyperinflation had harsh effects upon human life (UKAID, 2010). A huge number of human livelihoods were damaged, leaving many people in a vulnerable state.

Zimbabwe's climate characteristics support diverse species in the form of flora and fauna. According to MENRM (2010), the country is endowed with at least 4 440 plant varieties with 214 of these plant species being endemic. There are 672 bird species with 450 of these breeding locally, despite none of these species being endemic. There are about 132 fish species, at least 196mammal species, 57 amphibian species and finally at least 156 reptile species. The present flora and fauna in Zimbabwe are distributed according to the availability of wetlands in an area, such as riparian areas including wetlands, swamps and floodplains. Human activities, such as overfishing and water pollutionare amongst the main contributors to the decline in this biodiversity. Climate changes that have resulted in unreliable and intermittent rainfall patterns and drying water sources can be an attributing factor to declining aquatic life species.

Flora species amount to approximately 6 000 plant species that represent 200 families and 1 500 genera. Five hundred (500) of these indigenous plants found in the country are known to be used in traditional medicinal practices. Some 230 species are said to be endemic and approximately 500 species are on the verge of extinction (Van Wyk, 2013). Zimbabwe's population relies mostly on cultivated plants, such as cereal crops, grains, tubers and legumes, horticultural and exotic crops for their daily dietary needs. The country's climatic conditions which are subtropical and temperate, gives it an edge into having diverse fruits that include nectarines, kiwi and peaches amongst many others. Rural parts of the country domesticate some animal species that include herbivores, such as cattle, goats as ruminants and non-ruminants, such as poultry (MENRM, 2010; Mugambiwa, 2018; Ndlovu *et al*. 2020; Chingombe and Musarandega, 2021).

Zimbabwe is initially, as early as 1960, clustered into five agro-ecological regions. However, the constant changes in climate change and variability in rainfall patterns, have resulted in the shifting of these agro-ecological regions (Mugandani *et al*.2012). The agro-ecological regions are classified according to average annual rainfall, length of the farming season and soil type. Regions have not remained the same as boundaries shifted, such as those of Regions 2 and 3. These are the agro-ecological zones that receive annual rainfallwhich is between 300mm and 800 mm per year; hence they are significant for being the major food producers in the country. Therefore, there was need to reclassify regions to accommodate the changes.

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Agricultural land-use planning that is based on scientific studies, together with environmental management are necessary for ensuring healthy ecosystem management. Factors taken into consideration include soil analyses, landscape, climate characteristics and human activities. To take into consideration, the diverse, climate change impacts upon agro-ecological activities, reclassification was deemed necessary as a way to create homogenous regions from updated land use plans (Manatsa *et al*. 2020). The need for sustainable agricultural development has rendered agro-ecological zones formulated in the 1960s to be obsolete as they no longer fit within the modern-day climate characteristics. The improved agro-ecological zones ensure effective land-use planning, increased productivity in agriculture and efficient research in the country's agricultural sector (Chikodzi *et al*. 2013).

Appendix 4 is a map which shows shifts in the agro-ecological regions. The major changes that took place were based on the changing climatic conditions that affected rainfall patterns. This has led to boundary shifts that saw some regions expanding while others were contracting. Manatsa (2020) highlights that regions III, IV and V expanded atthe expense of Regions I, IIa and IIb. Region V, which is the country's most arid region, was subdivided to form Region Va and Region Vb. This is done to show the decrease of rainfall that had taken place in the region. The region that is in the southernmost part of the country bordered by Mozambique, South Africa and Botswana is classified as region Vb. This region has become the most arid one that can not sustain any crops from rain-fed farming. Even drought-tolerant crops which once thrived even in the absence of irrigation can hardly survive. Despite the static nature of some other boundary determining factors, such as soil characteristics and latitude, changes in rainfall patterns due to climate change are the major contributors to boundary shifts.

Being a landlocked country located in the sub-Saharan region that is experiencing severe climate change impacts, Zimbabwe will continue to experience severe water challenges. According to Gumbo (2006), the water sector in Southern Africa is already suffering on the verge of human activities, such as over pumping, watershed degradation, pollution and sedimentation. These challenges have continued to weaken the capacity to ensure sustainable water management. Apart from climate change being one of the major contributors, poor water management policies and institutional frameworks can be attributed to this demise. Zimbabwe is a sub-tropical country that has particularly November-March as its rainy season.

Though recent changes on rainfall patterns show an increase in rainfall in the past season, the average rainfall patterns annually stood at approximately 657 mm though they would vary spatially. The country can be said to experience intermittent, insufficient and unreliable rainfall generally. The country has seven river basins that are internal and have a watershed yielding capacity of at least 11.26 $km^3$ of fresh water annually. Ground water contained in aquifers consists of about 2km3 in Nyamandhlovu forest sandstone, Save Alluvial deposits, Kalahari sands and Lomagundi dolomite. This makes a total of 12km3 of annually available water in the country. The country is endowed with at least 5700 dams that are spread across farms, plantation estates and mines. This is where much or the country's surface water is stored.

The country has seven catchment zones that are Manyame, Sanyati, Runde, Save, Mazowe, Gwayi and Mzingwane. With the constantly increasing climate change impacts that are affecting rainfall patterns, these catchment zones are likely to decrease. Projections show that most catchment zones located in the southern part of the country may decrease by about 12 to 16% as of 2050 and approximately 12 to 20% by 2080. These catchments include Runde and Mzingwane (Davis and Hirji, 2014). Mazowe and Manyame catchment areas located in the north-western part of the country will likely remain constant.

Zimbabwe's plateaus can be divided into Low, Middle and Highveld. A veld is described as a wide or broad rural open space. The Lowveld is located close to borders in the southern part of the country. The lowveld has a broad tract that is between Save and Limpopo rivers and a narrow strip along Zambezi valley and is approximately 600 meters above sea level (MENRM, 2010). This region has particularly drier and even hotter climatic conditions as compared to other velds. The Middleveld has savannah characteristics, located on either side of the Highveld and is about 600 to 1200 meters above sea level. One of the country's defining landscape feature include the central plateau formally known as the Highveld. The Highveld has a stretch of about 650km and about 30km in width.

Among various catchments in Zimbabwe, Manyame catchment is one of the catchments at risk of flood due to its location and the general elevation of the area which is very low in the Zambezi basin. The catchment form part of the area on the confluence of Msengezi and Manyame rivers which are high threat of flood to the surrounding people whenever the

Zambezi river is at its peak (see Appendix 5) for a map of the main catchments). Appendix 6 shows Zimbabwe's protected areas.

The elevation map (Appendix 7) shows that the greater part of the Masvingo district comprising of Chiredzi, Mwenezi, Beitbridge and Zaka are Lowveld areas and hence they are characterised by high temperatures posing a major threat of drought in the area.

The vegetation map (Appendix 8) shows all the areas which are vegetated and those which are not vegetated implying either there is another landuse type dominating at the location which can be cultivation and possibly settlement. It is clear that in protected areas, including national parks and state forests, lushvegetation occurs as opposed to other areas

In terms of soil variation, Zimbabwe is most predominantly composed of chromic, Eutric and Ferralic type of soils (see Appendix 9).

Zimbabwe's population continues to increase and this can be attributed to natural growth increases amongst other factors. According to ZIMSTATS (2015), the country's population had doubled by 2012 from about 7.5 million of 1982 to approximately 13.1 million. The fertility rate is increasing since 2005 with a stable child mortality rate. These trends explain the rise in population in the country. Since the attainment of independence, the country has performed about four censuses that were done at a 10year basis in the years 1982, 1992, 2002 and 2012. However, some censuses are taken within these intervals as a means to update statistics and for effective demographic planning. As of 2012, the country's population stood at 13, 061, 239 people with 52% of these being females and less than 1% being foreigners.

The 2012 census indicated that about 41% of Zimbabwe's population were young people below the age of 15 and 4% being 65 and above. The ages below 19 had about 11 to 15 % and 1% alone constituted the population aged between 70 to 74 (ICDS, 2017). The presentation of population statistics and ratios is usually done on a population pyramid. Due to the highest number of the population being the younger groups, the pyramid often has a broad base and is usually narrow at the top.

The majority, about 68% of the population in Zimbabwe, resides in the rural areas. The majority of these live in the resettlement and communal areas. Each province has an urban area. The urban population makes about 32% of the total population with an average of 4.2 persons per household (ICDS, 2017). Economic changes and climate-related disasters have reduced the migration of households. Of the country's ten provinces (Manicaland, Midlands, Mashonaland Central, Matebeleland North, Matebeleland South, Mashonaland East, Harare, Masvingo, Bulawayo and Mashonaland West), Harare has the largest population.

Hull (1976: 400-1) has commented on the spatial structure of human settlements in Zimbabwe as follows:

> "Town layouts usually provided residents with wide-ranging opportunities for social and economic intercourse. Owing to a desire for privacy, African compounds usually looked inward upon an open courtyard. This inner space provided a communal area for washing, cooking, craftwork, relaxation and perhaps prayer. Yet every ward and quarter had its own community wells, market places and centres of worship. Quarters were often separated from each other by broad avenues or corridors which converged at a large open community space in the heart of the town or village. Surrounding thisspace were the chief's or king's compound, a central market and, if a seat of territorial government, the homes of leading aristocratic families and dignitaries. Thus, the town or village dweller could be as public or private as he wished. But divine kingship, where it thrived, often led to the creation of cities within cities to preserve the secrecy of power. In other words, the divine king's compound became in effect a private city, open only to his personal retainers, leading chiefs and invited visitors. This was indeed privacy at its ultimate…"

The interest to take over control of land by the whites waned around 1945 to 1948. However, after that period, white settlers extended their powers to control land and this led to forced removal of indigenous people (Nyandoro, 2021). The white settlers drove many African people from the prime land to reserves which could not effectivekly support arable farming. This was not only limited to land alone, but the indigenous people were side-lined even from industrial labour opportunities. This was justified as a means to minimize production costs and to suppress local people from gaining from the mineral fortunes on land.

Prior to colonisation, the country had flourishing urban centres in the form of states, with the Great Zimbabwe the famous stone city between 1290 and 1450; the modern day Masvingo city is located 40 km from the shrine (Jonga andMunzwa, 2010). The city was a centre for

international trade that was carried out with countries, such as India, Middle East and China. The popular traded goods included glass, beads, minerals and seashells.

The modern-day urban development can be attributed to colonialism. After indigenous cities had flourished for approximately 400 years, the white settler then occupied the country in around 1890. Their influence upon these ancient cities and their exclusionary policies that side-lined the indigenous people led to development of modern-day cities.

Tavuyanago *et al*. (2010) aver that the white settler regime influenced the spread in crop farming after imposing the Maize Control Act in 1931. This was targeted towards reducing the pressure of competition between the colonial and indigenous farmers in the sale of crops to the Grain Marketing Boards. This approach though seemingly fair, had discriminatory tendencies as the settler farmers were paid higher rates than indigenous farmers. The indigenous farmers would forego the growing of their traditional crops as they became hooked up in growing maize and other European crops (Roessler *et al*. 2020). This can explain why most rural areas in Africa face food insecurities and this has led most of African countries, Zimbabwe included, to place reliance upon food handouts, rather than being self-sufficient (Mfum-Mensah, 2018; Mangwanya, 2019; Rubhara *et al*. 2020). The contentions continued to the extent that the indigenous farmers were driven away from fertile farmlands to arid reserve areas.

Poor tribal land management together with increasing population pressure is one of the great concerns that demand immediate action before the nation is reduced to penury. Barnes (1978) recommended the need to implement a vigorous rural reform programme specifically in the Tribal Trusts Lands. This would be targeted towards reviving agricultural productivity and improving land use management for a sustainable cause. Success in implementing such a programme will depend on an effective national urbanisation policy that will control encroachment into tribal lands. This would ensure effective control and management of residual population in tribal communities. The existing socio-economic situation in tribal areas makes individual ownership impractical despite it being a socially acceptable setting (Chirisa and Nel, 2021; Helliker *et al*. 2021). The commonly implemented, most feasible approach is the community ownership of land that gives the whole community a responsibility in the management of land.

Linear settlement planning is necessitated by the Native Land Husbandry Actof 1951, which ensured the planning of land according to various uses. According to Hughes (2001), land is arranged along roads in rows to cater for grazing and other farming activities. This brought the notion of 'maraini' or lines. However, this instigated resistance among the black African populace that was to build to an armed struggle in later years. The maraini notion was effective in a few areas as other places were affected by accessibility challenges. As people were put in neighbourhood lines, their grazing land was also demarcated for community usage. This led to a decline in tree resources as much land was cleared of trees as people were creating place for farming (Gumbo, 1992). However, deforestation came as a result of mining, grazing, tillage and poor land management policies. The failure to give indigenous people rights to manage woodland resources has led to their continuous depletion. CAMPFIRE is one of the notable efforts done towards ensuring wildlife resources protection.

The population density in most African communal areas was so acute as compared to that of the white settlers' population in the early 1980s. After the Native Husbandry Act was passed in 1951, settlement planning took place in the form of farmland re-organisation. Zinyama (1988) points out that the Department of Native Agriculture[20] was responsible for allocating farms particularly to families found cultivating in the time when the Act was enforced. This meant that those who were found absent from their areas during that time would lose all rights to land (Nyandoro, 2019; 2021). Farmers in the communal areas would cultivate in the wetlands and alluvial flats during the dry season. Crops like rice and green mealies and tubers were grown as a means to add variety to their diet. However, the passing of this act meant the prohibition of wetland cultivation. The reasons given in support of this move included the need to protect the wetlands from soil erosion that was as a result of tillage. The Act also changed the land tenure system to individual ownership from the common communal individual ownership. This gave room for the buying and selling of the land. However, this Act only worked from 1951 to 1964 and was abandoned after political contentions from the indigenous African people.

Greediness and the need to overcome the indigenous African authority saw many indigenous people being evicted from their fertile farmlands to dry reserves. Nyandoro (2019) observes

[20]The colonial government used the policy of separate development; the Department of Native Agriculture focused in the governance of affairs of farming of the black africans.

that Africans that were residing on the Rhodesdale Estate around 1950hadforcefully evicted from that *Crown Land*. This was effected by the Rhodesian state under the Native Land Husbandry Act of 1951. These indigenous people were resettled in Sanyati communal lands popularly known as the 'native reserves'. All these resettlement and eviction schemes were a means of re-ordering the African agricultural development and settlement to give the white farmers power. This, rather than uplifting the African man, was a way of turning the country into a white-owned country.

The dawning of the colonial era also saw the changes in the building designs of the African town structures. According to Hull (1976), the rectangular buildings that had not been popular in most interior African towns, became popular in the colonial eraonce missionaries, colonial officials and Asian traders introduced them. With time, rectilinear developments became a symbol of political power, wealth and worldliness. People no longer desired the round, thatched compound, but saw happiness in the corrugated iron roofs. However, most people, particularly the poor, havecontinued using their hut structures due to their economic value, comfort and utilitarian nature.

Various land redistribution models are adopted by the nation in a bid to ensure well defined planning parameters, resource organisation, implementation procedures and tenurial arrangements (Gonese *et al*. 2005). The major land redistribution models that are implemented include Model A that had accelerated A1 and A2 schemes and Models B, C and D. Model A had covered the primary land resettlement form from the introduction of the national programme in early 1980s which focussed on the rehabilitation of refugees and the creation of agricultural opportunities in the overcrowded rural areas. The creation of villagised settlements is the central theme of the programme. However, there are modifications to the model. Model B promoted the creation of settlements that were more cohesive and cooperative in the management of resources, rather than individual ownership. Model C combined the intensive villagised settlements and an estate that was owned by cooperative of the Agricultural and Rural Development Authority (ARDA). Lastly, Model D had a different approach in land acquisition as it promoted the 'willing-buyer-willing-seller' approach (Gonese *et al*. 2005).

According to Mkodzongi and Lawrence (2019), Models A1 and A2 were simply the modifications of Model A. The A1 model's schemes were relevant in promoting the reduction

of poverty. The country's Fast Track Land Resettlement Programme was effected with the Land Acquisition Act of 2002 that redistributed farmland from white settlers to approximately 150 000 farmers. All this was done under A1 and A2 models with the A1 model allocating small plots for grazing land and the growing of crops. The A2 model ensured the redistribution of farmland to commercial black farmers who had adequate skills and investment to farm profitably (Chirisa and Nel, 2021; Helliker *et al*. 2021). This was aimed at improving agricultural productivity. The programme saw a decline in farms owned by white settlers by approximately 75% (Gonese *et al*. 2005).

### 3.3 Disaster Resilience Thinking and Practice

The intensity and frequency of climate change hazards demands a well-equipped nation to withstand the harsh impacts. Understanding the aspect of disaster resilience is one step towards ensuring safety and sustainability. Aldunce *et al*. (2015:3) describes disaster resilience as "the capacity of an actor, community, social unit, organisation, society or system to absorb, recover, cope, 'bounce back', mitigate, withstand or resist the impacts of hazards". It is a community's capability to self-learn and regain after being shaken by a hazard[21]. Understanding the danger of lack of preparedness helps a community to be prepared and to be aware of the need to fight against the damaging impacts of disasters. The concept of disaster resilience exists to ensure adaptability, innovation and preparedness in order for people to withstand or even avoid disaster occurrence. It equips a community with the need to be proactive and plan ahead to prevent potential damage or losses that may be as a result of poor disaster management.

Some factors that cause community vulnerability to disasters are as a result of poor settlement planning. Examples of poorly planned settlements are in Tsholotsho District. The district has most of its settlements close to dams and rivers and most of thehomesteads are built using poor-quality building materials (Dube *et al*. 2018). Also, the lack of flood warnings has cost the community much money. They are caught unawares and end up losing infrastructure and property. The major issue in the community is the lack of cooperation by community members to ensure disaster resilience. According to the National Research Council (2011), communities can become disaster resilient only when they are willing to act and put in a conscious effort to work on that.

[21] It is "… a source or a situation with the potential for harm in terms of human injury or ill-health, damage to property, damage to the environment, or a combination of these …" (https://www.dmp.wa.gov.au/Safety/What-is-a-hazard-and-what-is-4721.aspx)

Broad community efforts that counter environmental and socio-economic issues are effective in achieving disaster resilience and preparedness. Disastrous resilience challenges no longer demand sole decision-making or top-down approaches that exclude the community that feel the impacts on the ground. There is need for community participation and mobilization to ensure disaster resilience is achieved. When a disaster occurs, it can affect a whole community. Resilience is a cohesive, integrated approach that is composed of various systems and disciplines. Thus, local community residents need to work together beginning from the local level (Cutter *et al*. 2013).

### 3.4 Institutional Framework Governing Disaster Resilience in Zimbabwe

Institutional frameworks for disaster risk management and resilience practice in Zimbabwe were practised prior to the country's attainment of independence. The British focus on civil protection was premised on prevention and protection from hostile attacks or natural disasters. Efforts to improve disaster risk management are going on to adapt to the changing frequency and effects of hazards. The Civil Protection Act Number 5 of 1989, Number 3 of 1992 and Number 22 of 2002 show a progressive change and improvement towards ensuring protection of civilians from hazards. This is highly esteemed in the country because disaster management is a civil matter that needs proper administration.

The Civil Protection Unit's (CPU)mandate is to ensure the participation of every citizen in averting the impacts of a disaster. This is legislated through the Civil Protection Act (Chapter 10: 06) that ensures the formationof an organisation - the CPU - for civil protection in Zimbabwe. One of the major roles of the CPU is to strengthen the government's capacity towards supporting local communities' preparedness against hazards. The CPU has acknowledged the fact that the country encounters various disasters and hazardssuch as droughts, veld fires, epidemics and flooding (Mukanganise, 2011). All these come with devastating effects upon human life and thus demand institutional engagement. This CPU has carried out vulnerability mapping and hazard assessments. This created a good basis for emergency preparedness. These assessments are carried out regularly in both the rural and urban areas to ensure an up-to-date data availability and preparedness for the people.

The Agricultural Technical and Extension Services (AGRITEX) is a government department that exists to provide technical innovation, training and research, amongst many other mandates, pertaining to agriculture (The World Bank, 2019). AGRITEX promotes the use of resilient farm crops that can withstand differing climate conditions. Climate sensitive and smart agricultural practices are promoted to ensure continued high productivity. Risk management in the agricultural sector is dynamic and its process is constantly changing due to the volatile nature of climate risks. This demands constant periodic assessments with agricultural stakeholders to provide quality decision-making and policy formulation that work perfectly for the maintainance of agricultural productivity and food security.

Decentralisation has brought the creation of councils that are at the coalface where people are and the Rural District Councils (RDCs) are part of government's decentralised units. RDCs work for rural community development and facilitate well in ensuring resilience and mitigation from hazards. The RDCs have a mandate to ensure the formulation and implementation of disaster risk management and resilience goals targeted specifically for the rural areas (Manyena, 2006). Despite having such important responsibilities, RDCs in Zimbabwe encounter various challenges that deter the successful implementation of disaster resilience and preparedness. Some of the challenges include lack of financial resources, political contentions that include too much meddling of the central government into local issues and management. Disasters often triggered by droughts have become a norm and still most rural districts are failing to cope with the effects (Manyena, 2006).

The Regional, Town and Country Planning Act (Chapter 29: 12) of 1976 (revised 1996) was formulated to ensure orderly planning of regions, districts and local areas. This is intended to conserve and improve the physical environment. Disaster risk management and resilience is provided for in the Act by way of promoting environmental amenity, general welfare and safety in development. It authorizes the formulation of master and local plans and gives guidelines for preservation of natural resources and landscapes. It provides for the development control and this ensures that no settlements are located in hazardous and vulnerable areas for community protection. However, due to rising populations in most areas, many are illegally settling in vulnerable areas prone to flooding and other negative climate impacts.

The Environmental Management Act (Chapter 20:27) of 2002 provides for the establishment of environmental agencies, that include the Environmental Management Board, the Environment Fund, the Environmental Management Agency, the Standards and Enforcement Committee and the National Environmental Council. All these institutions have a common goal to ensure prosperous environmental management. This is done through environmental impact assessments and auditing. The Act also ensures the effective management of natural resources and prevention of environmental degradation. The Natural Resources Act (Chapter 20:13) promotes intensive conservation of resources.

The Forestry Act (Chapter 19:05) of 1949 (revised, 1996, 2002) provides for the establishment of the Forestry Commission that ensures effective administration, management and control of state forests. The main mandate is to ensure that private forests and their produce are regulated to prevent deterioration and destruction from unregulated forest fires. Conserving flora and fauna is the major goal to be achieved as unregulated human activities can lead to intensified disaster hazards. Human activities that lead to the cuttingof trees and burning forests threaten community resilience. Therefore, the Act spurns the burning down of trees and is complemented by statutessuch as the Rural District Councils Act (1988) (Chapter 29:13) and the Environmental Management Act (2002) (Chapter 20:27). Strict penalties are placed upon those who contravene these laws.

The enactment of the Traditional Leaders Act (Chapter 29:17) of 1998 was a measure to ensure the empowerment of traditional leaders in managing activities under their jurisdiction. Traditional leaders give passage to communal land as they are deemed the custodians to local culture and heritage. That way, they are the chief gatekeepers to communal land affairs. However, they have a mandate to preserve traditions and customs. These customs have in them embedded cultural practices for the preservation of the natural environment and disaster mitigation. They play a key role in contributing to disaster resilience. Despite the intensity of climatic disasters challenging the existing disaster management frameworks, the traditional approaches seem to have stood the test of time. However, the changing global environment and modernisation is slowly rendering traditional leadership less significant (Zamisa and Mutereko, 2019). Most communities do enjoy and are used to their traditional leadership that they obey without questioning, yet the communities are becoming discouraged as they do not directly enjoy the benefits from the traditional leadership (Mavhura, 2017).

The Communal Lands Act (Chapter 20: 04) of 1982was established to ensure the smooth management of communal areas in Zimbabwe. Hence, it ensures orderliness and the regulation of communal land usage and occupation. The Minister of Local Government, Rural and Urban Development is entitled to the implementation of most of the guidelines within this act (Mavhura, 2017). This act also ensures that smart, resilient land use activities are practised. This discourages the unnecessary cutting down of trees and de-pasturing of animals.

The Rural District Councils Act (Chapter 20: 13) provides for the administration and management of the Rural District Councils (RDCs). It empowers the RDCs as the custodians of natural resources; it is their duty to ensure effective management of these resources. Some of the duties of RDCs have a bearing upon disaster risk management. The Act provides the RDCs with the mandate to ensure environmental conservation, natural resources management the regulation of pollution and farm activities.

According to Masiiwa (2005), the Rural Land Occupiers (Protection from Eviction) Act (Chapter 20:26) of 2001 was enacted by ZANU-PF as a means to legalize rural land occupations. Itwas meant to restore land occupations that took place from February 2000 and March 2001. The Act has been supported by the Supreme court, the Minister of Agriculture and Rural Resettlement and a majority of judges. The judges upheld the newly enacted Rural Land Occupiers (Protection from Eviction) Act (2001) and it became constitutionalised (Masiiwa, 2005).

The setting up of growth points was intended to improve development in remote rural areas as a means of reducing inequalities. The strategy was an attempt to infusesome urban components into communal areas and ensure the diffusion of spatial urban values and behaviour. In facilitating the programme, the government selected various communal places to set the growth points[22]. Some of these places include Chiendambuya and Gutu, Mpandawana. Mutenga and Namasasu (1988) argue that the growth point was a mirror to the urban center that had basic infrastructure, a variety of services and had some residential components. Another argument given in support of growth points is the notion that there is need to ensure equal development

[22]In 1982, the Government of Zimbabwe set out 52 business centres across the country with a view of them growing and becoming hubs from business growth. They would become rural small towns.

in between rural and urban areas as rural areas are perceived to be less developed and less advanced than urban areas.

Muchineripi (2020) alludes that the National Human Settlement Policy was established after a realisation that the inadequacy in human settlement planning was leading to sustainability issues. Thus, the policyprovided a platform toensure effective development and planning of settlements in a manner aligned to environmental policies, standards and laws. The policy embraces indigenous or traditional environmental management knowledge and partnership building to ensure cohesion and participation. The major contributions of the policy regarding disaster resilience in human settlements included the strengthening of spatial planning and management, social inclusion, economic development of settlements, environment and climate change considerations and the economic development of settlements.

### 3.5 Chapter Summary

The chapter sought to establish an understanding into Zimbabwe's context in regard to disaster preparedness and risk management. The chapter has revealed the country's urgent need to act and ensure that resilience strategies are put in place as climate change impacts and disasters are affecting human safety. Various legislative frameworks and statues are explored to gain an appreciation into the country's preparedness when it comes to disaster resilience. Climate change impacts and frequent disasters are affecting even agro-ecological regions and this calls for human-agentpartnerships to withstand the effects. This relates to the human agent's development model for human settlements development. Section C of this thesis is a repertoire of the articles published, accepted and proposed for publication. These papers are so arranged that the speak to the subject at hand that the researcher sought to interrogate.

# SECTION C: ARTICLES AND PUBLICATIONS

***Part A: Articles – Articulation of the Rural Disasters and Risks – A Situation Persuasion***

A1: Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems

A2: Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe

A3: Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District?

A4: Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe

***Part B: Rationale for Disaster Resilience Thinking in the Rural Sphere – Philosophy and Theory***

B1: Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements

B2: Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions

B3: Resilience Thinking in the Rural Human Settlements' Development and Management

***Part C: Instruments and Intervention Options for Rural Disaster Resilience Practice – The Praxis***

C1: Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe

C2: The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe

C3: The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: Challenges and Prospects for Doing It Right

## C.1. Introduction

This section contains the 10 articles that were produced to bring out disaster resilience thinking into the praxis of rural settlement planning, development and management. Although the focus is one Zimbabwe, the country and its cases are placed with the macrocosm of the climate and disaster processes begging for resilience thinking and practice. The articles have been presented logically to present a picture in the debate. The first article 'A1: *Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems'* is in effect a book chapter. It views settlement planning as a system happening territorial in meso-spaces of regions. A region is a space that normally has a centre (core) and a hinterland (periphery) in which processes and transactions environmental and developmental happen. Three types of regions are noted in literature exist – subnational, national or supranational. Climate happens over spans of territory and over time making it a spatial-non-spatial phenomenon. Its consequences and impacts are not normally transboundary in nature. The second article 'A2: *Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe*' is an attempt to track Zimbabwe, as a territory under scrutiny, a 'a national region' with respect to the anthropogenic-induced changes to its rural land use. It marks the year 2000 as an important date for the 'national region' as the state embarked on the fast-track land reform programme. The policy induced a number of changes to perceptions and practices in planning and managing land. Although climate-induced changes to the rural environments might have become more evident around the same time, it should not also escape the mind of a serious scholar that artificial human processes many have also contributed especially to the livelihood debate and practices felt on the ground.

The third article 'A3: *Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District?*' puts into focus one critical anthropogenic factor of human-induced conflicts into rural environments. In this paper, demonstration is made between human-wildlife conflict and human-human conflict. The so-called development by the elite is considered as a serious threat to poor households that attempt to identify with the village spaces created for them by the colonial state. As development happens, the 'living and operational space for the poor' dwindles; regional and urban planning is used as the instrument to cause and induced the desired state-led development. The article is evident of planning as anathema to the livelihoods of the vulnerable rural dwellers. Resistance and resilience almost become synonymous as the poor battle out for 'right to the rural'. To demonstrate the

discomfort in the human-wildlife imbroglio, the article 'A4: *Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe*' is a story of the wildlife (including advocates for its protection) battling for the rights on the wildlife in the rural space. A district land-use plan is suggested and even designed but the question is to what extent does it respond adequately to the needs of wild animals whose autochthony dates that of humans in the area.

With the challenges raised in the C-papers, the B-papers attempt to figure out what can be done to turn the challenges into opportunities for the making resilience work in a positive direction for the vulnerable. B1: *Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements* is an attempt to interrogate whether indicators can be put in place so that they inform local practices for informed rural spatial planning and resilience. B2: *Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions* takes this debate further towards considering what infrastructure and policies are needed. A global scan of experiences elsewhere is done since climate and related phenomenon affects various parts of the globe. The article B3: '*Resilience Thinking in the Rural Human Settlements' Development and Management*' is a persuasive paper in infusing resilience thinking in rural settlements' development and management. It wriggles out the debate that has usually taken the proclivity and bias towards urban areas. In other words, this paper is saying 'rural areas are also a cause for concern in so far as investment in resilience thinking and practice is concerned.

The last but not least section of the C-papers is about largely strategies and tools that might have been applied historically towards building rural resilience or could really be tried out, modified and dovetailed in 'enforcing resilience thinking'. The usual bias has been always to treat 'master planning' as largely a tool for urban planning. But in this case, researchers suggest various opportunities in having deliberate master and local plans hence 'C1: *Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe*'. Given the trail of disaster impacts that follow climate-induced disturbances in the form of cyclones, typhoons, storms and hurricanes, C2: '*The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe*' is a plea that strict bylaws for construction can be put in place in the country to cater for rural vicinities and environments. The last paper C3: '*The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing*

*Climate: Challenges and Prospects for Doing It Right'* is an attempt to look into one common, usually human-induced problem of wild fires. It could be linked to the changes that were introduced into rural landscapes post-2000 where the so-called colonial controls of fire outbreaks might have been thrown into the dust-bin by most rural communities. Rural dwellers no longer take it upon themselves, and as a matter of environmental stewardship, to put simple things like fire guards especially during dry seasons. Fires threaten livelihoods, built-up structures and wildlife. Yet by merely having hindsight of the already set standards for fire management the rural spaces can be better managed.

Having introduced the focus and thrust of each article, it is critical to get into the propositions, articulations, debates and nuances of each of these articles.

## A1: Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems[23]

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|---|---|
| PUBLISHED AS: | Chirisa, I. (2021). Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems. Brears, R. (ed.), *The Palgrave Encyclopedia of Urban and Regional Futures*, Springer Nature: https://doi.org/10.1007/978-330-51812-7_132-1 |

### Introduction

The gale force winds of the tropical cyclones that have inundated Southern Africa since 2000 continue to be a serious cause of concern among practitioners in the built environment. Clearly, the built environment comprising infrastructure and buildings are under threat of destruction. The destruction of infrastructure carries with it huge costs for the governments relating to the evacuation of victims at mission stations, the reconstruction and maintenance of infrastructure and housing facilities in the affected areas. Most of the mainstream studies have generally centered on informal and slum settlements considering them to be more prone to cyclonic disasters (e.g., Muller, Diab, Binedell and Hounsome, 2003; Huchzermeyer and Karam, 2006; Oldewage-Theron, Dicks and Napier, 2006; Pelling and Wisner, 2012) than rural settlements. The most recent tropical cyclones code-named 'Idai' has ravaged Malawi, Mozambique and Zimbabwe while 'Kenneth' targeted Mozambique and Tanzania. The massive devastation wrought by these cyclones has not only attracted international attention but has shifted the radars of research interest to rural areas as the most affected areas.

The study in support of this chapter is largely informed by a document review. The study employs literature, reports and newspaper articles on rural poverty, vulnerability and resilience-building strategies in Zimbabwe. The data collected during the document reviews was then presented and interpreted using thematic content analysis. The process entails grouping data in themes, like rural housing, rural construction, legislation for rural housing and resilience in rural housing in Zimbabwe. These themes will help in responding to the aim of the study.

[23] Submitted and accepted to: Brears, R.C. (ed.). *The Palgrave Encyclopedia of Urban and Regional Futures*, London, Palgrave, Springer Nature Limited.

**Background and Overview**

Disaster planning and disaster resilience have increasingly occupied the centre stage of global concern. The combined interest in disaster planning and resilience has mobilised research underpinning the creation of adaptive designs and policy frameworks to address the growing socio-economic and spatial problems. In some of the coastal areas, such as Maputo and the low-lying regions of Tete in Mozambique, flooding has become rampant (Kay *et al*. 2017). In areas prone to active earthquakes, innovative strategies regarding earthquake adaptation have become popular while in the countries prone to mud slides, similar threats are addressed accordingly (Thomas and Griffiths, 2017). Cyclones have become detrimental globally and the loss to cyclonic disasters of properties worth trillions of dollars is common (Payo *et al*. 2017). Consequently, the systematic crafting of resilient responses to cyclonic disasters in the affected rural areas has become one of the global Sustainable Development Goals (SDGs).

The need for cyclonic disaster planning targeting most rural areas in Africa seems to be long overdue as developments in these areas have generally not been guided by any form of systematic planning and are piecemeal. This is so, since spatial and economic development of most rural Africa is largely independent of the development planning for urban areas (McManus *et al.* 2012). The former colonial development policy ideals and principles traditionally segregated against the development of the African rural areas to match the development of the urban areas where the majority White population lived. This white supremist approach to development created a planning system that neglected rural planning (Muller *et al.* 2003). As such, development in rural areas is routinely incremental and haphazard.

However, since independence, in many Southern African countries, rural development planning is largely managed by central governments through decentralised local governments although most of these lower-level local authorities have invariably failed to address local needs (Sorensen, 2012). The major causes of this failure are attributed to the lack of sufficient technical and financial resources to support local development initiatives and political interference in local governance by central authorities. As such, rural development planning has not been productive while the rural constituencies have survived on handouts from politicians in exchange for their votes come election time. This kind of survival has left rural Africa depending on whatever they can get their hands on. In most cases, the rural dwellers

survive on land based economic and social activities thereby leaving them prone to climate variabilities. A report by UN (2012) indicated that most (93%) of the African rural residents survive on subsistence agriculture thereby exposing them to climate change-related food security threats. Wary of possible loss of agricultural produce due to hostile weather conditions, most rural residents have settled in flood plains that are fertile and productive despite their proneness to wash away through flooding.

In considering the demands of affordability and cultural norms, rural inhabitants in Africa are adept in deploying vernacular architecture and the readily available building material, including stones, mud, wood and grass (Sorensen, 2012) for the construction of their homes. The use of these easily accessible building materials has dominated African housing construction since the eclipse of the Stone Age when the indigenous population relocated from the cave into other forms of shelter (Pelling and Wisner, 2012). While housing is normally cheap to build in African rural areas, however, the durability of the structures in the wet weather is highly questionable. The buildings are designed to withstand the generally hot climates in most rural Africa.However, under prolonged periods of extremely wet weather and flooding conditions, the poorly constructed mud huts can easily disintegrate leading to deaths and loss of livelihoods and property. In efforts to avoid and ameliorate such calamities, the governments of Zimbabwe, South Africa, Botswana and Nigeria have mobilized funding for rural housing construction programmes (Pelling and Wisner, 2012; Scott, 2013; Murata *et al.* 2019). However, the funding for such massive investment programmes has generally been paltry.

By and large, regional planning for rural development in most Southern African countries has traditionally focused on economic development (Murata *et al*. 2019). The importance of planning for disaster resilience on the African sub-continent has increased relative to the damages wrought by cyclones, volcanic eruptions and earthquakes, among others (Devi, 2019). In most rural areas in Africa, the systematic planning of settlements common in the global North is absent. A look into rural Mozambique can explain this. Since Samora Machel's declaration of free land for all, Mozambique has followed an anarchist path of unplanned rural development (Greco, 2016). This path has exposed the country to most natural disasters, with the most recent disaster, Cyclone Idai causing the death of more than one thousand people and leaving a hundred thousand victims in need of assistance.

The ravaged country now requires $2 billion dollars to recover from the damage caused by cyclones Idai and Kenneth (Devi, 2019). The tradition of rural development planning 'villagization' in Tanzania dates back to the 1960s when Julius Nyerere conceived *ujamaa* (villagization) policy. Nyerere's *ujamaa* approach was based on the concept of modelling collectivized villages sharing commonage facilities, such as cropping fields, irrigation schemes and paddocks that would generate agglomeration economies for rural development. The main focus on economic development was embedded in settlement planning.

Rural settlement planning in Zimbabwe is closely associated with piecemeal planning. Settlement planning was segregatory in nature as it prioritized white settled areas as compared to areas where the blacks were residing. On the one hand, there exist government policies and legislation that attempt to respond to the needs of housing settlers. On the other hand, there is a wave of uncoordinated development, as the government does not have enough capacity to successfully carry out systematic rural settlement planning. Precolonial Zimbabwe had divided rural planning into two, the part that was developed for Agricultural Development Authority that was well planned and the unplanned Tribal Trust Lands where the majority African population was forced to live by the Rhodesian colonial and subsequent settlers' governments (Stoneman, 2017).

By 1978, the then Ministry of Lands, Natural Resources and Rural Development had responsibility for ARDA, TILCOR, Intensive Conservation Areas (ICAs) and the Water Authorities. This Ministry was solely responsible for rural development. During colonial settlerist era, the name of ARDA changed to Agriculture and Rural Development Authority. The new name justified the need for an integrated plan for rural development under the then Ministry of Finance. At the attainment of independence in1980, Zimbabwe saw a shift into a unitary planning system when the new Mugabe-led government embarked on the Growth with Equity Policy approach (Makumbe, 1996). A new initiative to stimulate district level planning was needed. Accordingly, a new approach - bottom-up planning - was inserted in the development planning system and enshrined in legislation. The idea was to institutionalize a planning system that allowed development plans to commence from the village and influence each level upwards to ward, district and province level (Hoddinott, 2016).

The 1990s were a decade of major spatial planning upheaval in the country. The failure of the existing development planning *modus operandi* to provide an integrated and participatory planning system that could respond to people's local needs and priorities, led to the growth of a number of new planning initiatives. Surprisingly, albeit the relevance of disaster and flood mitigation measures to physical planning, such weather calamities ever threatening the country's space economy engaged the imagination of the day's land-use practitioners.

Undoubtedly, Zimbabwe was caught in a disaster emergency planning nap when tropical Cyclone Idai drowned Maputo before sweeping through the country's eastern highlands in early May 2019. Cyclone Idai left painful memories with stakeholders in government, the research and academic fraternity, civil society and the affected communities in the devastated parts of the country. Despite forewarnings about the approaching cyclone, the following questions were asked: Why were the weather forecasts concerning the cyclone ignored? What were the long-, medium and short-term measures put in place? Who should have done what and why or why not? It is very important that any stakeholder does not end up in paralysis by analysis why they did not do what was at their disposal to help avert a disaster. Although the early warning shots were fired, no action, in terms of disaster awareness and preventative evacuations was taken resulting in communities being affected, *in situ*.

It is important that one also understands the dynamics surrounding the genesis and evolution of the Cyclone. It began in the northeastern coast of Madagascar in the Indian Ocean. A vivid description of the life of the cyclone is presented as follows:

> "The cyclone started off the eastern coast of Mozambique in early March and hit the country's coast for the first time before heading back out into the Mozambique Channel. It intensified, weakened and intensified again before hitting the Mozambique coast for the second time on 14 March. Its winds reached up to 177 km/h (106 mph) and heavy rainfall caused disastrous flooding across a number of countries in its path."[24]

Figure P.1 is portrayal of its path depicting the wind speeds and the affected areas (Rodgers, Fletcher and Bryson, 2019).

[24] Rodgers, L, G, Fletcher and M Bryson (2019a). Cyclone Idai: How the storm tore into southern Africa, *BBC*, March 22, 2019. Available online: https://www.bbc.com/news/world-africa-47638696.

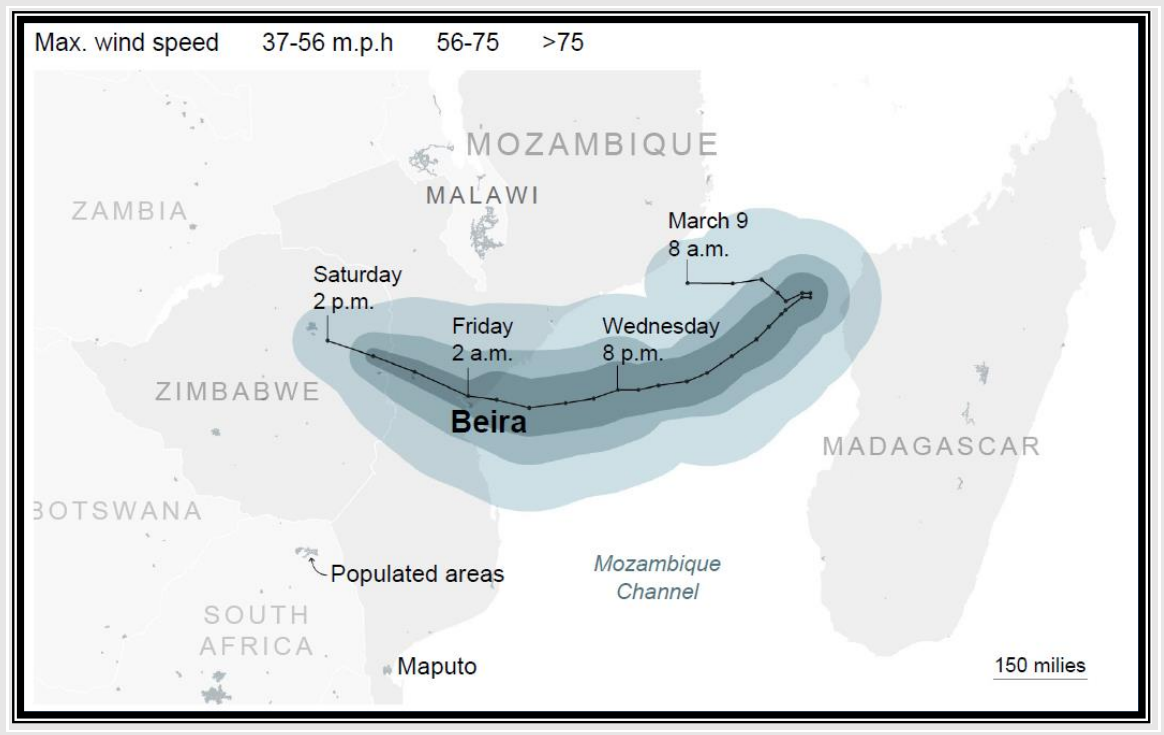


**Figure P.1: The Path of Cyclone Idai (Cai *et al*. 2019)**[25]

Overall, the intensity of the winds of Cyclone Idai grew in force leaving a trail of destruction along its path. In Zimbabwe, the areas that were most affected included Chimanimani, Chipinge, some parts of Masvingo Province and Chikomba Rural District in Mashonaland East Province. Some houses were destroyed, people lost lives (so were livestock and poultry), social infrastructure, including schools and roads and bridges were destroyed. The evidence of rocks and boulders coming to the surface in Chimanimani suggested that an earthquake might have happened before the cyclone hit[26].

## Literature Review

To understand the processes underlying planning for rural resilience and sustainable rural communities, the term 'rural' should be defined albeit there is no consensus regarding its definition (Jordan and Hargrove, 1987). This is largely because rural areas differ from place to place and over time. The definition of 'rural' is based on population sizes, activities in the area and economic development, among other conceptualisations (Flora, 2018). The Organisation

[25] Cai W, A Mccann and J. K. Patel (March 21, 2019). Mozambique's Cyclone: Mapping the Destruction of Idai. *New York Times*. Available online: https://www.nytimes.com/interactive/2019/03/19/world/africa/mozambique-cyclone-idai-maps.html
[26] Mugabe, T (2019). 'Earthquake hit before Cyclone Idai'. *Herald, The* April, 10, 2019. Available online: https://www.herald.co.zw/earthquake-hit-before-cyclone-idai/

for Economic Co-operation and Development (OECD) defines 'rural' as a community with a threshold population of 150 or less people per square kilometer. A further look into literature suggests that the definitions of 'rural' are rather complex leading to (Cobbett, 2016) defining 'rural' simply as "what is not urban." Clearly, defining rural makes it easy to understand what the rural development plans are meant to address and how they are designed (Shadish *et al*. 2002: 65).

Rural areas are largely associated with widespread poverty, climate change, natural resource degradation, conflict, weak institutions and poor agricultural conditions (Marsden, 2009). Rural poverty is a driver of a host of social problems, including hunger and malnutrition, poor working conditions and exploitation of children (Mayer *et al.* 2005). In addition, rural communities are particularly vulnerable to climate change, due to their dependence on rain-fed agriculture (Asian Development Bank, 2014). Vulnerability as a concept is largely associated with the level of exposure to certain threats, with relation to response capacity and the consequences faced due to decline of well-being after the exposition (Crea *et al*. 2013). The level of vulnerability of a group is largely linked to the capacity of the rural community in responding to an external situation (Hunter, 2007).

There exist other definitions of the concept of vulnerability in the literature. This situation if tallied with marginalisation of the disadvantaged rural communities can lead to devastating situation (Marsden, 2009). The disadvantages of rural communities can be a situation relating to the following cases, inequality in rights and entitlement-in most cases, while rural land has insecure tenure generally. Most rural areas in Zimbabwe lack proper infrastructure, such as water and electricity. It is acknowledged that poor infrastructure is a critical barrier to accelerating growth and poverty reduction, especially in Zimbabwe (AfDB 2011).

Having understood the risk and the vulnerabilities associated with rural communities, it becomes apparent that some communities are more vulnerable than others (McManus *et al*. 2012). In the context of this study risk is defined as to uncertainty about and severity of the events and consequences (or outcomes) of an activity with respect to something valued by humans (Aven and Renn, 2009). This imply that they lack the resilience capacity to cope, react, resist, anticipate and recover from various external factors that communities are exposed to (Frankllin *et al*. 2011). The living conditions of these vulnerable groups can be enhanced

through government interventions and policies (Glove, 2012). Efforts to build resilience can be done through formal and informal ways. Some of these ways include adaptation, reduction, sharing or transfer mechanism (insurances), avoidance, retention and preparedness, among others.

The International Labor Organisation (ILO) has looked into increasing rural resilience to deal with rural poverty (Brown *et al*. 2011). Rural resilience is done in the context of providing decent employment in what is called the Decent Work Agenda (Scott, 2013). The Decent Work Agenda was aimed at increasing the voice of rural people through organisation of communities and promotion of rights, standards and social dialogue. It also wanted to promote an employment based rural development model through diversified livelihoods, sustainable enterprises and better integration in value chains. Provision of social protection floors was also another core objective of the Decent Work Agenda as it guaranteed minimum income and access to basic services in rural economies that were often vulnerable to external shocks.

The vulnerabilities of rural communities are assessed by the ILO as being driven by factors, like lack of access to services or markets, the global financial crisis, fragile settings characterized by food insecurity and environmental stress (Schwarz *et al*. 2011). These factors are often worsened by unsustainable livelihood approaches (Cox and Hamlen, 2015).

Dealing with extreme vulnerabilities, such as poverty, is on the global agenda through Sustainable Development Goal 3. The sustainable development goal is aimed at eradicating extreme poverty that is largely a result of environmental stress on various vulnerabilities in most rural and urban areas. The literature reveals the gap where the settlement-based rural development approach is left out. Most settlement-based planning approaches are inclined towards urban settlement planning, unlike the rural counterparts.

**Results and Analysis**

Rural housing is one of the major components that affect rural resilience. From the study, it was noted that rural housing in Zimbabwe have insecurity of tenure and the houses are being constructed using poor quality building materials. This section looks into the current situation

in Zimbabwe with regards to rural settlement planning andrural housing construction and management.

It has emerged from the study that most rural houses have not been built to standard to allow them to withstand wind and related pressures. Most rural houses are sited haphazardly and in environmentally sensitive areas. Building on environmentally sensitive areas has become rampant to the extent that wetlands invasion has become a common practice. In rural areas, settling in grazing lands has become also a common practice. Although, the fast-track land resettlement program (FTLRP) was conducted in the spirit of decongesting the communal rural areas, fresh problems are observed in both the sending and receiving areas. Some vacated areas as a result of fast-track land resettlement program (FTLRP) have become so 'deserted' that the vegetation has brought about new problems, including threats to wildlife. In the areas where people were settled to (receiving areas), infrastructure deficits accompanied by threshold capacities are rampant. Apart from that, in A1 farms, that are usually on average six hectares (6 ha) in size, for example, the increasing household formations pose serious threats to homesteads' creation. The farm, in no time, becomes littered with so many built structures compromising space for farming. The farming area is overcrowding and requires attention to reduce land degradation.

Rural settlement planning in Zimbabwe is in a piecemeal state. This means that there is no orthodox way of developing plans or rural expansion, rather than a series of incremental land allocations (Dent *et al*. 2013). Inadequate resources, both financial and technical, havecontributed to poor resettlement planning. Currently, the local chiefs and local headmen do most rural planning. These people allocate land to the villagers to construct their homes, based on tradition and the availability of developable land. Rural communities grow incrementally. The absence of concrete planning framework for rural settlements has left some rural dwellers being located in dangerous locations, like waterways, mountain edges, among others, for human settlements.

Lack of planning in Zimbabwe can also be understood by looking at the existing tenure systems in managing rural settlements in Zimbabwe. Rural land in Zimbabwe is largely classified into seven main tenure systems that include, large-scale commercial farming land, small-scale commercial farming land, communal areas, resettlement areas, government estates, forest areas

and wildlife areas (Wekwete, 1989). The most common tenure system in most of Zimbabwe's rural areas is the communal tenure (86% of rural dwellers). The land, that is under the communal land, is governed by the Communal Lands Act (Chapter 20:04). This Act stipulates that the only kind of land rights that the occupier has are "use rights" and cannot be sold but it can be hereditarily transferred. Since planning is affected by legislation, it indicates that most rural spaces in Zimbabwe are just land banks that are waiting for the arrival of urban areas and be converted into council land or state land for urban development. This can be used to explain why rural settlement planning is still under-developed in Zimbabwe.

**Rural Housing Construction in Zimbabwe**

Rural housing construction in Zimbabwe is normally done by the owners (Zami, 2015). The housing construction process is done without any proper design of the house; the builder just uses their experience from the past housing projects done. The housing is also constructed based on the resources of the owner. As such, in rural Zimbabwe, there exists a vast range of housing types constructed using material ranging from pole and mud to modern houses (Dube et al. 2018). The diverse types of rural houses in Zimbabwe manifest the absence of any form of regulations in housing construction. This places all the poor rural dwellers to be atthemost vulnerable position in case of disaster outbreak.

Under the central government framework, there is no single or leading coordinating agency for rural development and planning. There is a Cabinet Committee on Rural Development, but it has a very broad remit and seems to act to sort out problems between potentially competing ministries (Dube et al. 2018). By the nature of their remits the Ministry of Local Government Public Works and National Housing (MLGPNH) and the Ministry of Rural Resources and Water Development (MRRWD), have overarching roles. The MLGPNH co-ordinates and guides local government and supports capacity building for the rural district councils (RDCs).

The Ministry of Local Government Public Works and National Housing (MLGPNH) houses the Department of Physical Planning (DPP). The Ministry of Rural Resources and Water Development (MRRWD) was created in 1997 and has important implementation powers in rural areas through the District Development Fund (DDF) (Mashizha and Mapuva, 2018). The Rural District Councils play a pivotal role in Rural Housing and Legislation in Zimbabwe. These are supposed to manage rural development and constructions. However, there is no

harmony amongst the acts that regulates rural development. For example, Roads and Traffic Act (13:11) provides a guideline on how rural dwellers can develop their dwellings from major roads, but the stipulations of building codes for rural dwellings is silent.

A Traditional Leaders Act (TLA) (Chapter 29: 17) was passed in 1998, that sought to make the old Ward and Village Development Committees (WADCOs and VIDCOs) elected committees of new structures - Ward Village Assemblies. The functions of the VIDCO remained as described in the Rural District Councils Act and those of the WADCO, previously undefined, were set out in the newTLA. However, the provisions of theTLA had not been implemented by November 2000 due to a lack of resources. The traditional leaders continue to operate in the context of a village court without much influence in rural housing planning and the rural settlement development. The traditional leaders also allocate land without any orthodox guideline but based on the opinion or request of the leader and the villager respectively.

Having looked at the housing design, construction and settlement planning and tenure systems in rural Zimbabwe, the question is: How resilient are rural housing communities in Zimbabwe (cf. Siwawa, 2018)? A lack of rural planning systems that are efficient has reduced rural resilience in Zimbabwean settlements. A recent example is the case of Cyclone Idai. The cyclone hit Zimbabwe's Masvingo and Manicaland province leaving most rural dwellers vulnerable. Plate P.4 are images of rural housing that was exposed to Cyclone Idai (UNICEF, 2019).

**Plate P.3: Pictures of Destroyed Structures by Cyclone Idai (UNICEF, 2019)**

The evidence from the images shows some huts that were destroyed in Manicaland and Masvingo Provinces of Zimbabwe. Most of these rural housing structures are made of pole, bricks and muddy that are not durable in times of disaster occurrence. As depicted from the images rural dwellings are vulnerable to disasters due to poor structures, that cannot succumb the ravages of Cyclones e.g., Cyclone Idai.

**Discussion**

There is no clear, coordinated national rural settlement planning policy for Zimbabwe. While there are several different policy strands, that can be said to influence rural development, these have not resulted in an overall integrated and holistic rural development strategy. This has resulted in a sector-led approach to rural development that has led to gaps and overlaps in activities. The lack of a coordinated rural development strategy has also led to an ad hoc action on the ground that affects communities as spelt out bygender and age disability. This points to the the imperative needs for including the socio-class dynamics in the spatial developmentpolicy of rural areas. The lack of a long-term vision for Zimbabwe led to the launch of the Vision 2020 process in 1996. Following a number of consultative exercises, a broad national vision was agreed. This placed a heavy emphasis on industrialising the economy of Zimbabwe along the route of endogenous development. But the vision has still not been realized albeit its far-reaching implications for a long-term development investment in the country's rural areas. Admittedly, the current planning approaches to rural development are disjointed. As a case in point, the existing planning legislation is silent on the design of rural settlements except for the services in rural areas as provided for in the Town and Regional Planning Act of 1996. The present situation implies that rural housing development is largely determined by one's own income. Given the dominant tenure systems in the communal lands of Zimbabwe, it is unprofitable for rich people to develop houses on land with no entitlement to ownership. Thus, most housing construction materials in rural areas are not durable and they are easily destroyed in case of disasters occurrence.

**Conclusions and Policy Options**

In conclusion, clearly the planning for resilient rural settlements in Zimbabwe is still at a nascent stage if not poorly understood. The existing planning legislation does guide proper

housing development in rural communities saving for the controlled rural service centers where standardized developments have long taken shape. The anti-urban policy bias practices that are traditional in most independent Africa seem to have conspired against the charting of planning legislation for housing and settlement planning in rural Zimbabwe. The urban policy bias continues to expose rural settlement planning to unforeseeable weather calamities as evidenced by the widespread damage that followed Cyclone Idai in recent times. The massive loss and damage of the ill-sited social infrastructure and housing in the affected areas of Chipinge, Chimanimani and parts of Masvingo Province serve as wake-up call for the introduction and the need to comply with rural housing construction and related infrastructure planning standards. Compliance with these planning standards and land-use regulations will help with guaranteeing the sustainable layout, enviornmental amenity and safety regarding the place-specific characteristics of the different rural settlements over time and space. By extension, these planning standards will determine the kind of designs and materials appropriate for region-wide housing construction programmes.

**References**


Brown, D.L and Schafft, K.A, 2011. *Rural people and communities in the 21st century*: Resilience and transformation. Polity.

Cobbett, W, 2016. *Rural Rides*. Read Books Ltd.

Cox, R.S and Hamlen, M, 2015. Community disaster resilience and the rural resilience index. *American Behavioral Scientist*, 59(2). 220-237.

Crea, T.M, Lombe, M, Robertson, L.A, Dumba, L, Mushati, P, Makoni, J.C, Mavise, G, Eaton, J.W, Munatsi, B, Nyamukapa, C.A and Gregson, S, 2013. Asset ownership among households caring for orphans and vulnerable children in rural Zimbabwe: The influence of ownership on children's health and social vulnerabilities. *Aids Care*, 25(1). 126-132.

Dent, D, Dubois, O and Dalal-Clayton, B, 2013. *Rural planning in developing countries: supporting natural resource management and sustainable livelihoods*. London: Routledge.

Devi, S, 2019. Cyclone Idai: 1 month later, devastation persists. *The Lancet*, 393(10181), 1585.

Dube, E, Mtapuri, O and Matunhu, J, 2018. Flooding and poverty: Two interrelated social problems impacting rural development in Tsholotsho district of Matabeleland North province in Zimbabwe. Jàmbá: Journal of Disaster Risk *Studies*, 10(1). 1-7.

Flora, C.B, 2018. *Rural communities: Legacy+ change*. London: Routledge.

Franklin, A, Newton, J and McEntee, J.C, 2011. Moving beyond the alternative: sustainable communities, rural resilience and the mainstreaming of local food. *Local Environment*, 16(8). 771-788.

Glover, J, 2012. Rural resilience through continued learning and innovation. *Local Economy*, 27(4). 355-372.

Greco, E, 2016. Village land politics and the legacy of Ujamaa. *Review of African Political Economy*, 43(sup1). 22-40.

Hoddinott, J, 2006. Shocks and their consequences across and within households in rural Zimbabwe. The Journal of Development Studies, 42(2). 301-321.

Huchzermeyer, M and Karam, A. eds. 2006. *Informal Settlements: A Perpetual Challenge*? Cape Town: Juta and Company Ltd.

Hunter, L.M, 2007. *Climate change, rural vulnerabilities and migration*. Population Reference Bureau.

Kay, R and Alder, J, 2017. Coastal planning and *management*. London: CRC Press.

Makumbe, J.M, 1996. *Participatory Development: The Case of Zimbabwe*. Harare: University of Zimbabwe.

Bornstein, E, 2004. *The spirit of development: Protestant NGOs, morality and economics in Zimbabwe*. London: Routledge.

Marsden, T, 2009. Mobilities, vulnerabilities and sustainabilities: exploring pathways from denial to sustainable rural development. *Sociologia Ruralis*, 49(2). 113-131.

Mashizha, T.M and Mapuva, J, 2018. The colonial legislation, current state of rural areas in Zimbabwe and remedial measures taken to promote rural development. *Journal of Asian and African Social Science and Humanities*, 4(3). 22-35.

Mavhura, E, 2017. Applying a systems-thinking approach to community resilience analysis using rural livelihoods: The case of Muzarabani district, Zimbabwe. *International Journal of Disaster Risk Reduction*, 25. 248-258.

Mayer, M.L, Slifkin, R.T and Skinner, A.C, 2005. The effects of rural residence and other social vulnerabilities on subjective measures of unmet need. *Medical Care Research and Review*, 62(5). 617-628.

McManus, P, Walmsley, J, Argent, N, Baum, S, Bourke, L, Martin, J, Pritchard, B and Sorensen, T, 2012. Rural Community and Rural Resilience: What is important to farmers in keeping their country towns alive? *Journal of Rural Studies*, 28(1). 20-29.

Muller, E, Diab, R.D, Binedell, M and Hounsome, R, 2003. Health risk assessment of kerosene usage in an informal settlement in Durban, South Africa. *Atmospheric Environment*, 37(15). 2015-2022.

Murata, C, Mantel, S, De Wet, C and Palmer, A.R, 2019. Lay Knowledge of Ecosystem Services in Rural Eastern Cape Province, South Africa: Implications for Intervention Program Planning. *Water Economics and Policy*, 5(02). 1-29.

Oldewage-Theron, W.H, Dicks, E.G and Napier, C.E, 2006. Poverty, household food insecurity and nutrition: coping strategies in an informal settlement in the Vaal Triangle, South Africa. *Public Health*, 120(9). 795-804.

Payo Garcia, A, Wood, B, Kessler, H, Lee, J, Burke, H, Barkwith, A, Pennington, C, Hobbs, P, Rees, J, Ellis, M and Gatliff, R, 2017. Trimingham Erosion Project: can next decades coastal erosion rates be more accurately assessed.

Pelling, M and Wisner, B, 2012. *Disaster Risk Reduction: Cases from Urban Africa*. London: Routledge.

Schwarz, A.M, Béné, C, Bennett, G, Boso, D, Hilly, Z, Paul, C, Posala, R, Sibiti, S and Andrew, N, 2011. Vulnerability and resilience of remote rural communities to shocks and global changes: Empirical analysis from Solomon Islands. *Global Environmental Change*, 21(3). 1128-1140.

Scott, M, 2013. Resilience: a conceptual lens for rural studies. *Geography Compass*, 7(9). 597-610.

Siwawa, V, 2018. The implementation of site and service schemes in a depressed economy. The case study of Beitbridge, Zimbabwe (Doctoral dissertation).

Stoneman, C, 2017. *Land reform in Zimbabwe: Constraints and prospects*. London: Routledge.

Thomas, R.G and Griffiths, J.S, 2017. An overview of the main landslide field sites in the 9th ICFL. In: *Landslides* (pp. 3-13). London: Routledge.

Wekwete, K.H, 1989. Physical planning in Zimbabwe: A Review of the legislative, administrative and operational framework. *Third World Planning Review*, 11(1), 49-61.

Zami, M.S, 2015. Drivers and their Relationship with Inhibitors Influencing the Adoption of Stabilized Earth Construction to Alleviate Urban Housing Crisis in Zimbabwe. In: *Key Engineering Materials*, 632. 119-144

## A2: Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe[27]

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### Introduction

Zimbabwe has experienced remarkable evolutionary processes concerning rural land-use and livelihoods. The Fast Track Land Reform Programme (FTLRP) of the early 2000s is unique for the speed in executing the programme (James 2015). Such programmes are purported to be poverty reduction strategies for 'ordinary' Zimbabweans. Land reform programmes were assumed to cushion rural populations from natural disasters through the improved livelihoods that would inherently accompany the FTLRP. Unfortunately, the envisaged benefits of the land reform programme were distorted by climate change and economic meltdown post 2000 (ZIMVAC, 2010, 2011, 2013; Zvinorova et al. 2013).

Despite these environmental and economic adversities, it is argued that the Zimbabwean rural populations are resilient. Unlike typical descriptions of simple agrarian livelihoods, this chapter contends that Zimbabwean rural livelihoods are complex and diverse influenced by household capabilities, local environmental characteristicsand national socio-economic conditions (Maphosa, 2005; Mano, 2007). Mutami and Chazovachii (2012) observe that the risks to livelihoods viability are compounded by the failure of macro-economic policies implemented in rural areas together with environmental disruptions due to climatic changes. World Bank (2019: 6) observes that "With climatic variability increasing, natural disasters are likely to occur more frequently and have the potential to hit the most vulnerable parts of the population, the poor, in a disproportionate way due to their hazard exposure and relatively weak coping mechanisms."

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This chapter explores the sustainability of the complex livelihood strategies employed by the rural populations in Zimbabwe. Using archival data and case studies, the chapter examines the concepts and realities of the interface of climate change and urbanisation. The research employed a desk-top review of published documents and governmental papers. The chapter then engages three case studies of rural districts in Zimbabwe – Chipinge in Manicaland, Nkayi in Matabeleland North and Gokwe in Midlands.

**Conceptual Framework**

Livelihoods comprise various ways of making a living to meet individual and household needs (Chambers and Conway, 1992) within a broader context of economic development and well-being, including freedom, autonomy and empowerment. Rural livelihoods are dynamic as captured in the Sustainable Livelihoods Framework (SLF) (Thennakoon, 2004). This approach considers the combination of assets and activities to do with threats and avert disasters (Mutami and Chazovachii, 2012). Assets are a crucial element of the SLF that enables rural populations to survive using their innate skills (Moser, 1998).

The SLF considers five forms of capital assets (natural, physical, human, social and financial) as essential resources facilitating livelihood strategies (Thennakoon, 2004). Such coping or adaptive measures can include intensifying or extending agriculture, livelihood diversification and migration. Livelihood diversification (on or off-farm) pertains to activities undertaken to reduce vulnerability arising from dependence on one activity for survival and welfare (Scoones, 2000). Thus, the SLF views vulnerability as a push factor towards invention and adoption of better means of attaining the wellbeing of people through the reduction of insecurity and uncertainties (Chambers, 1997; Scoones, 2000). A sustainable livelihood can cope with, and recover from both environmental and economic stress and shocks in such a way that it provides opportunities even for the next generation (see Figure P.2).

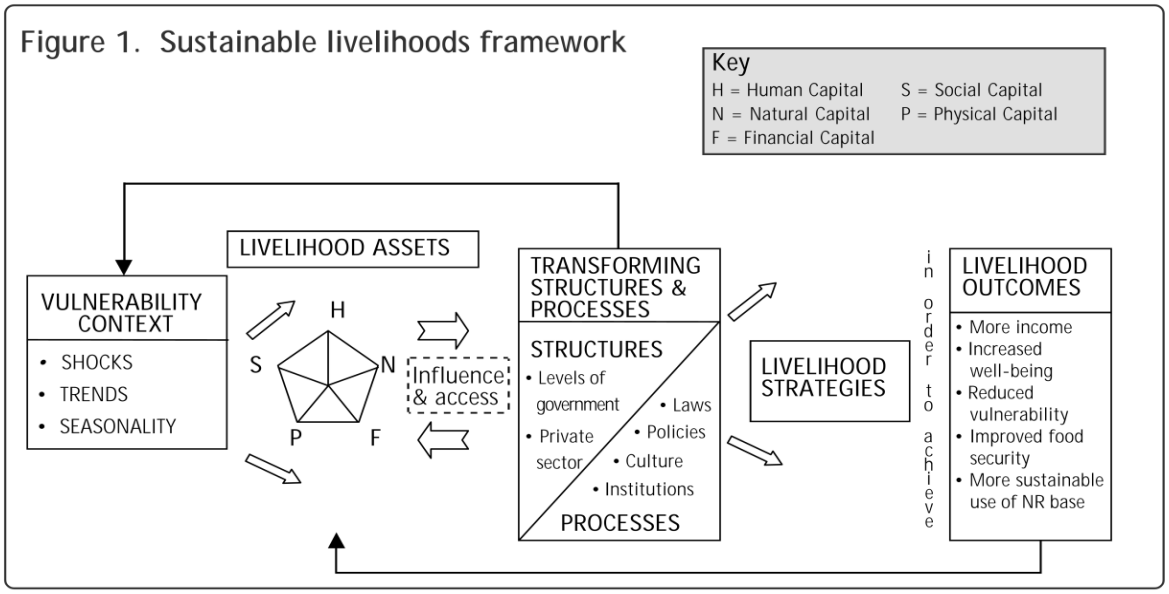


**Figure P.2: The Sustainable Livelihoods Framework** (DFID, 1999: 23)

## Literature Review

Livelihood resilience highlights the role of human agency and the collective capacity to respond to stressors (Chitongo and Casadevall, 2019). Governmental institutions regulating the rural environment are key for enhancing livelihoods and sustainability as they provide resources to develop the essential coping strategies. Public-private partnerships and the pooling of resources among the stakeholders are thus, present in most resilient rural areas.

Local economic development (LED) strategies can encourage rural livelihood resilience. LED is a participatory development process encouraging partnerships between the private and public stakeholders to promote socio-economic development (ILO, 2012). Strong private sector involvement in local issues can generate employment and transfer essential skills. Hence, LED decentralises development, emphasising local socio-economic development. In Indonesia, the government partnered with the ILO to facilitate decent jobs for the rural people of East Java. A programme "Job Opportunities for Young women and men", implemented from 2007-2010 developedthe resilience of beneficiaries. It focussed on sustainable enterprise development, employment-intensive investment programmes, skills development and financial access and led to a bio-gas initiative. This endeavour addressed fuel price hikes that negatively impacted on the livelihoods of the self-employed, traders and landless farmers (ILO, 2012). Therefore,

outsourcing is a viable option for governments lacking the resources or capacity to assist local communities.

Humanitarian assistance as part of government policies is an important input and a transformative force in sustainable livelihoods. Nonetheless, for effective humanitarian assistance, accountability, transparency and shared ownership of aid programmes among the government, donor agencies and the rural populationsas required by the Paris Declaration is needed. People in the remote districts of Ramanathapuram and Thuthicorin in India were left vulnerable to poverty after the 2004 devastating tsunami. The non-governmental organisation (NGO), Terre des Hommes Suisse, partnered with People's Action for Development to provide livelihood support within these two districts (Terre des Hommes, 2007). This partnership concentrated on fishing micro-entrepreneurship initiatives and reinforcing existing community self-help groups (SHG). The enterprises included fishermen and women assuming post-fishing activities, such as processing, drying and selling and, with the support of microcredit facilities from the donors, the SHGs embarked on other micro enterprises (Terre des Hommes, 2007). These enterprises demonstrate economic empowerment, diversity and sustainability of livelihoods. Consequently, humanitarian assistance may enable resilient and sustainable livelihoods if sufficient institutions are enabled to monitor the fungibility of donor funds.

Agriculture is fundamental to rural livelihoods in Sub-Saharan Africa and a key driver of economic development in Africa (WFP, 2015). The colonial era in Africa bequeathed a dual economy where the agricultural economy was a buffer for the industrial economy and vice versa (Maxwell, 1988; Mander, 1998; Khan, 2004; McSweeny, 2004). These backwards and forward linkages are reflected in the apportionment of land. As such, access to land improves food security and reduces poverty, creating sustainable livelihoods (World Bank (2008:2-3). However, most African governments fall short in the equitable distribution of the resources needed for the realisation of sustainable livelihoods. Corruption and partisanship are so rampant in Africa negating efforts to improve livelihoods (Chirisa and Nel, 2021).

One livelihood strategy that is common in Africa is artisanal small-scale mining (ASM). ASM refers to low-tech, labour-intensive mineral extraction and processing (Hilson and McQuilken (2014). Mining is a resilient livelihood strategy during environmental and economic shocks in rural areas (Karaki, 2018). ASM involves around 10 to 15 million gold miners worldwide,

including 4.5 million women and 600,000 children. ASM contributes to the livelihood of about 200,000 mining household in the Eastern provinces of Democratic Republic of the Congo (DRC) (Karaki 2018). Most African governments, however, relegate local communities in support of large-scale mining and this has often led to mining-induced displacements and subsequent conflicts and disruption of rural livelihoods (World Bank, 2019).

The local communities perceive ASM as an easier way to generate a higher income than agriculture (Mkodzongi and Spiegel 2019). It is contended that ASM and agricultural activities are often inseparable, citing that in Mozambique, ASM income was used to purchase agricultural inputs. In Ghana mining earnings provide start-up capital for small business growth and agricultural expansion (Wilson et al. 2015). These examples reveal the complexity of African rural livelihoods.

**The Impact of the Triple Challenges of Climate Change, Economic Stress and Urbanisation**

Global climate change is a force behind the increase of incidences of natural hazards, including the variability of rainfall, temperature and occurrences of climatic shocks (Chitongo and Casadevall, 2019). In this regard, climate-related issues and farmers' livelihood strategies are different the world over (Ellis, 2000). This way, over-generalisation tendencies are excluded when it comes to the issues of climate change and their impact to rural livelihoods.

There is a causal relationship between climate change and water-related disasters (WRDs). Liua *et al.* (2012) observe that WRDs increase with changes in temperature, precipitation and other climate variables. In this regard, the direct impacts of climate change on rural livelihoods increase risks and uncertainties from negative shocks, such as intermittent rainfalls and unpredictable weather patterns (Ellis, 2000; Henderson, 2004). As such, high temperatures and lower than anticipated precipitation results in drought which leads to famines and deaths. Meanwhile, the loss of vegetation due to overgrazing, deforestation and droughts increases the risk of landslides and the probability of downstream flood disasters. Floods in vulnerable communities may result in an increase of water-borne diseases, such as cholera (Lieu *et al.* 2012; UNICEF, 2018). There is need for close monitoring of urbanisation factors that lead to emigration and enhance sustainable livelihoods through an integration of urban and rural development planning (Dube and Chirisa, 2012).

Climate change has compounded upon an already fragile livelihood situation in most parts of rural Sub-Saharan Africa. It was estimated that by 2020 between 75 and 250 million people would likely be exposed to increased water stress and that rain-fed agricultural yields could reduce by 50% if practices remain unchanged in some African countries (Angelsen and Wunder, 2003; Bryceson, 2004, 2009; Carswell, 2002; Dold and Cocks, 2002; Bilal, 2017).

The key population most vulnerable to climate change and its impact are women and young people. FAO (2011) puts forward that about 65% of the active West African and Sahelian population eke out their living from the agricultural sector increasing their vulnerability to climate hazards and ensuing disasters in ill-managed environments. The agricultural activities in the region are mainly rain-fed subsistence farming and extensive livestock husbandry. It is evident that climate change will result in the reduction of the quantity and quality of pastures in this region, resulting in new forms of transhumance in the sub-region, thus increasing the risk of weakening of livestock and the spread of animal diseases and the risk of territorial conflicts among the local farmers (FAO, 2011).In this regard, the two-pronged vicious cycles of poverty and climate change are proven and the call for developmental interventions to enhance sustainable livelihoods among the vulnerable populations in this region.

The hazard occurrence trend in the SADC region is on the rise. UNECA (2015) reveals that between 1900 and 2013, the occurrence of hydro-meteorological hazards had increasing frequency owing to climate change. The frequency of biological hazards that was on the increase during the same period may also be explained by the increased occurrences of environmental disasters, such as floods and cyclones, whose frequency owed to climate change. The biological hazards in this region are compounded by urbanisation and unplanned sprawling of urban areas. UNECA (2015) observes that, in the SADC region, the top five countries vulnerable to disasters are Mozambique, Madagascar, Zimbabwe, the United Republic of Tanzania and Malawi, whereby Mozambique has the lowest adaptive capacity, while Zimbabwe has the lowest coping capacity.

The common hydro-meteorological hazards in the SADC region are droughts, floods and tropical cyclones. Of all the environmental hazards, drought is the most common one in the region. However, to “the credit of SADC member States, while droughts tend to trigger food

insecurity due to reductions in sub-regional food production, these droughts have not led to famine, suggesting some level of resilience" (UNECA, 2015:9). On the other hand, the vulnerability of the SADC member states to flooding are a result of the following: "…community exposure to rivers, especially river confluences, terrain configuration and building types" (UNECA, 2015:9). Such factors are related to housing stewardship in both rural and urban areas in the region. Overpopulation may result in the relinquishing of land rights from traditional custodians whereby the latter may succumb to the influence of land-barons, resulting in resettlement in wetlands. Concerning tropical cyclones, the SADC region is vulnerable by nature due to its proximity to the Indian Ocean where the tropical cyclones build from. It is of concern to note that "Vulnerability to disasters and poverty are intricately linked in SADC" (UNECA, 2015: 15). As such, it is suggested that economic hardships that describe most of the SADC member countries are a hindrance to disaster risk reduction progress in the SADC region. Resources are channelled towards superficial poverty reduction, discounting the root causes of such poverty prevalence as valorised by the impact of natural disasters.

**Rural Development and Practice in Zimbabwe since 2000**

The land issue has always been contentious in Zimbabwe. Cliffe et al. (2011:907) observe that the debate on the FLRP is 'highly polarised… between welcoming a reversal of a racial distribution of land - some of them bewailing the manner of implementation and its distorting of the state - and those who condemn the end, in principle and the means'. Such a myriad of views in the motives and processes of the land reform programme has resulted in different perspectives on whether the land redistribution programme had been a success or a failure. Moyo et al. (2009: 174) point out that "there is scant evidence to support most of the commonly held assertions regarding the outcome of the fast-track land reform process". This perspective is stressed by Scoones *et al.* (2010:236) who reveal that "the reality on the ground often does not match the myths perpetuated in many quarters". In this regard, the success or failure of the FLRP may not be comparatively ascertained since there are no established standards for comparison.

The land tenure for the beneficiaries of the FLRP was one set-back for the poor Zimbabweans. The "ordinary" farmers could not access lines of credit or loan from any financial institution for lack of collateral – their land ownership rights were unclear as they had only Offer Letters to show for it. In a bid to address the security of tenure the governmentintroduced the 99-Year

Lease, to formalise occupancy of re-distributed farms to beneficiaries who would have paid lease rentals. However, the issuance of these leases slows down enhancing the livelihood of the new farmers as farm valuations need to be carried out before issuance (Cusworth, 1990; Chimhowu *et al.* 2011; Homann-KeeTui *et al.* 2013; Jombo, 2016).

The productivity of the FLRP is hindered by lack of inputs, among other issues. With regards to the production of maize, "Zimbabwe's smallholders have had to deal with hyperinflation, recurring drought, shortages of all agricultural inputs, lack of credit and limited public investment in agriculture…" (James, 2015:100). The government devised a facility to overcome such economic constraints through a Special Agriculture Production Programme popularly coined "Command Agriculture", that is a partnership of the government and the private sector to facilitate agricultural inputs for the beneficiaries of the FLRP. However, such initiatives are marred by corruption.

The Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset) was an economic blue-print for Zimbabwe from 2013-2018. This Results-Based Agenda was built around four strategic clusters: "food security and nutrition; social services and poverty eradication, infrastructure and utilities and, value addition and beneficiation". As such, agriculture was to be among the key strategic drivers for the blue-print. For rural development, ZimAsset had the following package: The Presidential Agricultural Input Support Scheme; and recapitalizing and capacitating AgriBank and the Grain Marketing Board (GMB), the Agricultural Marketing Authority. The main thrust of the Plan was to ensure that the Presidential Input Support Scheme focused on supporting the vulnerable groups at household and community level and ensuring that other farmers timeously accessed affordable inputs. Moreover, the economic blue-print paved way for the governmental promotion of contract farming initiatives.

The clusters for the economic blue-print included "infrastructure and utilities" and focused on the rehabilitation of infrastructural assets and the recovery of utility services in Zimbabwe (Kinsey, 1999; PLRC, 2003 Tevera, 2008; TIMB, 2014). In the rural areas, the emphasis was on water and sanitation infrastructure and the construction of dams and conveyance systems were realised, as exemplified by the construction of Tokwe-Mukosi Dam in Masvingo Province and the Gwayi-Tshangani Dam in Matebeleland North Province. Access to clean water was

improved through the rehabilitation of broken-down pumps and drilling of new boreholes in most parts of rural Zimbabwe.

The other key result areas in the infrastructure and utilities cluster of ZimAsset was the construction and maintenance of government buildings and transport infrastructure and development. These key areas envisioned the construction of government buildings, such as Hwedza district composite office and Mutoko and Siyakobvu district composite offices. In addition, district registries were to be constructed in Hwedza, Goromonzi, Guruve and Nkayi districts. On the other hand, concerning the transport sector, the blue-print envisioned "improved road-networks". Some roads were expected to be constructed while others were to be dualised, rehabilitated, or resealed. For example, the following roads were rehabilitated: Nyazura-Dorowa (50km); Golden Valley-Sanyati (100km); and Gokwe-Siabuwa (100km). Such investment on road-networks enhanced the development of rural areas in Zimbabwe as they eased accessibility and linkage between rural areas and urban areas.

Zimbabwe is agro-based with around 85% of its 390,757 square kilometres being agricultural land (ILO, 2012). Prior to 2000, the agricultural sector contributed to about 40% of Zimbabwe's gross national product. However, since the inception of the land redistribution programme, the contribution of the agricultural sector to the national economy is reduced. For example, the GDP growth rate was estimated to be less than3% in the period 2014-2017, whereby the agricultural sector contributed only about 12.5% (CIA World Factbook, October 2018). The reduced performance of the agricultural sector, that had an adverse effect on the whole economy, could be explained by many factors, chief among them being the following: economic distress and climate change.

The downfall of the Zimbabwean economy may be traced back to the late 1990s whereby the government of the day engaged in appeasement policies, such as the unbudgeted payment of gratuities to war veterans of the liberation struggle. Subsequently, socio-economic indicators, such as poverty prevalence, unemployment rate and human development indices reflect that sustainable socio-economic development is yet to be reached (Moyo, 2002; Parliament of Zimbabwe, 2003; Matsa and Muringaniza, 2011; Zamchiya, 2013; Zembe *et al.* 2014).

The impact of climate change is mostly tackled at national level as stressed by the adoption of the 2014 National Climate Change Response Strategy in response to the challenges posed by climate and the need for adaptation and mitigation strategies. By and large, the effect of climate change is felt in the disruption of agricultural activities. For example, it is projected that the cereal production is forecast to be 24% lower on an annual basis in the 2018/2019 growing season owing to climate change. The climate change exacerbated the hardships brought on by corruption and poorly planned policies and policy inconsistencies. In 2017 Zimbabwe ranked 157 out of 180 on Transparency International's Corruptions Perceptions Index (Transparency International, 21 February 2018).

Regional livelihoods mapping defines Gokwe under Zone 6, that is described as a "Cereal and High Cotton Communal Zone", (ZimVAC, 2010). Musevenzi (2012) reveals that the major crops grown in the area are cotton and maize. However, after the FTLRP in 2003, the small-scale cotton farmers in Gokwe revealed that inputs were now scarce on the open market and accessing cotton inputs became a challenge for most rural people due to price hikes. However, social differentiation in this rural area is evident in that tribalism is believed to have played a hand also in determining the major economic activities in the area. Musevenzi (2012) points out that the Derukas (immigrants) dominated crop production whilst local tribes (Shangwe and Tongas) were largely engaged in less conventional agricultural activities and other non-farm livelihood activities, such as poaching, hunting, fishing and harvesting wild fruit.

Climate change is evident in the two districts of Gokwe (North and South) through sporadic rainfall and high temperatures. According to ZimVAC (2019), in the 2018/2019 growing season, Gokwe received less than average rainfall yet the area depends on rain-fed agriculture. Resultantly, the agricultural produce was minimal and this strained the rural livelihoods of the people as evidenced by food insecurity that was 56.3% and 39.7% for Gokwe North and Gokwe South respectively. Due to chronic droughts and adverse climatic conditions, livestock condition in Gokwe South was described as "poor". This was compounded by the fact that there were inadequate and poor-quality pastures due to low rainfalls in the areas. Of concern is that the area is prone to attacks by livestock diseases, such as anthrax and foot and mouth diseases (ZimVAC, 2019), thus constraining the livelihoods of the people.

Rural livelihood diversificationconstitutesthe major coping strategies forthe rural people of Gokwe. It is pointed out that for the planting season 2018/2019, the cultivated area for cotton in Gokwe was less than the previous season (ZimVAC, 2019). Therefore, on-farm casual labour in Gokwe South is usually scarce, although ploughing and weeding in Gokwe North are sometimes available. Climate change has forced some of the people in Gokwe to indulge in poaching to supplement their diet and as a source of income (Musevenzi, 2012). Poaching in the Chirisa game reserve to the west and Nyaminyami game reserve to the north has become a livelihood coping strategy for some of the people.

***Evidence from Nkayi Rural District***

Nkayi district falls under Zone 10 of the ZimVAC livelihood mapping, summarised as the Eastern Kalahari Sandveld Communal. The area is in Natural Region IV and has an average annual precipitation of less than 620mm. Farmers in this area are always vulnerable to climate change that is usually manifested through high temperatures and occurrence of droughts every two to five years. It is revealed that, for Nkayi, drought-proneness was mostly severe and this was reached using both the Standardised Precipitation Index (SPI) and the Water Requirement Satisfaction Index (WRSI) for maize as a proxy for drought. Despite these chronic hazards, farmers mainly grow cash crops, such as cotton and groundnuts. Accordingly, in the 2018/2019 growing season, cotton was grown in the eastern parts of the district, although a lesser area was planted as compared to the previous agricultural year (ZimVAC, 2019).

Poverty prevalence in the district is among the highest in the country whereby more than 76% of the rural population lives below the poverty line (<1.5 USD per day) and more than 22% is extremely poor (living <1USD per day). The population that was food insecure in 2019 was 54.8% (*ibid*.). As such, the livelihood coping strategies for Nkayi are classified under the emergency category that means that populations use drastic measures, such as selling assets to alleviate food insecurityas a coping strategy. The farming systems in Nkayi are integrated and interlinked as a cattle-maize enterprise. It is pointed out that the crop residue is mostly used to feed the livestock during lean seasons, while, the livestock are used as draught power to cultivate large pieces of land (Homann-Kee Tui *et al.* 2015). AgMIP (undated) points out that social heterogeneity in the farming community of Nkayi is evident whereby the three types of community farmers were distinguishable: extremely poor households with no cattle, cultivating 1.5 hectares on average; poor households with 0 to 8 cattle, cultivating 2 hectares; and better-

off households with more than 8 cattle, cultivating 2.7 hectares. In addition, the other differentiating factor, that is also a significant form of livelihood in the district, is the amount of remittances (cash and food) sent by the relatives who are in the diaspora, mostly in South Africa and Botswana (ZimVAC, 2010). The most vulnerable people in the district collect wild fruits and mopane worms as supplementary food. In addition, casual labour in the fields from the district's well-off people also cushions the welfare of the poor people in the area. Subsequently, with the chronic effects of climate in the district, food aid has become a significant source of food security in the district.

***Evidence from Chipinge Rural District***

The district may broadly be subdivided into the Highveld and the Lowveld regions. The Highveld region is depicted as Zone 8 that is described as the Eastern Highlands Commercial belt (ZimVAC, 2010). In this vein, the Highveld harbours agricultural estates that grow cash crops, such as tea, coffee, exotic tree plantations, bananas, macadamia nuts and avocado peas and these estates have not been affected by the FLRP (James, 2015). Although in general, the precipitation in this area is reliable and is usually above average and there are low incidences of flooding, farmers in some areas fail to harness these geographical features to their economic advantage due to input constraints, upon that the new farmers have no financial muscle to effectively practise commercial farming (ZimVAC, 2010).

As a consequence of high population growth rate in Chipinge district, land holdings shrink in size and there is also a decline in land productivity due to the over-use of the land without the application of adequate fertilisers (Chifamba and Mashavira, 2011). Therefore, in some parts of the district, poverty is on the rise and out-migration into South Africa is perceived as a mitigation coping measure whereby remittances are a significant source of money and food in the district. In addition, other poor people in the district opt to work as farm labourers in the agro-industrial estates dotted in the area. Agroforestry is practised in Chipinge district where farmers practise mixed land-use by integrating livestock rearing with the growth of crops and trees, mostly fruit trees.

On the other hand, the Lowveld parts of Chipinge are susceptible to frequent droughts and high temperatures, conditions that do not favour the growth of staple cereal crops, such as maize. These natural geographical features increase the vulnerability of the area to the adverse effects

of climate change. The farmers in these areas grow cotton as a cash crop that favours the dry conditions. The relatively new ARDA/Sabot Green Fuel sugar estate is a source of employment for many of the rural people in the area. The Green Fuel Ethanol Project was awarded National Project Status by the Government of Zimbabwe due to the significant benefits it brings to the country, such as being a source of employment for over 4,500 people. Such a venture covers 48,000 hectares, hence is a hindrance for some irrigation schemes, such as Zuwarabuda Irrigation Scheme that is located downstream of Save River since most of the water upstream was dammed for the Ethanol Project that significantly reduced the water available for the irrigation schemes (Dengu *et al.* 2010). Some irrigation schemes along the Save River in areas, such as Mutema, Chibuwe and Mutandahwe are success stories in enhancing the livelihoods of the people in the Chipinge Lowveld. As such, intensive gardening of onions, tomatoes, cabbages and maize have become a source of food and cash for most of the people in these areas.

**Discussion**

The FLRP offered rural Zimbabweans opportunities to improve their livelihoods. However, the way it was carried out disrupted the livelihoods of many people. For example, it is pointed out that some farm workers lost their livelihoods due to the FLRP. In addition, most of the beneficiaries were "ordinary and poor people", who lacked the know-how and capital to catapult their agronomical skills towards the envisaged economic growth. Unfortunately, the recurrent droughts due to climate change did not help and such natural phenomena have contributed to tarnish the FLRP as a "failure". However, in some locations and households, the land redistribution programme was a success. It is echoed that agriculture is the mainstay of the Zimbabwean economy. There are both forward and backwards linkages between agriculture and the industrial sector in Zimbabwe. In other words, the failure of one factor would have negative, ripple effects to the other. In this regard, in the face of climate change, the agrochemical sector has the mandate to innovate drought resistant seed hybrids for the staple cereal crops and make effective fertilisers and chemicals to use in such harsh environments. This observation extends to the control of pests and animal diseases. However, it was reflected that the agro-chemical industrial sector in Zimbabwe has not been performing to the expected levels since the inputs for the industrial sector are sometimes scarce and if they are available, they demand high prices. This may be indicative of the deindustrialisation wave

in the manufacturing sector. Resultantly, agricultural produce is affected and this has affected national food security and rural livelihoods are put in jeopardy.

Climate change has become an issue of concern in Zimbabwe. The direct effect is that the trend of agricultural produce is spiralling downwards, together with that of rainfall and that of temperatures going upwards. This proves that rain-fed agriculture in this scenario is a courtship towards both economic and livelihoods disaster (Shackleton and Shackleton, 2004; Sunderlin *et al.* 2005; Peng, 2011; Meteorological Office, UK. 2012). In this regard, it was revealed that some rural areas engage in irrigation schemes while others diverse from agricultural activities altogether, a phenomenon known as deagrarianisation. However, deagrarianisation without viable options for a livelihood may also result towards doom. The young generations in the rural areas have resorted to emigration into cities and the Diaspora, particularly into South Africa. However, with global economic slowdown affecting most economies, the envisaged remittances are reduced. By and large, most of the rural people in the country have employed diverse coping strategies, as determined by their localised environments.

**Conclusion and Recommendations**

When confronted with adversity, it is proven that people innovate ways to come through. In this regard, the rural people suffer from environmental hazards and economic hardships. Therefore, diversifying and introducing conservative agriculture is recommended. On the other hand, outsourcing agricultural inputs from donor organisations may also boost agronomical activities. Notwithstanding that, social dialogue between the rural people and contract agencies in contract farming may also reduce the envisaged "exploitation" of the farmers. The SI79 of 2017 that regulates "Command Agriculture" has also the dictates to protect the rural people from unruly results of contract farming (GoZ, 2017). In this regard, an awareness of "rights" for the rural people concerning contract farming is called for. The FLRPis a blunt instrument towards poverty reduction in the rural areas. Besides lacking capital inputs, human and social capital is also a constraint in agricultural production. In other words, social differentiation and heterogeneity that defines the rural areas in Zimbabwe result in disunity of purpose that culminates in loss of the needed social capital in cooperatives. Climate change calls for innovative ways of agricultural production. In this regard, there is need for vocational training tailor-made towards combatting the effects of climate change. This may be done through public-private engagements, between the government and donor organisations.

**References**


Angelsen, A, Wunder, S. (2003) Exploring the Forest–Poverty Link: Key Concepts, Issues and Research Implications. CIFOR, Bogor.

Bilal, S. (2017). On the political economy of reforms in the extractive sector. GREAT Insights Magazine, 6(3). July/August 2017. Maastricht: ECDPM.

Bryceson, D. (2004). Agrarian Vista or Cortex: African Rural Livelihood Policies. *Review of African Political Economy*, 37(102), 617-629.

Bryceson, D. (2009). Sub-Saharan Africa's Vanishing Peasantries and the Spectre of a Global Food Crisis. *Monthly Review*, 61(3), 1-14.

Carswell, G. (2002). Livelihood Diversification: Increasing in Importance or Increasingly Recognised? Evidence from Southern Ethiopia. *Journal of International Development*, 14, 789-804.

Chambers, R and Conway, G. (1992). *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. Institute of Development Studies. Discussion Paper 296, 1992.

Chambers, R. (1997). *Whose Reality Counts: Putting the First Last*. London: Intermediate Technology Publications.

Chifamba, E and Mashavira, N. (2011). Adaption and mitigation strategies in sustainable land resource management to combat the effects of climate change in Chipinge, Zimbabwe. *Journal of Sustainable Development in Africa*, 13(2), 15-27.

Chimhowu A, Manjengwa J, Feresu S (eds). (2011). Moving Forward in Zimbabwe: Reducing Poverty and Promoting Growth. Harare: IES/BWPI.

Chitongo, L and Casadevall, S.R. (eds.) (2019). Rural Livelihood Resilience Strategies in the Face of Harsh Climatic Conditions. The Case of Ward 11 Gwanda, South, Zimbabwe. *Cogent Social Sciences*, 5(1), 1-19.

CIA World Factbook. (2018). Africa: Zimbabwe: Available online: https://www.cia.gov/library/publications/the-world-factbook/geos/print_zi.html

Cliffe, L, Alexander, J, Cousins, B and Gaidzanwa, R. (2011). An Overview of Fast Track Land Reform in Zimbabwe: editorial introduction. *Journal of Peasant Studies*, *38*(5), 907-938.

Cusworth, J. (1990). Land Resettlement Issues, Background Paper: Zimbabwe Agriculture Sector Memorandum, a Paper prepared for World Bank, Harare.

Dengu, E, Mutambara, S, Matembudze, N and Mugore, A. (2010). Draft Report: End of project evaluation on Food Security and Livelihood Independence Program, Harare: Mercy Corps; Zim-ahead and SAFIRE

DFID (Department for International Development). (2001). Sustainable Livelihoods Guidance Sheets. London http://www.efls.ca/webresources/DFID_Sustainable_livelihoods_guidance_sseet.pdf

Dold, A.P, Cocks, M.L. (2002). The trade in medicinal plants in the Eastern Cape Province, South Africa. *South African Journal of Science*, 98, 589– 597.

Dube, D and Chirisa, I. (2012). The Informal City: Assessing its Scope, Variants and Direction in Harare, Zimbabwe. *Glo. Adv.Res. J. Geogr. Reg. Plann,* 1(1), 016-025.

Ellis, F. (2000). *Rural Livelihood Diversity in Developing Countries: Analysis, Policy, Methods*. Oxford: Oxford University Press, Oxfod.

FAO. (2011,). Disaster Risk Management Strategy in West Africa and the Sahel (2011-2013), Rome: FAO.

GoZ, (2017). SI 2017-079 Agriculture Marketing Authority (Command Agriculture Scheme for Domestic Crop, Livestock and Fisheries Production) Regulations. Available online: http://www.veritaszim.net/node/2128

GoZ. (1982). The Transitional National Development Plan, 1982/83-1984/85 Vol. 1, Harare: Government Printers.

GoZ. (2006). National A2 Land Audit Report. Harare: Ministry of Lands, Land Reform and Resettlement.

Henderson, L.J. (2004). Emergency and Disaster: Pervasive Risk and Public Bureaucracy in Developing countries. *Public Organisation Review.* 4 (2). pp. 103 119.)

Hilson, G and McQuilken, J. (2014). *Four Decades of Support for Artisanal and Small-Scale Mining in Sub-Saharan Africa: A Critical Review*. Guildford: Faculty of Business, Economics and Law, University of Surrey

Homann-Kee Tui, S, Valbuena, V, Masikati, P, Descheemaeker, K. Nyamangara, J, Claessens, L, Erenstein, O, van Rooyen, A, Nkomboni, D. (2015). Economic trade-offs of biomass use in crop-livestock systems: Exploring more sustainable options in semi-arid Zimbabwe. *Agric. Syst.*, 134, 48-60.

Homann-KeeTui, S, Bandason, E, Maute, F, Nkomboni, D, Mpofu, N, Tanganyika, J, Van Rooyen, A.F, Gondwe, T, Dias, P, Ncube, S, Moyo, S, Hendricks, S, and

Nisrane, F. (2013). Optimizing Livelihood and Environmental Benefits from Crop Residues in Smallholder Crop-Livestock Systems in Southern Africa. Socio-economics Discussion Paper Series. Series Paper Number 11. Available online: http://oar.icrisat.org/7277/1/S_Homann-Kee_Tui_et_al_2013_ISEDPS_11.pdf

ILO. (2012). Rural Policy Briefs: Boosting local economies in rural areas, Geneva

James, G.D. (2015). Transforming Rural Livelihoods in Zimbabwe: Experiences of Fast Track Land Reform, 2000-2012, Ph.D. Thesis, University of Edinburgh

Jombo, S.S. (2016). Quantifying the impact of the Land Reform Programme on land-use and land cover changes in Chipinge District, Zimbabwe, based on Landsat observations, Masters Dissertation, University of Witwatersrand, Johannesburg

Karaki, K. (2018). Artisanal Gold Mining in DRC: time to get down to earth, European Centre for Development Policy Management (ECDPM) Discussion Paper No. 223

Khan, M.H. (2004). Power, Property Rights and the Issue of Land Reform: A general case illustrated with Reference to Bangladesh. *Journal of Agrarian Change,*4(1 and2), pp 17-44.

Kinsey, L. (1999). Report of the study on the Determinants of Rural Household Incomes and their Impact on Poverty and Food Security in the Resettlement and Communal Areas of Zimbabwe, Report submitted to FAO, Rome

Liua, C. (2012). Susceptibility Evaluation and Mapping of China's Landslide Disaster Based on Multi-Temporal Ground and Remote Sensing Satellite Data. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences.* XXXIX-B8. XXII ISPRS Congress, 25 August–1 September 2012. Melbourne, Australia.

Mander, M. (1998). Marketing of Indigenous Medicinal Plants in South Africa: A Case Study of KwaZulu-Natal. FAO, Rome. 151 pp.

Mano, R. (2007). *Zimbabwe's Smallholder Agriculture and Livelihood Performance and the Challenges of Recurrent Food Security Crisis: A Causes and Consequences Think Piece.* Harare: Paper prepared for CASS, University of Zimbabwe**.**

Maphosa, F. (2005). The Impact of Remittances from Zimbabweans Working in South Africa on Rural Livelihoods in the Southern districts of Zimbabwe," *Forced Migration Working Paper Series No 14, Forced Migration Studies* Programme, University of the Witwatersrand: 1-23.

Matsa, M and Muringaniza, K. (2011). An Assessment of the Land-use and Land Cover Changes in Shurugwi District, Midlands Province, Zimbabwe. *Ethiopian Journal of Environmental Studies and Management,* 4(2), 88-100.

Maxwell, S. (1988). National food security planning: first thoughts from Sudan. Paper presented to workshop on food security in the Sudan, IDS, Sussex, 3–5 October 1988. In: Smith, M, Ponting, J and Maxwell, S. (1993) *Household food security: concepts and definitions. An annotated bibliography. IDS Development Bibliography* 8, p. 28.

McSweeny, K. (2004). Tropical forests product sale as natural insurance: the effects of household characteristics and the nature of shock in Eastern Honduras. Society and Natural Resources 17, 39– 56.

Meteorological Office, UK. (2012). Climate: Observations, Projections and Impacts, Fact Sheet. Case Study. Available Online: http://www.metoffice.gov.uk/media/pdf/7/9/COP18_Factsheet_-_China.pdf

Mkodzongi, G and Spiegel, S. (2019). Artisanal gold mining and farming: livelihood linkages and labour dynamics after land reforms in Zimbabwe. *The Journal of Development Studies*, 55(10), 2145-2161.

Moser, C, "The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies," *World Devel*, vol. 26, no. 1: 1-19, 1998.

Moyo, S. (2002) 'Peasant Organisations and Rural Civil Society in Africa: An Introduction', in S. Moyo and B. Romdhane, eds, *Peasant Organisations and Democratisation in Africa*, Dakar, CODESIRA: 1-26.

Moyo, S. (2009). *Fast Track Land Reform Baseline Survey in Zimbabwe: Trends and Tendencies, 2005/06,* Harare: AIAS.

Musevenzi, J. (2012). Rural Livelihood Diversification in Semi-Arid Districts of Zimbabwe: An analysis of Muzarabani, Gokwe and Mwenezi districts. PhD Thesis in Development Studies, Nelson Mandela Metropolitan University

Mutami, C and Chazovachii, B (2012). Effective Livelihood Strategies in Distressed Environments: The Case of Mudzi District of Zimbabwe. *Current Research Journal of Social Science*, 4(5), 362-372.

Parliament of Zimbabwe. (2003). *A Report on the Plight of Farm-workers and Newly Resettled Farmers,* Report prepared by the Public Service Labour and Social welfare Committee, Third Session, Fifth Parliament, Harare: Parliament of

Zimbabwe.Peng, J, 2011. WaterWorld. *Market Report: Developing Desalination in China.*

PLRC (2003) The Presidential Land Review Committee on the Implementation of the Fast Track Land Reform Program, 2000-2002 Government Publications, Harare.

Scoones, I, Marongwe, N, Mavedzenge, B, Mahenehene, J, Murimbarimba, F and Sukume, C. (2010). *Zimbabwe's land reform: myths and realities*. Oxford: James Currey.

Scoones, I. (2000). *Rural Livelihoods and Diversity in Developing Countries*. New York: Frank Allis.

Shackleton, C.M, Shackleton, S.E. (2004). The importance of nontimber forest products in rural livelihood security and as safety nets: evidence from South Africa. South *African Journal of Science,* 100, 658–664.

Sunderlin, W.D, Angelsen, A, Belcher, B, Burgers, P, Nasi, R, Santoso, L, Wunder, S, (2005). Livelihoods, forests and conservation in developing countries: an overview. World Development 33, 1383–1402.

Terre des Hommes. (2007). From Post-Tsunami Emergency Assistance to Livelihood Recovery in South India: Exploring the Contribution of Micro Entrepreneurship Initiatives in the Gulf of Mannar, Tamil Nadu. Retrieved from http://www.terredeshommes.org/pdf/publication/working_paper_regnier.pdf

Tevera, T.G. (2008). Gender, Migration and Remittances in Southern Africa," *SAMP Migration Policy Series No. 49*. Cape Town: The International Development Center.

Thennakoon, S. (2004). Rural livelihood strategies and the five capitals: a comparative study in selected villages of Sri Lanka. In: *Proceedings of the 18th European conference on modern South Asian Studies. Lund, Sweden, July* (pp. 6-9).

TIMB. (2014). National Tobacco Workshop Proceedings, Harare: TIMB.

UNECA. (2015). Assessment report on mainstreaming and implementing disaster risk reduction in Southern Africa, Addis Ababa: UNECA.

UNICEF. (2018). Zimbabwe Cholera Outbreak Report, Harare: UNICEF.

United Nations Development Programme, 2016, Mapping of Selected Hazards Affecting Rural Livelihoods in Zimbabwe: A District and Ward Analysis, Zimbabwe Resilience Building Fund (ZRBF) Management Unit, Harare

WFP (2015). Technical Guidance Note. Rome: WFP.

World Bank. (2008). *World Development Report: Agriculture for Development*, Washington, DC: World Bank.

World Bank. (2019). Zimbabwe IDAI Recovery Project (P171114) May 31, 2019, World Bank Harare:

Zamchiya, P. (2013). The Role of Politics and State Practices in Shaping Rural Differentiation: A Study of Resettled Small-Scale Farmers in South-Eastern Zimbabwe. *Journal of Southern African Studies*, 39(4), 937-953.

Zembe, N, Mbokochena, E, Mudzengerere, F and Chikwiri, E, 2014. An Assessment of the Impact of the Fast Track Land Reform Programme on the Environment: The Case of the Eastdale Farm in Gutu District, Masvingo. *Journal of Geography and Regional Planning*, 7(8), 160-175.

ZimVAC. (2010) Rural Livelihood Assessment, Harare: Government of Zimbabwe.

ZimVAC. (2011) Rural Livelihood Assessment, Harare: Government of Zimbabwe.

ZimVAC. (2013). Rural Livelihood Assessment, Harare: Government of Zimbabwe.

ZimVAC (2019) Rural Livelihood Assessment, Harare: Government of Zimbabwe.

Zvinorova, P. I, Halimani, T.E and Mano, R. T, 2013. Viability of Smallholder Dairying in Wedza, Zimbabwe. *Tropical Animal Health Production*, 45(4), 1007-1015.

## A3: Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District?[28]

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### Introduction

Settlement expansion induces conflict with other land-use practices, especially land cultivation and grazing. Fast urbanisation is the chief driver of rural land encroachment and competition (Xu *et al*. 2009; Lombard, 2015). Urban land development compromises rural livelihoods, most of which are hooked to natural resources like forests and fisheries. The present article is built on a study that explored land-related conflicts and confrontations induced by settlement development and expansion in Gokwe South Rural District (GSRD) with local communities citing exclusion and their interests and wishes of development side-lined. Gokwe is located in the Midlands Province of Zimbabwe. In the 1960s, Gokwe District was one entity comprising both the present day Gokwe North and South Districts. The area used to be sparsely populated and people later settled from places like Bikita (Chief Jiri and Kraalhead Masuka) and Chirumanzu (Headmen Muyambi and Huchu), Chivi, Mberengwa and Zvishavane areas to pave way for the white farming minority. Currently, GSRDC business centres are expanding and land within gazetted boundaries is running out. Development expansion is seeing encroaching into communal land, inhabited by local communities and now triggering compensation and rights debates. This article is organised as follows: introduction, theoretical perspectives underpinning the study, research methodology presentation and analysis of the research findings and a summary of the study, conclusions and recommendations.

### The Socio-ecological Dynamics and Characteristics of Gokwe South

Socio-ecologically, Gokwe is divided into Gokwe South and Gokwe North districts. Divergent ethnic groups, coming from many parts of Zimbabwe have settled in the districts. Two dominant ethnic groups are the Tonga (who traditionally lived in the Zambezi Valley, an

[28]Chirisa, I & Nel, V. (2021). (Published)

enclave between Zimbabwe and Zambia) and migrants from Masvingo province (Nyota, 2015). Migration into the district began in the 1950s (Ncube, 2017); it was both environmental migration and institutionally-engineered migration (Sachingoma, 2016; Charewa, 2017). Migrants perceived advantages, like podzolic soils that supported cotton production and the removal of tsetse flies in the area (Masvaya *et al.* 2010). Pressure on land resources in other districts saw the colonial and post-colonial governments opening up the district as an institutional decision (Nyambara, 2001). In recent times, climate change and variability are putting pressure on the district and this is affecting agricultural productivity even further (Gwimbi and Mundoga, 2010; Sachingoma, 2016).

Ecologically, Gokwe Southissituated between the agro-ecological Regions 3 and 4 with an average rainfall of 600 to 650mm per year, principally from November to February. Soils are predominantly sandy soils. Livestock production in the district is supported by savannah grasslands (Maburutse *et al.* 2012). Contract farming isamajor activity in the district (Hove, 2014). Dryland crop production and the recently promoted conservation farming are key in the district (Hanyani-Mlambo, Sibanda and Rukuni, 2000; Nhodo, Dube and Mafongoya, 2012; Mashango, 2015). For a long period, cotton was a major commodity of production and sale from the district (Jingura, Sibanda and Hamudikuwanda, 2001; Gwimbi, 2009; Mtetwa and Nlanga, 2018).

The Zion Christian Church (ZCC), founded by Samuel Mutendi, who died in 1976, started in Gokwe South in area of Chief Sahai in the 1960s (Chimininge, 2014; Mberengwa, 2016; Robert 2018). Before that, Mutendi established his first Zion city or centre of worship at Mbungo in Masvingo. Having experienced tension with colonial administrators, the Dutch Reformed and Roman Catholic Church members, Mutendi established a shrine at Defe Dopota in Gokwe. The religious influence of the ZCC has expanded territorially and spiritually in Gokwe and beyond (Chimininge, 2014).

**Theoretical Framework**

Conflict theory and the principal-agent theories underpin the study. The conflict theory explains how conflict starts, varies and affects individuals and communities. Unequal distribution of scarce resources and power differences in interests and goal variation are the main sources of conflicts. However, different paths open up opportunities for negotiation

(Maslow, 1943; Castelfranchi, 2000; Thangarajah *et al.* 2002). Order, change and conflict are linked by often reciprocal interactions. New values can arise within the societywhich areincompatible with the old. Hostilities are possible ethnically and culturally (Scott and Storper, 2015; Schweitze, 2016). Unequally distributed natural resources induce the bulk of conflicts experienced in rural areas (Grimble, 1998; Teferra and Beyene, 2014). Traditionally, the principal-agent problem is viewed as a product of the principal inducing incentives that the agent has to harness from them (Grossman and Hart, 1992). The incentives set may not be once-off, but continuous creating a dynamic relationship between the agent and the principal, defining life contracts (Sobel, 1993; Sannikov, 2008; Toelstede, 2020). Overall, the principal-agent problem is a hierarchised game-theoretic problem; all strata of society will not get the same information at the same time with the same understanding (Turner, 2017). The conclusion by Turner (2017: 22) is important to the debate of the principal-agent relationship:'

**Table P.2: Types and sub-types of land conflict (Wehrmann, 2008)**

| Type of land conflict | Sub-types of land conflict |
|---|---|
| **Boundary conflicts** | • Between individuals (over private land)<br>• Between administrative units (villages, communes, municipalities, districts)<br>• Between private individuals and the state (over private or state land)<br>• Between clans (over common property) due to oral tradition and physically unfixed boundaries. |
| **Ownership conflicts due to legal pluralism** | • Overlapping/contradictory rights due to legal pluralism (customary/indigenous rights vs. statutory law) |
| **Multiple sales/allocations of land** | • Multiple sale of privately-owned land by private individual<br>• Allocation of same land parcels by the land registration office due to technical shortcomings or corruption (acceptance of faked titles)<br>• Multiple sale of state land by public officials<br>• Overlapping/contradictory rights due to double allocation of land titles by different institutions all legitimised to do so. |
| **Peaceful, informal land acquisitions without evictions** | • Market-driven displacements within that speculators or developers pay less than the real market value due to information asymmetry<br>• Illegal occupation of state, private or common land (squatter settlements) |
| **Conflicts between human/cultural and natural use** | • Misuse and overuse of agricultural land<br>• Unsustainable land-uses, such as conversion of forests into construction land or settlements at risk prone locations<br>• Conflicts between natural protection and farming or mining |

| | |
|---|---|
| | • Conflicts between wildlife and peasants |
| **Expropriations by the state without compensation** | • Expropriation of land property without (adequate) compensation to use the land for public purposes<br>• Expropriation of owners from private or common land without (adequate) compensation to allocate the land to private companies and new informal occupations by the original (customary) owners to receive the land back<br>• Displacement of land owners without giving them adequate land and/or sufficient rights to it |

"With the commercialisation of civil society on the one hand and the financialisation of capitalism on the other, a new figure is emerging, namely, the citizen who, from the safety of his or her own private space, observes society as a spectacle, rather than acting upon or with society."

## Literature Review

Land-use conflicts are social disputes arising in a multi-stakeholder environment and a widespread phenomenon (Torre *et al.* 2014). Usually, decisions on land leave part of the local population unsatisfied (Wehrmann, 2008; Darly and Torre, 2013). The construction of big projects (roads, railways, airports, dams) or expansion of a business (industries, firms and warehouses) can produce negative externalities, like population displacement from their territory, decline of cultivable lands, deforestation and pollution (Mora *et al.* 2020). Land-use conflicts that come from development expansion are mainly grouped into the types: boundary conflicts, ownership conflicts due to legal pluralism, multiple sales/allocations of land, peaceful, informal land acquisitions without evictions, conflicts between human/cultural and natural use and expropriations by the state without compensation (Table P.2).

Contests over power arise from the disjuncture between political elites and the masses during state building (Mlambo 2009; CCMT, 2015; Thomas, 2015). Studies have shown how the countryside as a 'purified space' are used to exclude undesirable, 'incongruous', or essentially 'urban' types of development. Discussion of rural planning policy is often couched in the politically acceptable, neutral and scientific language of environmental sustainability; opposition to rural development is as fervent and sensational as ever (Lombard, 2016). For example, diverse claims, overlapping frameworks and power relations were experienced in Mexico. The complexity and intractability of the land conflict in Santa Lucia reflects the diverse interests of the actors involved in land transactions.

In most sub-Saharan African countries, land-related conflicts are increasingly becoming a threat to rural economic activities, such as agriculture (Yamano and Deininger, 2005; Deininger and Castagnini, 2006). Many studies have, thus, linked land conflicts to weak or non-existent formal land institutions and the failure of current customary land tenure systems to resolve conflicts (Fred- Mensah, 1999; Donge and Pherani, 1999). Often, original inhabitants oppose the transfer of traditionally owned family and community land to 'strangers' by committing acts of sabotage, looting, burning and theft of property and crops of new landholders (Platteau, 1996; Donge and Pherani, 1999; Fred-Mensah, 1999). The issue of control over agricultural land and even pastoral resources is a major concern (Maiga and Diallo, 1998; Alawode, 2013). Generally, access to arable productive land in Africa is declining due to the growing population. This has exacerbated land degradation brought about by climate change (FAO 2006 in Onoja and Achike, 2011). Government and political office-holders are accused of getting involved in land grabbing as well (Manzetti and Wilson, 2007; Van Leeuwen *et al.* 2014; Adebayo and Oriola, 2016).

Driven by economic activities and increased population, urbanisation is rapidly developing in urban hinterlands and a series of land resource and environmental conflicts (Xu *et al.* 2016; Li, 2017). Loss of farmland is the most socially undesirable outcome of urbanisation, especially in a developing economy, even though these farmers are properly compensated for their land (Li, 2017). Farmers may not have other skill sets to survive in urban settings. Some may not be amenable to living in crowded city environments. Leaving the village implies loss of social and personal networks.

Governments in the majority of African countries use various means to dispossess locals of their land in the name of promoting agricultural investment, provision of housing estates and industrial revolution (Abdulatif, 2009). For instance, most land grabbed in Nigeria were profit-driven under the guise of using the land acquired for agricultural investments, especially for cassava, sugarcane and sweet sorghum, that ultimately would become raw materials for bio-fuel production. In Ethiopia, national parks came into being in the late 1960s and early 1970s (Sawada and Koike, 2016; Teklehaimanot and Balakrishnan, 2017). The establishment of national parks has overlooked the livelihood bases of local people hence a conflict-inducer (Teferra and Beyene 2014). In Zimbabwe, in2012, for example, there was a conflict between

Vungu Rural District Council and Kushinga resettlement areas (CCMT, 2013). The conflict emanated from a disputed site for a secondary school in that particular area. This did not sit well with the settlers and conflict arose. In natural resource management, conflicts indicate the outcome of competition and potential disagreement between two or more groups (Teferra and Beyene 2014).

## Research Methodology

The study used primary and secondary methods to gather data. Document review included literature, reports and newspaper articles on conflicts and confrontations across the globe and in Zimbabwe. The data collection methods followed a series of steps, including focus group discussions in April 2019, historical narratives, interviews with respondents and key informant interviews. Five villages in GSRDC were purposively selected that share a boundary with Gokwe town and have frequent conflicts between the local authority and local communities. Five focus group discussions were conducted with 10 to 15 individuals in each. In selecting participants for the group discussion, different age groups and social statuses were included to capture as diverse opinions as possible. The checklist used for focus group discussions were on an electronic tablet. Four teams were constituted, each headed by a technical expert. Four key informants, selected for the study, included community elders (the chief and the kraalhead) and the technical team of the local authority who were knowledgeable with the process and events in the area. Data analysis was done using thematic analysis. Issues that came out of the study were clustered around themes of community lived realities, land shortage, water scarcity, council development programmes, tenure insecurity, land-use planning and roles and responsibilities of government departments and institutions.

## Results and Interpretation

This section presents an analysis and discussion of the research findings. Key issues that were raised included community lived realities, land shortage, water scarcity, council development programmes, tenure insecurity, land-use planning and roles and responsibilities amongst institutions.

## Conflict Around Resources

Noted is that land in the villages is distributed by the kraalhead (*sabhuku*) who receives a token of appreciation called *maburamunzwa* from the beneficiary. *Maburamunzwa*is a custom

inherited from the forefathers' traditions. The corollary effects of institutional conflict emanate from some village heads selling other households' plots to outsiders, for some to as much as US$ 3000,00 /hectare. It emerged that some pieces of land sold had already been subdivided by the GSRDC. Households involved saidtheywere applying a concept of *garawadya* 'eat first then be questioned later'. They were not interested in the 'urban plots', 'introduced on their traditional land' by the GSRDC through planning.

Villagers also complained about the *ad hoc* nature of the process of land acquisition by the GSRDC. They said that the local authority did not follow proper consultative procedures to engage them. They accused the council of forcibly pegging on their land with the assistance of heavily armed police forces and police dogs. On the contrary, the GSRDC cited that it has the powers to displace and evict the villagers in evocation of the Regional and Town Country Planning Act of 1976 (revised in 1996). Yet, the villagers were concerned about the long-term investments they had done on their homesteads and orchards. They also cited that they were attached, by cultural reference to the graves of their departed relatives. They cited also that the GSRDC had not communicated any clear framework or guideline regarding compensation.

Overall, the expansion of the growth point entailed encroachment into communal land inhabited by local communities. The GSRDC designed a layout that was approved by the Department of Physical Planning and these naturally would displace the villagers and their activities – cultivation and grazing. Specifically, Villagers also indicated that plantations, orchards and gardens (*mushandirapamwe*) formed the backbone of their livelihoods as income generation. They depended on the wild fruits, such as *mazhanje, matamba* and *shumha* from the nearby forests. The GSRDC barred villagers from practising farming from the pegged areas and this stirred hostility.

The villagers also indicated that cattle formed part of their economic activity. The subdivision of communal lands to accommodate the growth point expansion resulted in the paddocks being depleted, endangering their livestock (Plates P.5 and P.6). In the two plates, there is increased socio-ecological conflict. Livestock owners also increasingly quarrel over the grazing resources. Particularly, Plate P.5 shows a house that was built in the middle of a pastureland. The tension between the villagers and the migrant increased. The villagers base their arguments on ancestry; migrants base their claims on the money they have used to buy 'land'. Yet council

policies and statutes argue that land is never sold, only improvements done on land can be paid for.

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**Plate P.4: Grazing land before subdivision (Fieldwork, 2019)**

**Plate P.5: Subdivided stands in the grazing lands (Fieldwork, 2019)**

## Conflicts around Religion and Territoriality

The development of areas in Gokwe caused a number of conflicts, including evictions and the threatening of non-ZCC members, unplanned expansion of the area into village lands, uncoordinated and inharmonious land-use (graveyards in the vicinity of Defe), the banning of other economic activities that werebelieved to be unholy and forced rest on Sundays despite even as one isa non-believer. The expansion of the Defe area brought with it changes that affected the lives of the villagers. Defe has some developed residential areas, which are high, medium and low-density suburbs with some hotels meant to accommodate church congregants. By virtue of being ZCC church members, professionals from GSRD are used to seek approval for developments which are rarely approved by the rural district council. Though the spatial area of Defe is increasing, it is unknown what the service to population ratio is like. The settlement lacks coordinated service delivery, such as water and sewage networks. It is not clear whether the area has septic or soak-away sewage systems and, if so, how they are discharged and managed, which becomes a health concern in the long run.

The area had no proper shopping centre and relied on small tuckshops that could not provide a sufficient variety of services and products. An absence of a clinic was noted as ZCC members believed in spiritual healing. This is a cause for concern in the event of disease outbreak. Unfortunately, the residential set up near Defe is mixed with a graveyard site close to residents' accommodation. The developments are not harmonious as required by planning regulations. The village heads who are of the Mutendi clan are continuously denouncing the rearing of pigs in the area and this has affected the livelihoods and practices of non-believers. Every village member is not supposed to work on a Sunday despite going to a different church. The village heads allocate communal land to members of the ZCC from across the country in the area and nearby game reserve, depriving these privileges to the original villagers who are non-believers. The effect of religion on conflict has generated much attention around the area.

**Conflict Between the Institutions as a By-product**

Various pieces of legislation have a bearing on access, control, ownership and utilisation of communal land in Zimbabwe. These pieces of legislation include the Communal Land Act (Chapter 20:04), Constitution of Zimbabwe (Amendment No. 20 of 2013), Environmental Management Act (Chapter 20:27), Forest Act (Chapter 19:05), Land Survey Act, Regional, Town and Country Planning Act (Chapter 29:12), Rural District Councils Act (Chapter 29:13), Sustainable Development Goals – Agenda 2030, Traditional Leaders Act (Chapter 29:17), Water Act (Chapter 20:24), Mines and Minerals Act (Chapter 21:05) and Parks and Wildlife Act. These pieces of legislation form the crux of the matter for rural development in areas, such as GSRDC and neglecting one of these legislations could result in land-use conflicts. Additionally, the Constitution of Zimbabwe (Amendment Act 20) of 2013 is the supreme law of the country and all laws, practices, norms and values are subject to it (GoZ, 2013; Chatiza *et al.* 2014). Within the field of spatial planning, most allied acts are not aligned to the provisions of the Constitution of Zimbabwe (Amendment Act 20) of 2013. Local authorities seem to conceptualise the constitution as only binding on national government, as they have not implemented constitutional provisions that do not require legislation to operationalise (Chatiza *et al.* 2014).

There is lack of proper understanding of the Traditional Leaders Act Traditional Leaders Act [Chapter 29:17] (Act No. 25 of 1998) on land allocation by the traditional leaders themselves,

as the Government sought to democratise land allocation by setting up elected Village Development Committees (VIDCOs). When the statute was enacted, it corrected the exclusion of traditional leaders by making the village heads and headmen, chairpersons of Village Development Committees and Assemblies. In this light, the village head became the land authority; in fact, he had power to allocate land contrary to council resolution. At independence, the enactment of the Traditional Leaders' Act, corrected the exclusion of traditional leaders by making the village heads and headmen, chairpersons of Village Development Committees and Assemblies and Ward Assemblies, respectively. Thus, the perspective of political ecology, the outcome of the conflicts is the recurrence of grievances by the indigenous claimants distinguished as customary right-holders.

There is an increased complexity in the decision-making environment. The power of structuring dynamics to shape agency possibilities is always limited, contingent on the way agents respond to the opportunities available to them. For example, the Forestry Commission, ZimParks and Wildlife, Environmental Management Agency have the responsibility to plan and manage forestry, wildlife resources and deployment of effective environmental strategies, respectively. However, if the rural district council fails to engage the relevant governmental departments and ministries in its developmental programme and expansion, it results in conflicts and contestations. If the process or procedures of land acquisition are not inclusive and transparent, land-based conflicts result in negative effects on the economy, society, ecology and spatial development.

**Discussion**

A plethora of diverging claims about the nature and kind of development compete for attention and often result in conflicts. An intensification of conflict in the development of urban areas, peri-urban areas and rural communities is noted in GSRDC. A realistic conflict may end when the social actors find another more satisfactory way of reaching their goals (Coser, 1957; Himes, 1966; Bressers, 2004). Different perceptions of a conflict situation require joint conflict analysis with all relevant parties to resolve confrontations and conflicts in Gokwe. The analysis must switch between the overall system and a micro-analysis of the relevant sub-systems (Mitchell, 2005). It must be noted that processes of social change within societies do not follow linear principles, hence, according to Diamond (1997), 'conflict habituated systems' apply. Ethnic, religious or territorial tensions must be understood for effective reconstruction of the

post-conflict environment (Bowd and Chikwanha, 2010). The governance factor speaks to how power struggles over authoritative, allocative and framing are conducted, restructured or changed. Less fragmented governance frameworks and collaboration in any development, be it in rural or urban regions, can contribute to economic growth by harnessing the potential and diversity of various institutional roles and responsibilities (Ahrend *et al.* 2015).

The absence of a clear policy to provide a framework for the creation and sustenance of a Gokwe rural settlement and its land-use planning and management, demonstrates institutional complexity. Promotion of fairness, accountability, transparency and trust in land-use management induce an unclear monitoring and evaluation system on human, wildlife and livestock resources. In the GSRDC proper land-use planning could be organised through first establishing the adequacy levels of land for cropping and grazing towards sustainable development practices in the district. Lack of funds, lack of a clear policy to guide the desired practices and corrupt tendencies by some leaders who arbitrarily continued to admit people from other places in the district are the excuses by the GSRDC to implement this. As supported by Robinson (2015: 833), "policy-makers compose their ideas in the midst of a myriad influences from elsewhere", resulting in an "often messy and unmappable complexity". Various non-state actors, including cultural institutions, cultural intermediaries and independent cultural producers are not respected (Temenos *et al.* 2019).

## Conclusion, Policy Options and Recommendations

This article provided an indication on how settlement development and expansion could be done in an inclusive way to reduce conflicts and confrontation amongst various stakeholders in Zimbabwe. There are diverse and varied rights to a given piece of land, which becomes a contentious issue given competitive claims from various institutions and ministerial objectives. Policies promoting sustainable human settlement for all needs, need to be encouraged and supported. Lack of a policy on settlement and land-use in GSRDC has resulted in an *ad hoc* way of acquiring land in Gokwe. Thus, there is need for a policy that deals with settlement and land-use.

- The policy would provide a framework that supports the creation and sustenance of a Gokwe rural settlement whose land-use planning and management are sustainable, harmonious, inclusive and responsive.

- Villagers' participation in the acquisition of land was done in a fragmented and piecemeal manner, which led to tension and confrontations in Gokwe. Imperative, therefore, was community inclusion in decision-making processes - appreciating all forms of social, economic and political differences (age, religion, disability, culture, education, language, economic, geographical and any form of differences) in Gokwe.
- The uncoordinated development happening in GSRDC calls for the development of detailed land-use plans for all communal land in the district.
- The GSRDC lacks a clear compensation strategy. In this regard there is need for the GSRDC to introduce a clear compensation policy and guideline for development by induced displacements offering guidelines and recommendations. Development projects should be in place for the purposes of public notice of intent, negotiations, consultations, valuations, community impact assessments, alternative land and determining financial compensation.
- There are no timeframes for compensating communities affected by development induced developments in GSRDC. Measures should be in place to ensure that all the affected households, upon receiving payment schedule, be relocated within a minimum possible time.

**References**


Abdulatif, A. (2009). Land Grab: A violation of human rights and disregard for the basic essence of governance. Available online: http://course.earthrights.net/?q=node/317. Accessed on 16/03/2017.

Adebayo, A. A and Oriola, B. (2016). Nexus of land conflicts and rural-urban migration in South-West Nigeria: Implications for national development in Nigeria. *Nigerian Journal of Rural Sociology, 16*(2202-2019-1107), 70-78.

Ahrend, R, Farchy, E, Kaplanis, I and Lembcke, A. (2015). What makes cities more productive? Evidence on the role of urban governance from five OECD countries (Working Paper). Paris: OECD.

Alawode, O.O. (2013). Determinants of land-use conflicts among farmers in southwestern Nigeria. *Journal of Research in Peace, Gender and Development*, 3(4); 58-67.

Bowd, R and Chikwanha, A. B. (2010). Understanding Africa's contemporary conflicts: origins, challenges and peacebuilding. *Institute for Security Studies Monographs*, 173, 281-317.

Bressers, H. T. (2004). Implementing sustainable development: how to know what works, where, when and how. Chapter 10 in: Lafferty WM (Ed.) *Governance for sustainable development: The challenge of adapting form to function*, Cheltenham: Edward Elgar Publishing.

Castelfranchi, C. (2000). Conflict ontology. In *Computational conflicts* (pp. 21-40). Springer, Berlin, Heidelberg.

CCMT (2015) Roles and Responsibilities in Rural Local Governance in Zimbabwe: Parallels, Overlaps and Conflict, Harare: Centre for Conflict Management and Transformation (CCMT).

CCMT. 2013. CCMT Annual Report 2013. Available online: https://www.africaportal.org/publications/ccmt-annual-report-2013/

Charewa, A. T. (2017). *An Investigation into the adaptation strategies to climate change impact on food security: The case of Makore Ward 1 Gokwe North district* (BSc dissertation, BUSE).

Chatiza, K, Muchadenyika, D, Matumbike, D, Sakarombe, W, Nyamukapa, T and Chikowore, N. (2014). Status of social accountability in the delivery of services by public institutions with an emphasis on local authorities. Available online: https://zimbabwe.actionaid.org/sites/zimbabwe/files/status_of_social_accountability_in_delivery_of_services_zimbabwe_october_2014.pdf.

Chimininge, V. (2014). Zion Christian Church. Chapter 2 in: Chitando, E, Gunda, M.R and Kügler, J (Eds.). *Multiplying in the Spirit: Africa initiated churches in Zimbabwe*, Bamberg: University of Bamberg Press.

Coser, L. A. (1957). Social conflict and the theory of social change. *The British Journal of Sociology*, *8*(3), 197-207.

Darly, S and Torre, A, 2013. Land-use conflicts and the sharing of resources between urban and agricultural activities in the Greater Paris Region. Results based on information provided by the daily regional press. In: Noronha Vaz, T, Leeuwen, V.E, Nijkamp, P. (Eds.) *Towns in a rural world*. Ashgate, London.

Deininger, K and Castagnini, R. (2006). Incidence and impact of land conflict in Uganda. *Journal of Economic Behavior and Organisation*, 60(3), 321-345.

Diamond, L. (1997). Training in conflict-habituated systems: Lessons from Cyprus. *International Negotiation, 2*(3), 353-380.

Donge, J. K and Pherani, L. (1999). Law and order as a development issue: land conflicts and the creation of social order in southern Malawi. *The Journal of Development Studies*, 36(2), 48-70.

Fred-Mensah, B. K. (1999). Capturing ambiguities: communal conflict management alternative in Ghana. *World Development,* 27(6), 951-965.

Government of Zimbabwe (2013) Constitution of Zimbabwe (Amendment No. 20) Act, Harare: Government of Zimbabwe.

Grimble, R. (1998). Stakeholder methodologies in natural resource management. Available online: https://gala.gre.ac.uk/id/eprint/11697/1/11697_Grimble_Stakeholder%20methodologies%20%28book%29%201998.pdf

Grossman, S. J and Hart, O. D. (1992). An analysis of the principal-agent problem. In *Foundations of Insurance Economics* (pp. 302-340). Springer, Dordrecht.

Gwimbi, P. (2009). Cotton farmers' vulnerability to climate change in Gokwe District (Zimbabwe): impact and influencing factors. *Jamba: Journal of Disaster risk studies*, 2(2), 81-92.

Gwimbi, P and Mundoga, T. (2010). Impact of Climate Change on Cotton Production Under Rain-fed Conditions: Case of Gokwe. *Journal of Sustainable Development in Africa*, *12*(8), 59-69.

Hanyani-Mlambo, B. T, Sibanda, S and Rukuni, M. (2000). Farming systems in Zimbabwe's smallholder agricultural sector: the case of Gokwe South District. Available online: https://scholar.google.com/scholar?cites=16311559636032452638andas_sdt=2005andsciodt=0,5andhl=en

Himes, J. S. (1966). The functions of racial conflict. *Social Forces, 45*(1), 1-10.

Hove, J. (2014). The role of contract farming on cotton production and peasantry livelihoods: the case of Jiri communal lands of Gokwe South in Zimbabwe.

Jingura, R. M, Sibanda, S and Hamudikuwanda, H. (2001). Yield and nutritive value of tropical forage legumes grown in semi-arid parts of Zimbabwe. *Tropical Grasslands*, *35*(3), 168-174.

Li, L. (2017). Balancing Rural and Urban Development: Applying Coordinated Urban–Rural Development (CURD) Strategy to Achieve Sustainable Urbanisation in China *Sustainability* 2017, *9*, 1948; doi:10.3390/su9111948

Lombard, M. (2015). Land conflict in peri-urban areas: Exploring the effects of land reform on informal settlement in Mexico, Urban Studies 2016, Vol. 53(13) 2700–2720.

Lombard, M. (2016). Land conflict in peri-urban areas: Exploring the effects of land reform on informal settlement in Mexico. *Urban Studies*, 53(13), 2700-2720.

Maburutse, B. E, Mutibvu, T, Mbiriri, D. T and Kashangura, M. T. (2012). Communal livestock production in Simbe, Gokwe south district of Zimbabwe. *Online Journal of Animal and Feed Research*, *2*(4), 351-360.

Maiga, I and Diallo, G (1998). Land tenure conflicts and their management in the region of Mali. *IIED, London,* 5 – 17.

Manzetti, L and Wilson, C. J. (2007). Why do corrupt governments maintain public support? *Comparative Political Studies*, *40*(8), 949-970.

Mashango, G. (2015). Conservation Agriculture challenges in developing countries and possible suggestions-the case of Gokwe South District, Zimbabwe. *Zimbabwe Journal of Technological Sciences*, 2015m 71-87.

Maslow, A. H. (1943). Conflict, frustration and the theory of threat. *The Journal of Abnormal and Social Psychology*, *38*(1), 81.

Masvaya, E. N, Nyamangara, J, Nyawasha, R. W, Zingore, S, Delve, R. J and Giller, K. E. (2010). Effect of farmer management strategies on spatial variability of soil fertility and crop nutrient uptake in contrasting agro-ecological zones in Zimbabwe. *Nutrient Cycling in Agroecosystems*, *88*(1), 111-120.

Mberengwa, N. (2016). The rise and phenomenal growth of Samuel Mutendi's Zion christian church in the Shangwe area. Available online: https://www.semanticscholar.org/paper/The-rise-and-phenomenal-growth-of-Samuel-Mutendi%E2%80%99s-Mberengwa/b645f6f477952902670b7e7b46ea324b782a63cb?p2df

Mitchell, D. (Ed.). (2005). *Contextualizing inclusive education: Evaluating old and new international paradigms*. London: Routledge.

Mlambo, A. S. (2009). *From the Second World War to UDI*, 1940-1965 pp75-114 in in Raftopoulos B and Mlambo A (Eds.) Becoming Zimbabwe: A History from Pre-colonial Period to 2008, Harare: Weaver Press.

Mora, O, Le Mouël, C, de Lattre-Gasquet, M, Donnars, C, Dumas, P, Réchauchère, O and Barzman, M. (2020). Exploring the future of land use and food security: A new set of global scenarios. *PloS one*, *15*(7), e0235597.

Mtetwa, E and Nlanga, G. (2018). The Effects of Depressed Prices of Cotton on Sustainable Livelihood for Communal Farmers in Zimbabwe. The Case of Ward 6, Gokwe South District. *Journal of Gleanings from Academic Outliers*, 7(1), 25-40.

Ncube, A. (2017). Cultural dynamism as a solution to ethnic conflict the case of Gokwe south district 1950-2017. Available online: https://www.semanticscholar.org/paper/Cultural-dynamism-as-a-solution-to-ethnic-conflict-Ncube/20b75dc0ea3eb014df334d0b77b22b9ee2560fe8?p2df

Nhodo, L, Dube C and Mafongoya O.M. (2012). Civil society, new farming technologies and acceptability by local communities in Zimbabwe: A case study of conservation farming project in Gokwe South district in Zimbabwe.

Nyambara, P.S. (2001). Immigrants, 'Traditional' Leaders and the Rhodesian State: The Power of 'Communal' Land Tenure and the Politics of Land Acquisition in Gokwe, Zimbabwe, 1963–1979. *Journal of Southern African Studies*, 27, 771 - 791.

Nyota, S. (2015). Language shift among the Tonga of Mkoka? Assessing ethnolinguistic vitality in Gokwe South. *South African Journal of African Languages*, *35*(2), 215-224.

Onoja, A. O and Achike, A. I. (2011). Implications of large-scale land acquisitions by foreign investors for Nigerian agricultural policy reforms and foreign investment drive. A paper presented at the Sixth Annual conference organised by Trade Policy Training Centre in Africa, Arusha, Tanzania, held 24 – 25 November, 2011.

Platteau, J.P. (1996). The evolution theory of land rights as applied to Sub-Saharan Africa: a critical assessment. *Development and Change*, 27, 29-86.

Robert, D.L. (2018). Samuel Mutendi of the Zion Christian Church: Interpretations of a Prophet. *Journal of African Christian Biography*, 3(2),5-10.

Robinson, J. (2015). ‘Arriving at ’urban policies: the topological spaces of urban policy mobility. *International Journal of Urban and Regional Research, 39*(4), 831-834.

Sachingoma, A. (2016). *Climate change adaptation and conflicts in rural communities: a case of smallholder farmers in Gokwe South District* (BSc dissertation, BUSE).

Sannikov, Y. (2008). A continuous-time version of the principal-agent problem. *The Review of Economic Studies, 75*(3), 957-984.

Sawada, Y and Koike, T. (2016). Towards ecohydrological drought monitoring and prediction using a land data assimilation system: A case study on the Horn of Africa drought (2010–2011). *Journal of Geophysical Research: Atmospheres*, *121*(14), 8229-8242.

Schweitzer, J. (2016). How contracts and culture mediate joint transactions of innovation partnerships. *International Journal of Innovation Management*, *20*(01), 1650005.

Scott, A.J and Storper, M. (2015). The nature of cities: the scope and limits of urban theory. *International Journal of Urban and Regional Research*, 39(1), 1-15.

Sobel, J. (1993). Information control in the principal-agent problem. *International Economic Review*, 34(2), 259-269.

Teferra, F and Beyene, F. (2014). Indigenous claims and conflicts in managing the Abijata-Shalla lakes National Park, Ethiopia. *International Journal of Biodiversity Science, Ecosystem Services and Management*, 10(3), 216-227.

Teklehaimanot, G and Balakrishnan, M. (2017). Population Status, Feeding Ecology and Habitat Association of the Common Warthog (Phacochoerus africanus) in Bale Mountains National Park, Ethiopia. *International Journal of Ecology and Environmental Sciences*, 43(3), 185-194.

Temenos, C, Baker, T and Cook, I. R. (2019). Inside mobile urbanism: cities and policy mobilities. *Handbook of Urban Geography*. Edward Elgar Publishing. In Tim Schwanen and Ronald van Kempen (Eds.), Handbook of Urban Geography (pp. 103–118). Cheltenham: Edward Elgar Publishing.

Thangarajah, J, Winikoff, M, Padgham, L and Fischer, K. (2002, July). Avoiding resource conflicts in intelligent agents. *ECAI*, 2, 18-22.

Thomas, E. (2015) *South Sudan*: *A Slow Liberation*, London: Zed Books.

Toelstede, B. (2020). Social hierarchies in democracies and authoritarianism: The balance between power asymmetries and principal-agent chains. *Rationality and Society*, 1043463120904051.

Torre, A, Melot, R, Magsi, H, Bossuet, L, Cadoret, A, Caron, A, Darly, S, Jeanneaux, P, Kirat, T, Pham, H.V, Kolokouris, O, (2014). Identifying and measuring land-use and proximity conflicts: methods and identification. SpringerPlus 3, 85–111.

Traditional Leaders Act of 1998, Chapter 29.17, Government of Zimbabwe.

Turner, B. S. (2017). Contemporary citizenship: Four types. *Journal of Citizenship and Globalisation Studies*, 1(1), 10-23.

Van Leeuwen, M., Zeemeijer, I, Kobusingye, D, Muchunguzi, C, Haartsen, L and Piacenza, C. (2014). The Continuities in Contested Land Acquisitions in Uganda. *Everyday Forms of Land Grabbing in the Great Lakes Region*, 103-24.

Wehrmann, B. (2008). Land conflicts A practical guide to dealing with land disputes Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Eschborn, GTZ.

Xu, X, Peng, H. Xu, Q, Xiao H and Benoit, G. (2009). Land Changes and Conflicts Coordination in Coastal Urbanisation: A Case Study of the Shandong Peninsula in China, *Coastal Management*, 37(1), 54-69.

Xu, Z, Zhang, Z and Li, C. (2019). Exploring urban green spaces in China: Spatial patterns, driving factors and policy implications. *Land Use Policy*, *89*, 104249.

Yamano, T and Deininger, K. (2005). Land conflicts in Kenya: causes, impacts and resolutions. FASID Discussion Paper. Available online: http://www3.grips.ac.jp/~yamanota/Land%20Conflicts%20in%20Kenya%20(FASID%20DP).pdf

## A4: Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe[29]

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### Introduction

Change is an inevitable phenomenon that should be embraced in governance and management issues. Social changes that constantly take place have impacted on ecological interactions. Understanding the contribution of socio-ecological dynamics to governance is a vital tool to unravelling complex ecological systems (Michael and Madon, 2017). Apart from being complex, socio-ecological systems are dissipative and volatile, representing uncertainty features that need to be placed at the forefront of all efforts targeted towards societal transformation. Societies continue to change and evolve and so does their interactions with the ecosystem. Such dynamics whose defining characteristics are 'uncertainty and complex' have led to dynamical challenges that require a well framed approach that improves and balances human-nature evolving relations. Earlier studies on ecological studies focused on the natural environment as a separate entity from the human activities. However, in attemptingto seek better appreciation that there is causal-effect relationship between the two, recent studies have resorted to 'socio-ecological' systems analysis (Seixas, 2002). It is important to also manage and control humans and their activities as they have a bearing upon the changes that take place on the natural ecosystem.

It is now widely recognised that social issues, whetherarising in the health and disease, food and agriculture, natural resource and environment, or even within socio-economic/political domains, inevitably represent complex dynamical problems. Given such systemcomplexity, the rational planning and institutional frameworks used traditionally are particularly ill-suited for their effective management. Complex socio-ecological changes have progressed in many settlements which brought uncertainties towards community development. Where there is no comprehensive system that is adaptive, the socio-ecological changes may outpace

[29] *Journal of Land and Rural Studies*

communities' resilient capacity. An understanding of the socio-ecological dynamics in rural settlements enables the formulation of relevant policies and plans that meet the arising needs of the changing settlements. Rural settlements have not been spared of socio-ecological changes due to the inevitable volatility of human settlements. Population growth, social and ecological changes are amongst the dynamics facing rural settlements with migration as the contributing factor. Diverse socio-eco-political drivers influence the migration of people from one place to the other in search of better living standards (Niva, Taka and Varis, 2019). Armengol (2010) alludes that the movement of people has brought changes to the receiving areas affecting ecological, social and economic aspects. The modern world has brought many changes that have impacted the functioning of rural settlements from ecological, economic, social and environmental matters. Varying changes that have brought many challenges to rural societies that require resilience and adaptation to sustain human livelihoodsexist (Schouten, Van Der Heide and Heijman (2009). Modern changes have seen the loss of many culturally held practices and beliefs in most remote areas.

The dynamics and changes for the Mbire region can be classified according to changes in population growth, livestock population and cotton farming expansion. With increases in population growth, changes in the land-use and natural-ecology of the regionhave occurred (Baudron, 2011). The study focuses on socio-ecological dynamicspaying particular attention to Mbire district. It explores the history of the district and various social challenges facing the local community. The objective of the paper is to investigate the socio-ecological dynamics within rural settlements in Mbire, Zimbabwe. The article provides reasons beyond people's migration to Mbire from some parts of Zimbabwe. It brings out the increase in school dropouts in Mbire and how teachers are understaffed. The study unravels the issues concerning black magic that was practised then, the school dropouts in Mbire, the history of people moving in search of salt, their communication with spirit mediums and cotton farming.

Limited research is done to assess human contribution towards changes in the natural ecosystem. Thus, the paper puts a focus on the changes within a rural settlement which gives a basis for policy formulation that improves societal development in the region. Paying particular attention to Mbire rural district, the main objectives of the paper include: investigating socio-ecological dynamics within rural settlements particularly Mbire district, describing the Mbire district and analysing the ecological challenges being experienced within the district. The

results from the research review the existing dynamics and socio-ecological challenges within the district and how the people are coping in meeting their livelihood and development needs.

The findings from the study are laid out according to major themes addresed in the paper. The study reveals that the socio-ecological dynamics taking place in various setlements particularly the Mbire District require a systems approach ingenerating solutions. The paper shows that human economic activities continue to evolve and this has an impact upon the natural environemnt. Working together with the communities for the cause of environmental managemement helps develop sustainable solutions that maintain a well-balanced socio-ecological system. The paper contributes to the knowledge body through promoting the analysis of socio-ecological dynamics in rural settlements, giving an appreciation of the history of the Mbire rural district and revealing the challenges the communities face in trying to meet their livelihoods needs and requirements. The study begins with a literature review that describes the various socio-ecological challenges being faced by most rural settlements then follows the research methodology that details how the study was carried out. The results and discussion sections give insights on specific experiences of the Mbire district people regarding socio-ecological matters.

**Socio-Ecological Dynamics'-Experiences in Rural Settlements**

Research on socio-ecological dynamics emerged long back aiming to understand the cross-scale interlinkages between societies and their natural environment (Martin-Lopez, 2020). The understanding and appreciation of the importance of socio-ecological research are seen in its contribution towards policymaking as the complex dynamic systems are explored extensively (Diaz *et al.* 2015). The achievement of Sustainable Development Goals (SDGs) is enhanced effectively by understanding socio-ecological dynamics. Martin-Lopez (2020) alludes that it is imperative to understand the spatial-socio-ecological interactions across regions as this creates a workable base for policymaking. He provides a comparative example where increasing protected zones in Europe can lead to a displacement in the farm production in other regions where food and raw materials are imported. Such cross-site or regional comparisons enhance sustainable-development-knowledge regarding socio-ecological interactions and thus enhance better policymaking (Balvanera *et al.* 2017).

Rural settlements are going through various changes due to various factors, including population growth and various policies that have affected the thriving ecology of the areas. This is evidenced by the loss of biodiversity and environmental degradation. The growth in rural areas varies depending on location, economic and administrative setup. Some rural areas thrive on agricultural activities while others are advancing in the service and business sector for their livelihoods (FAO, 2017). This is a more reliable shift in many rural areas as it provides substitutes to agriculturally based livelihood activities as climate change is taking its toll against nature and causing seasonal variations that may affect farm produce. Therefore, it is imperative that an in-depth understanding of the socio-ecological aspects of rural regions be understood to proffer resilient strategies by boosting the capacity of rural areas.

Most rural regions have experienced many changes due to climate change and other factors. Hanke *et al.* (2017) highlights the experiences of rural areas in Western Madagascar that are severely affected by climate change witnessed by crop failure and increasing poverty. Despite the intensive efforts by most governments and NGOs in development projects, regions still suffer from compromised livelihoods. Due to severe development problems, much stress is imposed upon the environment and bio-diversity. Approximately 45% of forest cover is depleted in the Spiny Forest in the past (Brinkmann *et al.* 2014). This reveals an interconnection or relation that exists between humans and animals. Without proper management and co-relation between the two, the consequences will be felt by both groups (Hanke *et al.* 2017). As population growth for humanity increases, nature is exploited and yet with its exploitation, humans will also suffer as they depend on it for their livelihoods.

Holling (2001) describes sustainability in the context of socio-ecology as panarchy, that is, the extent to which a system invents, tests and retains adaptive capacity while benefitting from the new opportunistic inventions, but being safe and resilient from excessive consumption and exuberance. Humans depend on nature's providence for support (Michael and Madon, 2017). However, the rapid population increases and the damaging human activities have changed the outlook of ecosystems in unprecedented ways. If not managed well, ecosystem mismanagement at a local level may escalate to become huge and uncontrollable global issues (Holling, 2001). With the rapid expansion of human settlements and the resultant deforestation ecosystem mismanagement has caused serious climate change problems. The mismanagement and poor socio-ecological interactions resulted in the spreading of COVID-19 as a result of the

widespread deforestation and human settlement expansion (Martin-Lopez *et al.* 2020). The virus found in bats had no harm to humans just as long as their interaction was distantly maintained, but, the socio-ecological interactions have resulted in the deadly pandemic.

*Livelihoods Coping Strategies by Local Communities*

The existence of socioecological traps that are often experienced by rural people has had adverse effects on their livelihoods (Hanke et al. 2017). 'Poverty trap', is a typical example and has locked people in extreme poverty (Maru et al. 2012). Poverty traps are described as socio-economic challenges that affect people as they become locked-in and are vulnerable to poverty as they will be disconnected from natural ecosystems. The degradation of the environment sets people at a more vulnerable state to poverty as the natural source of their livelihoods gets depleted (Hanke et al. 2017). The relationship between humans and nature is such that a misuse of nature by humans that lead to exhaustion can haunt back the people as they will suffer the results of poor ecological management. However, Michael and Madon (2017) denote that not only natural and ecological imbalances by human activities lead to intense poverty, but the poor policies that are rigid and do not accommodate the changing ecosystems have placed rural settlements in a more vulnerable state.

There is the resource production or consumption trap that has massively contributed to the extinction of biodiversity. When population increases, people encroach animal and wildlife sanctuaries thus reducing wildlife. Brinkmann et al. (2014) explain this trap as a scenario when humans overconsume natural resources at a rate that outpaces the production of the resources. This is evidenced by the loss of vegetal cover, the migration of wildlife from the original zones and the loss of soil fertility as people overuse the ground (Hanke et al. 2017). This is evidence of the undeniable relationship that exists between humans and nature. Ecology is to be guarded jealously if human life is to be sustained continuously as a result of the imbalance. The end-result of poor ecological management results in speeding up climate change. As the vegetal cover and natural resources are depleted, there is more room created for climate change to accelerate and this is evidenced by climate variability and the occurrence of droughts in seasons where rainfall is expected (Hanke et al. 2017).

Socio-ecological issues that arise in human settlements in varying domains, such as political, agriculture and natural resources management, present a web of problems that render the old

rational planning approaches less effective (Michael and Madon, 2017). Most people in developing countries like Zimbabwe are struggling to make ends meet as their livelihoods are compromised making them vulnerable. The Mbire District is a typical example of compromised livelihoods. The Mbire District experiences high temperatures and often has seasonal droughts (Janssen, 2010). The district faces infrequent rainfall patterns that are often characterised by flooding worsening and compromising livelihoods. Such complex and dynamic socio-ecological problems now demand a more comprehensive and diverse approach that incorporates multiple stakeholders in policymaking. Such inclusion and diversity enhance effective policies that meet rising community needs and lead to ecological balance.

*Environment and Resource Endowments*

As climate change becomes a more imminent factor, rural settlement resilience becomes very important. Heijman et al. (2007) state that integrating resilience for rural development enables the areas to respond and adapt to harsh circumstances at the same time coping and maintaining a liveable standard of life. A more resilient rural setup can be able to tolerate changes by balancing ecological functions (Colding, 2007). Proper management of agricultural activities helps minimise further biodiversity losses (Baudron, 2011). However, there is need to improve agricultural output for better livelihoods conflicts altogether with the need to minimise biodiversity loss. Mbire District's efforts to manage biodiversity and wildlife sustainably is at a slow pace as most of the land was used for agricultural purposes leaving limited land for wildlife. Land-use changes are imminent from the 1980s to around 2007 in the district that was a result of the increasing human and animal population in the area (Baudroon, 2011).

In maintaining socio-ecological balances in rural settlements, Delgadoo-Serrano et al. (2015) highlight the importance of CBNRM when applied towards the protection of common resources by communities. Such management of natural resources by communities is efficient in the Latin American ecosystems. Delgadoo-Serrano et al. (2015) emphasise the importance of bottom-up approaches in dealing with socio-ecological issues. The communities, when given the capacity and knowledge, are best in maintaining ecological systems as they are at the firing ground point. This renders the top-down socio-ecological systems management approaches less effective when the communities are not participating. Various countries have had their experiences in socio-ecological matters.

Where there are poor socio-ecological interactions, conflicts always arise between humans and wildlife. Colombia is experiencing socio-ecological conflicts as the expansion of human population has displaced much vegetal cover and natural resources (Delgadoo-Serrano et al. 2015). Mexico on the other hand has its communities complaining that their efforts to protect natural resources are not being rewarded economically. Again, in Argentina, the communities managed to confront their government to be granted full rights towards the management of natural resources. They have since succeeded in managing forests in a politically peaceful environment. The socio-ecological systems in these areas are maintained highly as there is continuous passing of indigenous knowledge from generation to generation. The population of Argentina are exemplary when it comes to the conservation of natural resources through traditional means and this has maintained a socio-ecological balance in the region (Delgadoo-Serrano et al. 2015).

Conflict exists wherever humans and animals are co-located and especially when sharing common resources (Musiwa and Mhlanga, 2020). Due to the increase in population and domestic animal growth, conflicts will continue to exist with wildlife as their space is invaded. Manjengwa, Feresu and Chimhowu (2012) narrate that the Mbire District isoneof the districts with wildlife management issues as it is located close to wildlife protected zones. This affects human life and poses challenges on the agricultural produce of the communities. The Mbire District is part of the first districts to implement CAMPFIRE programmes targeted towards the management of wildlife species through active participation of the local people. However, conflicting land demands between humans and animals residing in the Mbire District continue to exist. The demand for cultivation land has led to the removal of many animals from areas that humans would have reserved for development and farm activities (Baudron, 2011). Mombeshora and le Bel (2010) recommend effective wildlife management by the community to enhance sustainability.

## Research Methodology

### Study Area

The study was carried out in Mbire District. The Mbire RDC was established in 2006. The district focuses on ensuring the provision of service delivery in the area. However, the economic hardships have deterred efficiency in the meeting of public needs hence some NGOs

are working together with the Mbire Rural District Council (Siyavizva, 2015). The district has approximately 12 clinics, 1 hospital, 34 primary and 15 secondary schools (Siyavizwa, 2015). The CAMPFIRE council is part of the supporting pillars of Mbire District as the income it generates helps the RDC. An understanding of the socio-ecological dynamics in the Mbire district requires an appreciation of the rural settlement.

The settlers in the Mbire District were mostly the Karanga Agro-pastoralist immigrants (Musiwa and Mhlanga, 2020). The wildlife species in the area are affected by the increasing population that has left wild animals with limited space. As oral tradition relates, the Mbire state was established as a result of the search for salt that was later discovered in that region with the emissaries led by Mutota (Zvobgo, 2009). Mbire District is characterised by abundant wildlife as and there are minimal agricultural activities, including agricultural activities giving room for wildlife habitation. The district experiences very erratic and low rainfall. Cotton is the most common crop in the area as it is most suitable for the climate characteristic of the area (Baudron, 2001). Mbire has four Chiefs, several headmen and numerous village heads. The area under the jurisdiction of each of the four chieftainships is shown in Figure P.3. In terms of administrative wards, nine of them fall under Chief Chitsungo (Wards 3, 7, 8, 9, 10, 12, 15, 16 and 17), two under Chief Chisunga (Wards 2 and 11), five under Chief Matsiwo (Wards 4, 5, 6, 13 and 14) and the remaining Ward 1 under Chief Chapoto.

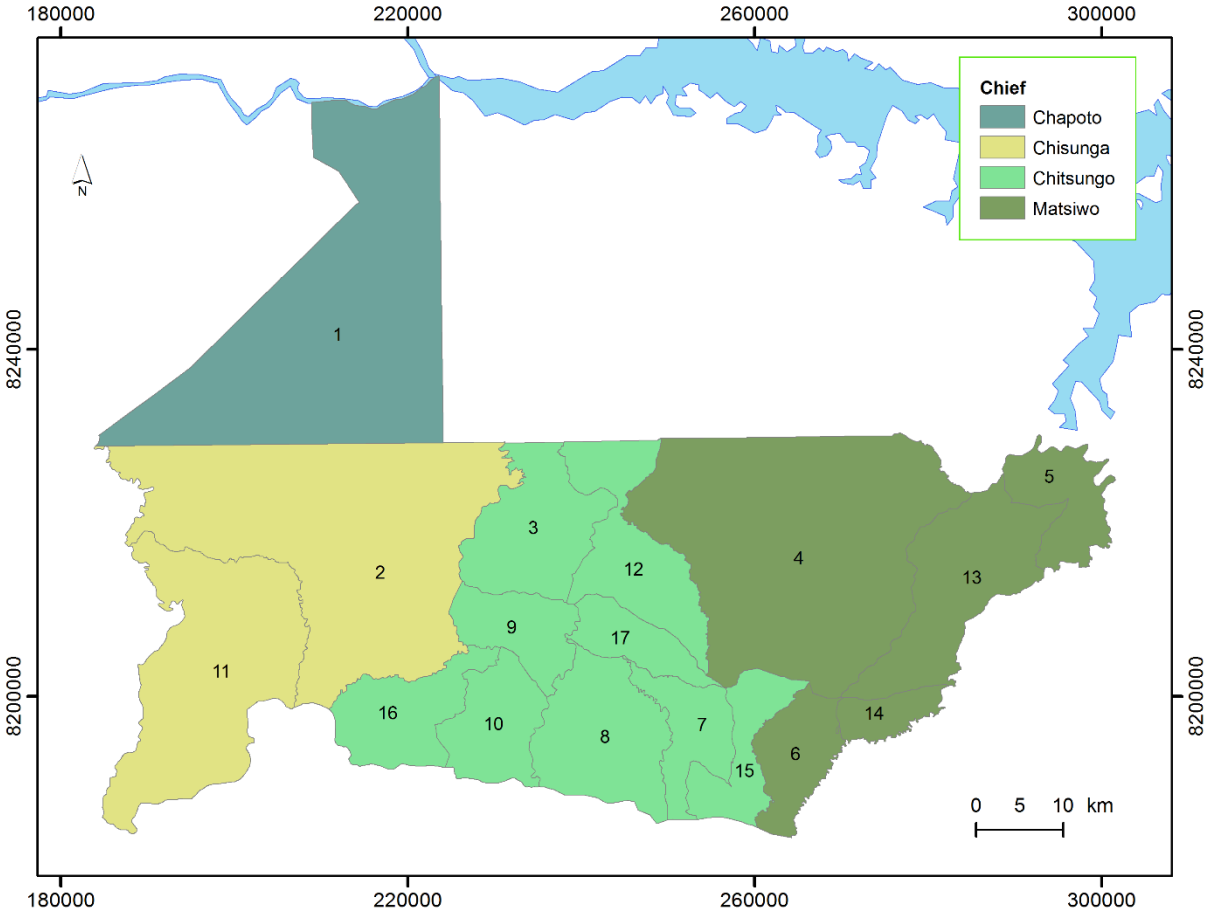


**Figure P.3: Four chiefdoms of Mbire District** (MRDC/AWF, 2020)

## Research Design

The study made use of both primary and secondary research methods in building up the discussion and appreciating the experiences in other rural settlements. The article used open ended structured interviews to gather extensive information from the interviewees. As the study was part of the Mbire RDC Land-Use Plan 'project', interviews were done selectively with the six district elders in July of 2019. The direct interaction with respondents removed all bias and misconceptions that are usually wrought from theoretical analyses as the people would speak for themselves (Matamanda *et al*., 2020). An interview guide was used to guide the research and get the relevant data specific to the research study (Appendix 2 and 3). In every ward, there was an interviewee either a headman or a councillor. Secondary data sources were also accessed to synthesise and concretise the arguments brought forth.

## Results

Based on these results the present (2019) district population is estimated to be 90,342 (Table P.3) and is expected to rise to a little over 100,000 by 2029 (103,920). This analysis does not take into account different rates of growth between different wards, as was demonstrated to have occurred during the previous inter census interval.

Continued population growth will result in enormous pressure on the demand for land for all purposes, including settlements, crops and the grazing of livestock and the provision of health and education facilities and other public utilities and the need for employment. Table P.4 indicates the projected populations by wards for 2019 and 2029 in Mbire District.

**Table P.3: Projected populations by wards for 2019 and 2029 (MRDC/AWF, 2020)**

| Ward | Population 2012 | Projected Population 2019 | Projected Population 2029 |
|---|---|---|---|
| 1 | 3180 | 3507 | 4035 |
| 2 | 4851 | 5351 | 6155 |
| 3 | 6106 | 6735 | 7747 |
| 4 | 7116 | 7849 | 9028 |
| 5 | 5289 | 5834 | 6710 |
| 6 | 4062 | 4480 | 5154 |
| 7 | 2549 | 2811 | 3234 |
| 8 | 8397 | 9262 | 10654 |
| 9 | 4894 | 5398 | 6209 |
| 10 | 6917 | 7629 | 8776 |
| 11 | 1638 | 1807 | 2078 |
| 12 | 6785 | 7484 | 8608 |
| 13 | 5745 | 6337 | 7289 |
| 14 | 2409 | 2657 | 3056 |
| 15 | 5162 | 5694 | 6549 |
| 16 | 2996 | 3305 | 3801 |
| 17 | 3812 | 4205 | 4836 |
| **Total** | **81908** | **90342** | **103920** |

Current numbers and locations of homesteads were derived through visual interpretation of high-resolution Google Earth satellite imagery, whereby individual homesteads (isolated clusters of huts/buildings) were identified and mapped throughout the district. A total of 15,944 homesteads were identified (Table P.4). The highest numbers of homesteads were observed in Ward 13 (2,162), Ward 5 (1,518) and Ward 8 (1,453) while the lowest numbers were observed

in Ward 11 (231), Ward 9 (421) and Ward 1 (439). However, in terms of density of homesteads, the highest densities were observed for Ward 14 (24.83/km$^2$) and Ward 5 (13.40/km$^2$), with the lowest densities being for Wards 11 (0.51/km$^2$) and Ward 1 (0.53/km$^2$). The spatial distribution by wards of numbers and densities of homesteads is shown in Table P.4

**Table P.4: Number and density of homesteads by wards, Mbire District (MRDC/AWF, 2020)**

| **Ward** | **Area (km$^2$)** | **Homesteads** | **Density (no per km2)** |
|---|---|---|---|
| 1 | 835.36 | 439 | 0.53 |
| 2 | 801.38 | 1025 | 1.28 |
| 3 | 200.62 | 1217 | 6.07 |
| 4 | 792.24 | 951 | 1.20 |
| 5 | 113.29 | 1518 | 13.40 |
| 6 | 110.91 | 648 | 5.84 |
| 7 | 102.58 | 548 | 5.34 |
| 8 | 218.06 | 1453 | 6.66 |
| 9 | 109.79 | 421 | 3.83 |
| 10 | 130.06 | 1168 | 8.98 |
| 11 | 450.84 | 231 | 0.51 |
| 12 | 199.01 | 932 | 4.68 |
| 13 | 259.29 | 2162 | 8.34 |
| 14 | 52.12 | 1294 | 24.83 |
| 15 | 103.73 | 785 | 7.57 |
| 16 | 147.51 | 483 | 3.27 |
| 17 | 81.66 | 669 | 8.19 |
| **Total** | **4708.45** | **15944** | **3.39** |

The results are presented to cover the issues of livelihood strategies, land conflicts, environment and natural resources and the existing beliefs and traditions in the district.

*Land as a Political Hot potato*

Distribution of land is amongst the controversial issues that have caused social dissension in many rural settlements. Not only does the land issue affect human relationships, it also affects the natural environment as the protected wildlife zones tend to be encroached due to human population expansion. In Mbire, land disputes emanate as a result of the in-migration of people into the area. As reiterated by the interviewee, the community has to accept people from Gutu. This results in land conflicts as people are forced to subdivide their land to cater for the new

people. If population continues to expand in the area, more wildlife zones will be invaded as the demand for land will increase. Land conflicts are very imminent in rural areas especially with the increasing pressure over land due to population growth. Andersson (1999) alludes that, in most communal areas, the politics over land is socially driven. The Mbire District land politics generally begin with the people versus wild animals. The conflicts exist between humans and animals, as the human population increases, animals are pushed even further away with limited land (Musiwa and Mhlanga, 2020).

Not all parts of Mbire District are fully settled by humans at present. This presents wildlife conservation opportunities based on striking a balance between needs for human settlements and wildlife habitat. The extent of settlement by ward in percentage terms is shown in Table P.5. Six wards have proportions of unsettled areas that are above 40% (Wards 1, 2, 4, 11, 12 and 16).

**Table P.5: Percentage of settled and unsettled land by ward, Mbire RDC 2019 (MRDC/AWF, 2020)**

| Ward Number and Name | Percent (%) land area | | |
|---|---|---|---|
| | **Total** | **Settled** | **Unsettled** |
| **1. Kanyemba** | **100** | **15** | **85** |
| 2. Angwa | 100 | 48 | 52 |
| 3. Madzomba | 100 | 86 | 14 |
| 4. Gonono | 100 | 28 | 72 |
| 5. Chidodo | 100 | 94 | 6 |
| 6. Kasuwo | 100 | 96 | 4 |
| 7. Hambe | 100 | 81 | 19 |
| 8. Karayi | 100 | 77 | 23 |
| 9. Neshangwe | 100 | 79 | 21 |
| 10. Chitsungo | 100 | 84 | 16 |
| 11. Masoka | 100 | 16 | 84 |
| 12. Chikafa | 100 | 57 | 43 |
| 13. Sapa | 100 | 94 | 6 |
| 14. Masomo | 100 | 97 | 3 |
| 15. Mahuwe | 100 | 71 | 29 |
| 16. Monoz | 100 | 52 | 48 |
| 17. Majongwe | 100 | 72 | 28 |

*Beliefs and Traditions*

The long-standing traditions and beliefs of Mbire have seen prolonged gender inequalities as evidenced by the unequal access to education between boys and girls (Janssen, 2010). Their differentiated responsibilities are seen by women specialising in taking care of the family, cooking and garden management while males concentrate on decision-making and other strategic issues. The Mbire culture accepts men having more than one wife. However, due to modernisation, societal improvement and economic hardships, most men have adopted monogamy (Janssen, 2010). Daniel (1970) alludes that the Mbire-Shona religious beliefs are characterised by a high reverence of the Supreme God as the highest authority above their ancestors and is believed to control fertility and to provide rain during drought periods.

With modernity and Christianity in the present world, most rituals and beliefs are no longer followed. Places that were once preserved for wildlife, such as elephants, are invaded and trees have been chopped. This, however has driven awaymany elephants. The relocation of people to Ward 9A was driven by a need for safety as the area was less war-torn and quiet. In verifying

the safety of the place before relocation, they would consult spirit mediums. In facilitating this, the elderly had to bring tobacco and buy ‘mbande” and grind the tobacco to powder, fill it into small clay pots, leave it into bushes for three days. If they find the tobacco not devoured by field mice, it would mean that the ancestors would have approved the place and they would settle and build permanent structures.

*Environment and Resource Endowments*

People practice nutritional gardening in Ward 17A and get fish from the dam. The Natural Resource preservation teams under the RDC, carry out educational and awareness campaigns on how to build kraals. The campaigns and ward commissions are done frequently with people being educated by the Carbon Green, an NGO focusing on environmental management. The forestry people also educate on environmental management. The Carbon Green focuses on the conservation of trees and discourages deforestation. The organisation discourages veld fires and provides money to the council which they decide on development projects implementation. Carbon Green also educates the communities to plant trees to improve the vegetal cover of the areas. Resilience is practiced in various ways by the Mbire community. They harvest water during rainfall time and this has also helped animals in drought seasons. This enhances the communities’ resilience capacity as supported by Young et al. (2006) that the vulnerability of communities under the ongoing climate change can be fought through creating a positive human-environment relationship.

*Human-Animal Conflicts*

Socio-ecological changes are imminent and negative in Mbire District. A good example of the narratives taken from the interviews is the conflicts between humans and animals that are failing to co-exist harmlessly in the same area. There are existing challenges between humans and animals sharing the same space (Musiwa and Mhlanga, 2020). Inward 9A there were issues on elephants that attack homesteads. Apart from human animal conflicts, tension also arises as indigenes try to secure sacred places and as they also try to mantain boundaries with migrants fom places like Gutu. As long as the growth of animals and humans continue to increase, conflicts will always exist and, as such, long-lasting wildlife management solutions that cater for the safety of both humans and animals need to be implemented.

*Institutions and Organisations Operating in the Area*

Three major problems that are being faced in this ward include corrupt leaders and the poor, unequal distribution of land. Some of the leaders, such as the chairman are said to be corrupt as they misuse their office power by exploiting the people below their positions. The election period usually creates problems from the groups that would have lost the elections as they blame the winning party. In most cases, the Councillor faces difficulties in trying to please all stakeholders who in most circumstances hold different views. Some community members would be after overthrowing those in administrative positions from power to attain the positions. However, true leadership ensures transparency and fairness in dealing with the public and their resources. As such, the Councillor tries to manoeuvre his way through and avoid storing some things for the leaders e.g. foodstuffs so that the public benefits. Successful socio-ecological management is facilitated by efficient administrative systems that are in unison with the community and nature's requirements. With so much dissension in the administration of the areas, it becomes difficult to achieve sustainable ecological management.

*Livelihoods Coping Strategies by Local Communities*

Enhanced resilience is a requirement in the district to ensure safe and secure livelihoods for the community. Poor infrastructure in the district compromises the safety of the community. A good example is that of the only existing bridge in the community that is made of wood which is less sustainable in case of heavy floods. The interviewee revealed that the bridge usually gets covered during flood periods and this has resulted in the destruction of nearby fields thus affecting their food-base. The challenge needs to be met urgently before many lives of the community members are affected as it is along the only route used by the community to access the commercial centre.

It is highlighted that the livelihoods of many people in the rural areas are compromised by land shortages, climate change and poverty and the high vulnerability they have to floods. To improve the resilience of rural settlements, there is a need for diversifying livelihoods through infrastructure improvement and agricultural investments amongst many other factors. Technologically-based farm methods are relevant substitutes in times of droughts as they aid in lessening high dependence rain-fed farm practices that are easily crippled once droughts occur (Mucherera and Mavhura, 2020). Mbire District is close to the border and, as such, should explore opportunities presented, such as cross-border trading (Manjengwa, Feresu and Chimhowu, 2012).

There are a number of local rules established to ensure proper land administration systems. These are provided in Box P.1 and discussed in terms of their importance for the Mbire Land-use Plan (MLUP) proposals and their implementation. The different actors/agencies are involved in setting up and enforcing these rules. These rules are important in terms of sustainable land utilisation. They also apply to accessing timber and non-timber forest products that are in abundance in parts of Mbire, such as honey, ilala palm (*Hyphaene petersiana*), thatching grass, medicines, charcoal, poles, fruits and salt. At ward and village level these rules are the domain of traditional leaders and spirit mediums. Fines are imposed where one offends; these include goats, cattle and cash depending on the gravity of the offence and the social circumstances of the offender, for instance whether it is a first or repeat offence. The visibility of Council in village and ward-level enforcement of land administration rules appears inadequate partly because the land allocation system empowers traditional institutions more than Council. This strategic gap weakens land-use planning preparation, implementation and enforcement of development conditions. The gap affects all land-uses and land classes.

**Box P.1: Local Land Administration Rules in Mbire (MRDC/AWF, 2020)**

1. No cutting down of trees, dragging of logs and ploughs
2. No veld fires
3. Building a toilet at every homestead (rule suggests toilets must be established before houses)
4. Not settling in grazing areas
5. Observing the 'resting day'/*Chisi*
6. Observing proper livestock husbandry practices like having secure pens to keep them overnight and herding
7. No to wildlife poaching (anti-poaching rule)
8. Cutting crop stalks on time especially cotton
9. Payment of development/land levies and other service fees e.g., at dip tanks
10. Respecting local leaders, including spirit mediums
11. Not entering sacred sites unsupervised and while wearing shoes
12. Not burying people at homesteads and respecting '*Tsokoto'*/where Chiefs and Spirit Mediums are buried

*Emerging Issues*

The problem of dropouts has become a growing challenge in Mbire District. Village 9C has one of the highest numbers of school dropouts. The narrator describes that at the beginning of 2019, they were around 580 students but decreased to 400. It is difficult to point to one problem

as the cause for the dropouts' challenge. The issue is intertwined in a web of problems that include the failure of parents to afford school fees for their children, the children not appreciating the importance of education and the challenge of dangerous animals that make it difficult for children to walk safely to school. Most schools are understaffed with an unbelievable student-teacher ratio. A good example given was a scenario where teachers end up attending to 70 students instead of 40 students per teacher. This reduces the effectiveness of education and affects results.

Upgrading the social lives of the Mbire people especially in regards to education is held back due to the high number of untrained teachers. The interviewee explained that the schools managed to get a full complement of trained teachers in 2015. As from the 2014 going back, there were untrained teachers except for the deputy head masters. Under such circumstances, it becomes difficult to operationalise the new curriculum in the district as there is lack of sufficiently trained workforce to teach students. Wild animals, such as elephants, also make it difficult for students to attend school. This makes teaching less effective. More so, due to climate change drought effects, most teachers' livelihoods were affected especially under low salaries that are already demotivating. Education implants self-help skills that can improve the livelihoods of people when agriculture fails to yield enough. However, more needs to be done in Mbire district to improve educational facilities and upgrade their livelihoods. Apart from farming activities, socio-ecological interactions, in the presence of people with other sources of livelihoods, are positively enhanced.

**Discussion**

In the growth and development of human settlements, social and ecological changes are inevitable (Seixas, 2002). As communities grow, demands on nature to meet their livelihood need change and this impacts ecological balances. Whereas, socio-ecological dynamics are inevitable, there seems to be a huge reluctance upon governing institutions to monitor the changing needs of communities and draft accommodative policies. The growth in population usually tears down the thriving and available natural resources, especially when there is no effort to improve the natural resource management. The existence of non-governmental organisations in the management of natural resources is of huge importance especially when the communities are incapacitated to perform natural resources management activities. Most of the rural areas in Zimbabwe are struggling on developmental matters, as such, they have

resorted to public-private partnerships that enable funding and ensures development (Siyavizva, 2015). However, community participation needs to be a common goal as it equips community members to protect what 'belongs to them'.

Social systems and the natural ecosystem thrive on each other. But to a greater degree, humans depend on nature and thus the need to thrive for a socio-ecological balance (Koczberski *et al*. 2009; Mutopo, 2014; Oberlack *et al*. 2016). The forces that motivate human activities need to be understood to assess the impacts on natural ecosystems. Human activities whether political, cultural and economic, have a bearing upon the ecosystem changes (Petrosillo, Aretano and Zurini, 2015). Some of the easily recognisable activities include mining and farming. With the continued increase in populations, humans will always demand land for cultivation and residence and this disturbs the natural ecosystem. There is need for proper planning boards to counter such challenges while meeting human needs. For Mbire, the increase in the number of school dropouts is a cause for concern. It brings to surface the human-animal conflicts that are affecting development progress.

In this era of modernity and global change, resource dynamics become more and more variable (Lade *et al*. 2013) and without proper management, settlements regress towards unsustainability. Thus, the gaining of alternative skills for livelihoods development is a recommendable issue to avoid overexploitation of natural resources. However, Zembere (2014) alludes that Mbire District faces challenges in the aspects of education as most of its schools are understaffed and lack qualified teachers. There are shortages of manpower in most schools due to the exodus of many teachers to urban areas and neighbouring countries. The district resorted to employing primary school teachers for service in secondary schools leading to poor quality education for the students. The long distances to school from students' homesteads demotivate them leading to many dropouts (Zembere, 2014). Access to quality education enables humanity to crawl easily to secure modest livelihoods as people become knowledgeable about various income-generating skills and generally becoming open-minded.

In terms of technological development, the Mbire District's development is one of the slowest. Janssen (2010) denotes that the infrastructure development in the area is poor, with no electricity and water supply as people rely on boreholes. Janssen (2010) reiterates that the district was not connected through communication infrastructure as it was not connected by

landline. The poor health facilities that include the lack of government hospitals with the existing facilities understaffed and lacking resources place rural settlements in a vulnerable position that entangles them in unending poverty. Under such circumstances, existing institutions need to brace up and work cooperatively with the communities to bring the needed developmental change. The existing institutions have distinct purposes with most of them focusing on environmental management. However, countering development challenges may somehow demand unitary comprehensive management.

The political arena of Mbire is composed of two administrative structures that are national and traditional (Janssen, 2010). The traditional administrative structure comprises of chiefs and other local members and it reports to the national structure. The traditional structure oversees the management of wards and focuses on local matters. The national structure is superior to the traditional structure and this is managed by parliamentary delegates (Janssen, 2010). Giller *et al*. (2008) reiterate that most leadership and administrative conflicts emanate from land claims, especially in most developing countries. The need to improve the nourishment of settlers in Mbire requires fair land allocation and in trying to meet up the needs, conflicts are imminent.

The growth and expansion in land-uses as a result of increasing populations has had a detrimental effect on land and natural species. The Councillor recommends that the public be educated on how to manage land and utilise environmentally friendly farm activities that protect the environment. Challenges due to the expansion of the growth point are always there if we are to look into the side that the growth point is expanding to, then people who are on that side are already affected. There is also the issue of soil erosion and gullies, people are now practicing river bank cultivation that is causing siltation in the river. There is not even single vegetation you can find in the river because of siltation. There is sand everywhere because of soil erosion since there is no vegetation to hold the soil particles together.

Human-wildlife conflicts continue to persist especially with the invasion of wildlife territories by human population. When wild animals become a danger to human life, humans retaliate by killing the animals. Without urgent action to solve these conflicts, there is a risk of wildlife extinction as the killing is done to ensure a safer and habitable human environment. There is need to manage the area as it was in earlier times with manageable livestock and human population. In the past, land reserved for wildlife could neither be tilled nor be allowed to be

denuded through the wanton cutting of trees. People would come and report attacks on their cattle and goats and the security of the kraals was checked. The partial enforcement of environmental laws leaves harmful endangered wildlife species at the mercy of humans as they kill them for their protection. Socio-ecological changes and disconnections continue to exist that need urgent action to bring back the human-nature balance especially amidst the climate change debacle.

**Conclusion**

The article sought to assess the socio-ecological changes that are being experienced in most rural areas in Zimbabwe with particular focus on Mbire District. The article revealed the history of Mbire through exploring the migration of the people and their settling into the area. Some of the emanating issues that require urgent action in the district are the high number of school dropouts and the understaffed schools. The cultural beliefs of the district are also revealed and how they treasure their ancestral spirits and consult them before making important decisions. The article revealed the livelihoods of the people and how they are sustained by NGOs and cotton farming for their living.

Socio-ecological dynamics continue to exist resulting in the changes in people's lifestyles, their culture, education and economic base. Many districts and regions have a historical background that needs to be kept vivid for the modern generation to appreciate. Humans are mandated to take care of nature and ensure sustainable preservation of natural resources and wildlife species as they coexist with nature. There are rising conflicts between humans and animals in the Mbire District and the onus is upon the humans to accommodate wildlife and ensure the protection of their lives too. More wildlife protection measures are relevant especially with the rising human population that tends to drive animals away or leave small habitable places as humans encroach in wildlife protected areas. From all the above information, people in Mbire seem to survive with the little they have and there is much positive change happening i.e., electrification, dams, dip tanks and schools being built. Mbire the Mutota Empire was built in that area and there is much legacy and tradition in the Mbire area famed for its discovery and abundance of salt and bicarbonate soda. Spirit mediums in the area play a very important role in that they help in guiding inter-generational transfer, access to land use, allocation, settlement, distribution and management regimes. Cotton was important in this area as they seem to survive much on it, they sell it as a cashcrop and they get money.

The study recommends the need for livelihoods improvement through community protection and resilience initiatives. Wildlife animals must be placed in protected zones away from humans. The separation of animals from people will also ensure the reduction of school dropouts that are as a result of wildlife distraction. There is a need to provide favourable work conditions for teachers to attract qualified personnel that ensure quality education in the district. However, there are some areas that require further research which include the need to explore sustainable ways of easing human-wildlife conflicts and improving school attendance for human capital development. New research may examine whether or not it is feasible to introduce alternative livelihood means in rural settlements that ease human exploitation on natural resource endowments.

**References**


Andersson, J. A. (1999). The Politics of Land Scarcity: Land Disputes in Save Communal Area, Zimbabwe. *Journal of Southern African Studies*, 25(4), 563-578.

Armengol, A. O. (2010). The Rural-Urban Sociological Transformation of Mediterranean Mountain Areas under Global change. Local Studies in Olzinelles and Matadepera (Barcelona Metropolitan Region). Universitat Autonoma de Barcelona (UAB).

Balvanera, P, Daw, T.M, Gardner, T.A, Martín-López, B, Norström, A. V, Speranza, C.I, Spierenburg, M, Bennett, E. M, Farfan, M, Hamann, M, Kittinger, J. N, Luthe, T, Maass, M, Peterson, G. D and Perez-Verdin, G. (2017). Key features for more successful place-based sustainability research on social-ecological systems: A Programme on Ecosystem Change and Society (PECS) perspective. *Ecology and Society*, 22(1), 14

Baudron, F. (2011). *Agricultural Intensification-Saving Space for Wildlife?* C.T. de. Wit Graduate School of Production, Ecology and Resource Conservation. Wageningen University.

Bola, G. et al. (2013). Coping with Droughts and Floods: A Case Study of Kanyemba, Mbire District, Zimbabwe. *Journal of Physics and Chemistry of the Earth*.

Brinkmann, K, Ratovonamana, R. Y, Buerkert, A and Fanambinantsa, N. (2014). Deforestation Processes in south-western Madagascar over the past 40 years: What can we learn from Settlement characteristics? *Agriculture, Ecosystems and Environment*, 195(1), 231-243.

Colding, J. (2007). Ecological Land-use Complementation for Building Resilience in Urban Ecosystems. *Landscape and Urban Planning*, 81: 46-55.

Daneel, M. L. (1970). the god of the Matopo Hills: An Essay on the Mwari Cult in Rhodesia. STH Articles, Papers and Essays. Boston University.

Delgado-Serrano, M, Oteros-Rozas, E, Vanwildemeersch, P, Ortiz-Guerrero, C, London, Silvia and Escalante, R. (2015). Local Perceptions on Social-Ecological Dynamics in Latin America in Three Community-Based Natural Resources Management Systems. *Ecology and Society*, 20(4): 24-38.

Díaz, S. et al. (2015). The IPBES Conceptual Framework – connecting nature and people. *Current Opinion in Environmental Sustainability*, 14, 1–16

FAO (2017). *The State of Food and Agriculture: Leveraging Food Systems for Inclusive Rural Transformation*. Rome: FAO.

Giller, K.E, Leeuwis, J.A Andriesse, A. W. and Brouwer, A. (2008). Competing claims on natural resources: What role for science. *Ecology and Society*, 13(2), 34-45.

Gregory, P.J, Meybeck, M, Betts, R, Brovkin, V and Ortez-Monasterio, I. (2002). Environmental consequences of alternative practices for intensifying crop production. *Agriculture, Ecosystems and Environment*, 88, 279-290.

Hanke, H, Barkmann, J, Coral, C, Kaustky, E. E and Marggraf, R. (2017). Social-ecological traps under rural development in South-western Madagascar. *Ecology and Society*, 22(1). 42.

Heijman, W, Hagelaar, G and Heide, M.V.D, (2007). Rural resilience as a new development concept, EAAE seminar Serbian Association of Agricultural Economists, Novi Sad, Serbia.

Holling, C.S. (2001). Understanding the Complexity of Economic, Ecological and Social Systems. *Ecosystems*, 4, 390-405.

Janssen, P. (2010). Kamuchina Kemombe: Opening the Black-box of Technology within the Capability Approach. The University of Twente.

Lade, S. J, Tavoni, A, Levin, A. S and Schluter, M. (2013). Regime Shifts in Social-Ecological System. Centre for Climate Change, Economics and Policy. Working Paper number 13.

Manjengwa, J, Feresu, S and Chimhowu, A. (2012). Understanding Poverty, Promoting wellbeing and Sustainable Development: A Sample Survey of 16 districts of Zimbabwe. Sable Press, Harare.

Martin-Lopez, B, Balvanera, P, Manson, R, Mwampamba, T.H and Norstrom, A. (2020). Contributions of Place-Based Social Ecological Research to Address Global Sustainability Challenges. *Global Sustainability*, 3, 21, 1-4.

Maru, Y.T, Fletcher, C. S and Chewings, V. H. (2012). A Synthesis of Current Approaches to traps is useful but needs rethinking for indigenous disadvantage and poverty research. *Ecology and Society*, 17(2),7.

Matamanda, A. R, Mphambukeli, T and Chirisa, I. (2020). Applied Systems Analysis in Water Access for Emerging human Settlements: A Case Study of Hopley Farm, Harare, Zimbabwe. *Urban Water Journal*, DOI: 10.1080/1573062X.2020.1811882.

McGinnis, M. D and Ostrom, E. (2014). Social-Ecological System Framework: Initial Changes and Continuing Challenges. *Ecology and Society* 19(2): 30.

Michael, E and Madon, S. (2017). Socio-Ecological Dynamics and Challenges to the Governance of Neglected Tropical Diseases *Control. Infectious Diseases of Poverty*, 6(1).2-9.

Mombeshora, S and Le Bel, S. (2010). Community-Based Game Ranching and politics in Chiriwo Wards of Mbire District, Zimbabwe. Innovation and Sustainable Development in Agriculture and Food, Montepellier.

MRDC/AWF (Mbire Rural District Council/African Wildlife Foundation). (2020). Report of Study for the District Land-Use Plan, Mbire: Mbire Rural District Council/Harare: African Wildlife Foundation (AWF).

Mucherera, B and Mavhura, E. (2020). Flood Survivors' Perspectives on Vulnerability reduction to floods in Mbire District, Zimbabwe. *Jamba-Journal of Disaster Risk Studies* 12(1),3396-3421

Musiwa, A.R and Mhlanga, W. (2020). Human-Wildlife conflict in Mhokwe Ward, Mbire District, North-Eastern Zimbabwe. *African Journal of Ecology*/Early Review, Wiley Online Library.

Niva, V, Taka, M and Varis, O. (2019). Rural-Urban Migration and the Growth of Informal Settlements: A Socio-Ecological System Conceptualisation with insights through a "Water Lens". MDPI Concept Paper. Water and Development Research Group, Aalto University.

Nyahunda, L and Matthew, H. (2019). challenges faced by Rural people in Mitigating the Effects of Climate change in the Mazungunye communal Lands, Zimbabwe. *Jamba-Journal of Disaster Risk Studies*.

Petrosillo, I, Aretano, R and Zurini, G. (2015). Socio-Ecological Systems. Reference Module in Earth Systems and Environmental Sciences, Elsevier.

Schouten, M, Van Der Heide and Heijman, W. (2009). The resilience of Social-Ecological Systems in European Rural areas: Theory and Prospects Paper prepared for presentation at the 113th EAAE Seminar, Belgrade.

Siyavizva, K.P. (2015). Evaluating the significance of External Funding in underdeveloped Rural Areas of Zimbabwe: A Case of Mbire RDC. MSU, Gweru.

Taylor, R, (2009). Community-based natural resource management in Zimbabwe: the experience of CAMPFIRE. *Biodiversity and Conservation*, 18, 2563-2583.

Young, O.R, Berkhout, F, Gallopin, G. C, Janssen, M. A, Ostrom, E and van der Leeuw, S. (2006). The Globalisation of Socio-Ecological Systems: An Agenda for Scientific Research. *Global Climate Change* 16: 304-316.

Zembere, M. (2014). An evaluation of the Impact of Economic Sanctions on Science Teaching and Learning at Secondary level in Zimbabwe's Mbire District of Mashonaland Central. *Education Journal*, 4(5), 194-200.

Zvobgo, C.J.M. (2009). *A History of Zimbabwe, 1890-2000 and Post-Script, Zimbabwe, 2001-2008*. Cambridge: Cambridge Scholars.

## B1: Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements[30]

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### Introduction

Understanding the concept of resilience is crucial. The main constraint on resilience is its abstract nature (Cutter *et al*. 2014:68). It is important to note that there is a necessity for appropriate analysis and evaluation of the setting in which it is to be used. Hence, critically analysing and understanding the indicators of resilience are valuable qualities for preparing for, reacting to and recovering from disasters. The indicators of resilience are envisioned to capture demographic qualities of a community's population that tend to associate with physical and mental wellness leading to enlarged knowledge, communication and mobility (Shao *et al*. 2018).

In a globalising and urbanising world, disparity within a nation cannot be separated from global forces and trends and from policies implemented by other countries or the international community. The extent of disparities within a nation calls for interest amongst the policymakers and the social and political processes of nations (Mearns and Norton, 2010). In several instances, the level of inequality cannot be detached from the social and political developments in other countries, particularly neighbouring countries. Such disparities are exacerbated by climate change that calls for nations to think globally and act locally (Kronik *et al*. 2010). The activities taking place in one nation can have an impact on climate change in other countries. The level of adaptability and mitigation causes inequalities between and among nations. In many cases, the rural people in a nation suffer the most from the impacts of climate change because of their vulnerability (Aliso *et al*. 2009). Equity and inequality are challenged by climate change within countries, its effect on growth and on the public and what policies can best be adopted to lessen its effects if that is a moral goal, to manage its consequences for growth and development (Schneider and Lane, 2006).

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Building the resilience of vulnerable communities means not only aiding people through direct execution of aid programmes at various levels, but also enabling modification of promotion of revised policies and adaptive practices that make them functional. The frequency, extent and severity of shocks and stressors are expected to intensify because of climate-related change. This trend worsens and is worsened by other fundamental factors, such as poverty, malnutrition, inadequate physical infrastructure, degraded ecosystems, conflict and ineffective governance.

Climate change is identified as the leading human and environmental challenge of the 21st century. Understanding climate change and its effects is one of the major challenges confronting African people, their governments and the African Union (AU). The potential and actual impacts of climate change in Africa are large and wide ranging and they are affecting many aspects of people's lives, particularly those living in rural areas (Connolly-Boutin and Smit, 2016). Many climate models predict negative impacts of climate change on agricultural production and food security in most parts of sub-Saharan Africa. An increase in temperatures, the desiccation of soils, continuous pest and disease pressure, shifts in appropriate regions for cultivation of crops and livestock, floods, deforestation and the rise in desertification are all signs of climate change (Kangalwe and Lyimo, 2013).

Projected warming is a general feature of the Southern Hemisphere. In the low-emission scenario RCP2.6 (representing a 2oC world), African summer temperatures will increase until 2050 at about 1.5◦C above the 1951–1980 baseline and remain at this level until the end of the century. A pattern of wetting in tropical East Africa and drying in southern Africa emerges in both seasons and in emission scenarios, with both temperature increase and decreases of rainfall, 10–30 %. Projected climate changes show the strongest movement toward more arid conditions in Southern Africa. But wetter with more intense rain events in the eastern part of South Africa – as already seen with the flooding in KwaZulu Natal (KZN) in 2019 (Shanganlall *et al*. 2019; Vilakazi, Zengeni and Mafongoya, 2019).

**Climate Change and Resilience in Rural Settlements: A Review**

If the emission of greenhouse gases was halted, though probably impossible, many of the negative effects of climate change will continue to have an impact for decades to come (Brazier,

2015). Because of human and natural activities and the continued increase of greenhouse gas emissions, there will be disastrous consequences for socio-ecological systems (Magis, 2010).

The principal causes of climate change are identified as greenhouse gas emissions, overgrazing, overexploitation of natural resources, deforestation and poor irrigation practices leading to negative impacts like resource-use conflicts, food scarcity, loss of flora and fauna (Belay *et al*. 2017). It is proven that land degradation resulting from droughts is enhanced by anthropogenic factors (Stringer *et al*. 2009; Stavi and Lal, 2015). It is necessary to build the adaptive capacity of communities and institutions so that they can effectively tackle climate change effects, including health (Moser, 2010). Such action will also help the region to effectively access additional adaptation funding that may be available.

Zimbabwe is experiencing several exceptional economic, environmental and social shocks and stresses that have long-lasting effectson the country. Climatic and non-climatic challenges faced in Zimbabwe include poverty, food insecurity, malnutrition and environmental degradation. In the early 1970s, the concept of resilience emerged as a plausible framework among humanitarian and development actors and government as a long-term economic strategy for considerably improving national and local capacity to endure shocks and stresses, eventually leading to a reduction in the need for humanitarian response and an increase in community longer-term well-being (Holling, 1973). In 2015, this approach was operationalized in the Zimbabwe Resilience Building Strategy, established mutually by the Government of Zimbabwe, UN agencies, civil society organisations and academia. In 2016 the approach was further validated by the results from the World Humanitarian Summit, through the "Grand Bargain", that promote for improved collaboration between development and humanitarian partners.

Climate change, as a factual reality, is mostly challenging to low-income rural communities whose livelihoods predominantly depend on rain-fed subsistence agriculture (Hellmuth *et al*. 2007; Nyahunda and Tirivangisi, 2019). The reason is their high exposure to risks from changes in climatic conditions is not equal to their adaptive capacity. Their vulnerability is augmented by the combination of social, economic and environmental influences that interrelate with it (Turpie and Visser, 2013).

In Africa and in particular Zimbabwe, most rural households depend on natural resources for survival and livelihoods (Dube and Phiri, 2013; Gukurume, 2012). The vulnerability of rural households to climate risk can be linked closely to socio-economic conditions that relate with the people's adaptive ability (McLeman *et al*.2010). Many rural communities in developing countries have underdeveloped or, in some areas, little infrastructure and the dependency on climatic volatile resources is very high. The livelihood activities of the communities in rural areas are largely dependent on the use of the natural environment. Effects of vulnerability induced by climate change have increased the poverty levels of the communities that are trapped in high poverty. The variability of climate change has intensified challenges in rural areas as demonstrated by decreasing agricultural outputs, deterioration in economic productivity, poverty and food insecurity, with rural people being affected (Gukurume, 2013).

Rural communities are engaging in numerous activities as resilience instruments to endure the impacts brought by climate change. However, this is a major challenge because rural communities rely on income generating activities centred on agricultural and forest products that are prone to climate change and variability (Ofoegbu *et al*. 2017). This is extending the poverty levels in rural communities because rural people are implementing mechanisms that are not responsive to the shifting climate (Madzwamuse, 2010). Poverty, poor public and environmental health, weak institutions, gender inequality, marginalisation from decision-making processes and planning procedures, natural disasters, lack of education and information, lack of infrastructure and services, environmental degradation, dependence on rain-fed agriculture and climate-sensitive resources and uncertain tenure are limiting factors to the adaptive capacity among rural people (Brown *et al*. 2012).

Poor rural households are highly prone to shocks and stresses since their livelihoods rely on a gradually weakening natural resource base and on often-unbalanced climatic conditions (Dasgupta and Baschieri, 2010). Rural communities have limited assets to fall back on and limit risk management strategies, that intensifies their vulnerability. This calls for an effective spatial planning framework developed by planners and policy-makers, with the view to ensure that rural communities are prepared for resilience in light of the effects of climate change bedevilling their spaces. The defining aspect of adaptive capacity includes the availability of technological developments that allow adaptation, the equal distribution of resources, availability of human and social capital, including literacy levels, social and personal security

and how the public perceives the cause of climate change and its manifestations (Nyahunda and Tirivangisi, 2019: Brooks *et al*. 2005). The restraining aspects to rural communities in attaining resilience and enhancing their adaptive capacity comprises of unpredictability of indigenous knowledge systems (IKS), lack of resources and techno-science adaptive methods, lack of support to implement feasible mitigation strategies and lack of information about resilience and adaptive capacity to climate change (Nyahunda and Tirivangisi, 2019).

Zimbabwe is an agrarian society that has natural resources as the linchpins of the economy (Moyo, Chambati and Yeros, 2019). Since 1980, when she attained independence, the country has suffered frequent droughts and famines that are exacerbated since the year 2000 (Mhlanga, Muzingili and Mpambela, 2019; Muzerengi and Tirivangasi, 2019; Takayindisa *et al*. 2019). Blame is squared on climate change as the chief driver of the famines much as it has also been squared on the structural changes made to the land distribution by government (Mkodzongi and Lawrence, 2019). This could be true as the frequency of cyclone induced floods have also impacted on the performance of the agriculture sector.

Climate change is a global phenomenon however; its impacts affect people differently as a result of their location. The impacts of climate change, such as changing temperature and precipitation patterns have a huge impact on the natural resource base world-wide and on the income and livelihoods of people that rely on the use of these resources (IPCC. 2007). In Zimbabwe, the agricultural sector is crucial to sustainable development, livelihoods and food security. This is because it is the chief support of more than 75% of the population, accounting for 45% of the GDP and is crucial for ensuring food security and addressing rural poverty (Nhemachena and Mano, 2007). Therefore, examining susceptibility of agricultural activities to climate change and planning adaptation and mitigation interventions is vital for sustaining rural livelihoods. As a result of climate change, there is a reduction in the production of crops, such as cowpeas and groundnuts that arebelieved to be associated with drought and diseases (Mutsamba, Nyagumbo and Mupangwa, 2019).

It is argued that warmer temperatures lead to accelerated phenology, shortening the growing season that reduce potential crop yield (Mashizha *et al*. 2017). Hence, the warmer temperatures and reduced rainfall have led to declining yields. Climate forecasts have shown that droughts pose great risk to crops, livestock, wildlife and communities. In effect, livestock and human

diseases will increase with increasing temperatures and flooding (Kellogg, 2019; Shah, Dulal and Awojobi, 2019). Currently, human diseases, such as malaria and cholera are more widespread and dominant in several parts of Zimbabwe and Southern Africa (cf. Pitzer *et al*. 2019; Chikumbu, 2019).

Resilience Principles

The concept of resilienceis appropriate to comprehend socio-ecological responses to climatic risks and global climate change. The principles of resilience enhance the resilience of societies to cope with extreme weather events. De Bruijn *et al*. (2017:24) propose five principles that aid in comprehending the aspects that are missing in risk approaches. The resilience principles embrace a systems approach that looks beyond-design events, building and preparing infrastructure. According to de Bruijn *et al*. (2017: 28) the resilience principles provide a valuable translation of ideas of resilience for policy-makers. Because of the constant exposure and familiarity to growing complexity and uncertainty, decision-making should shift from a generalised risk approach to a much richer resilience approach to cope with extreme weather conditions. This requires additional development of resilience-based models and frameworks and additional decision measures beyond the common cost-benefit related criteria. The community should engage policy-makers and communicate on matters affecting the community and the proposed resilience strategies.

The resilience principles can aid in the growth of sustainable strategies to assist the diverse social groups (farmers/citizens) to cope with climate change. The principles should be considered in a systems approach and interests of the communities should be balanced. Consideration should mainly be on the more regularly expected drought circumstances and what might be done to best cope with extreme droughts.

Resilience is a vague concept and is understood differently by many. Despite the various definitions, resilience can be noted for dealing with extreme weather events, to support decision-making and disaster risk reduction policies (Davoudi *et al*. 2012; Davoudi, Brooks and Mehmood, 2013; Seeliger and Turok, 2013; Seeliger and Turok, I. 2014; Turok, 2014). Applying the resilience principles in practice will support in developing strategies and designing adaptive pathways into the future that make the physical-societal system for those in rural areas more resilient to extreme weather conditions, such as droughts. The principles take

a systems approach, consider system response, recovery, recognising and containing gradual future changes (Batty, Bettencourt and Kirley, (2019).

Resilience has emerged as a key concept across disciplines for investigating responses to changes in human and ecological systems. This has resulted in a variety of ways in which resilience is understood, investigated and applied (Colding and Barthel, 2019; Meerow and Newell, 2019; Gligor *et al*. 2019; Van Assche *et al*. 2019). From a concept originally concerned with the persistence of ecological systems in the context of external disturbances (Holling 1973), resilience has developed through a concept underlining the role of adaptive capacity to one emphasising the transformation in the face of global change. Attention has thus, widened from the ecological to include the social dimensions of resilience. This comprises human agency, social learning and the skills and capacities of social actors to cope with, adapt to change and facilitate transformation. The resilience concept needs an increase on its focus on human livelihoods if it is to respond to the shortfalls to adaptation strategies by vulnerable communities ((Belay *et al*. 2017; Barua *et al*. 2014; Tanner *et al*. 2015; Mekuyie, Jordaan and Melka, 2018). Although the concept of resilience is increasingly guiding research and policy, its move from ecological theory to social systems leads to feeble engagement with normative, social and political dimensions of climate change adaptation. A livelihoods view aids to fortify resilience thinking by positioning much attention on human needs and their agency, empowerment and human rights and in view of adaptive livelihood systems in the context of wider transformational changes.

**The Challenge of Ensuring resilience**

Understanding the characteristics that contribute to resilience is a major milestone to enhancing resilience. It influences decision-makers, stakeholders and beneficiaries to prioritize the activities that are required to build and sustain resilience. This is because resilience is an abstract concept and it is difficult to measure the concept in complete terms (Asadzadeh *et al*. 2017). Several conceptual frameworks of resilience comprise several approaches that are developed to operationalize resilience of communities, regions and systems (Cutter *et al*. 2008). These vary from those that contemplate resilience as a set of community capitals and community capacity index, engineering functionality or place-based measurements. Regardless of these actions, debate on features that contribute to resilience and change from simply

theoretical frameworks to empirical assessments of community resilience is on-going (Asadzadeh *et al*. 2017).

Adelekan *et al*. (2015) consider as one of the main challenges in developing community resilience framework as theformulation of a precise and reliable basis for defining and classification of key rural risks and vulnerabilities. The approaches that can show where and how risks recognised differ by settlement and can offer data disaggregated by age and sex are required. A systematic, disaggregated approach entails addressing the lack of disaster databases presently upheld, mainly concerning extensive risk (Gall *et al*. 2009). The absence of data regulation remains an obstacle for data comparability and aggregation, although the DesInventar methodology (Bull-Kamanga *et al*. 2003) that offers a framework to regulate and examine local event reports is starting to address the situation in Africa.

A key point of consideration for assessing resilience is the question on why resilience is being measured and what the eventual goals of such valuation are (Asadzadeh *et al*. 2017). To date the difference between processes oriented (measuring set of capacities and process) and result-oriented (measuring set of characteristics or assets) describes the measurement literature. Resilience measures are also considered as to whether they are assessing determination, recovery and adaptive capacity circumstances or the timeframe of resilience (Asadzadeh *et al*. 2017).

The conceptual foundation of a framework can be organised around the question of, whose resilience is going to be increased, that is the question of resilience for whom (Schipper and Langston, 2015). It is important to understand that resilience is a dynamic process and measurement frameworks need to conceptually focus on shifting from a simple prevent inherent resilience to a post-event adaptive capacity that offers transformation and contemplation of the term as both measuring static results and dynamic processes (Francis and Bekera, 2014). This is a major challenge of climate change resilience measurement since the development of primary indicators for examining resilience is profoundly dependent on suppositions about resilience for whom, what and when (Meerow and Newell, 2016; Meerow, Newell and Stults, 2016). Attaining human well-being through enhanced and sustained livelihoods is a major human development aim. Climate change and its related stressors influence human development through their support and destabilization of livelihood systems,

especially that of the poor and vulnerable people. The farming sector remains the dominantandsignificant source of income with half the country's adult population in Zimbabwe dependent on it.

**Role of Indigenous and Traditional Knowledge**

Traditional knowledge can be all-inclusive in outlook and adaptive by nature. The information is collected over generations by observers whose lives depended on the use of this information. Traditional knowledge is frequently gathered incrementally, tested by trial-and-error and conveyed to future generations orally or by shared practical experiences (Berkes *et al*. 2000: 1252). Traditional knowledge determines the practices, values and norms of the people and has an effect on the acceptance of the people to policies offered to them. Many plans become unsuccessful if the policy-makers do not take into consideration the beliefs and norms of the people. Traditional knowledge should be well incorporated in the decision-making process to ensure successful implementation and acceptance of policies (Stoll and Von Hahn, 2008).

There is a difference between the practice of traditional ecological knowledge and scientific ecological knowledge in that, the former is mainly reliant on local social mechanisms (Chepchirchir *et al*., 2019). The social mechanisms can be understood as a hierarchy that moves from local ecological knowledge to social organisations, to instruments for cultural internalisation and to worldviews (Pierotti and Wildcat, 2000; Berkes and Berkes, 2009; Gómez-Baggethun, Corbera and Reyes-García, 2013). Organisations, in the sense of rules-in-use, offer the ways by whichthe people and community can act to produce a livelihood from the environment basing on their local knowledge (Berkes, 1989). Both knowledge and institutions need instruments for cultural internalisation, so that learning can be programmed and reminisced by the social group. World view or cosmology provides form to ethics, cultural values and the general norms and rules of a society. The idea of traditional ecological knowledge is complex and is regarded as a knowledge–practice–belief complex. Local observational knowledge of the land, resource management systems, social institutions (or rules-in-use) and the world view can be denoted as a hierarchical system (Berkes, 1993). Such an illustration has limitations in that it does not show the feedbacks among the ellipses and the close connection of particular parts of the system, particularly management systems and social institutions. Nevertheless, it does take the idea of embeddedness of local knowledge with its rules/norms in the world view of a particular culture.

The levels of analysis in traditional knowledge and management systems arecritical in planning for rural resilience (Berkes, Colding and Folke. 2000: 1257). According to Berkes *et al*. (2000: 1260), "many of the prescriptions of traditional knowledge and practice are generally consistent with adaptive management as an integrated method for resource and ecosystem management''. It is adaptive because it recognises that environmental conditions will continuously change, necessitating communities to respond by regulating and developing. Adaptive management and traditional knowledge systems, highlights processes and resource utilisation that are a component of ecological cycles of renewability (Holling, 2017: Holling *et al*. 1995). Adaptive management and traditional knowledge systems, beliefs that nature cannot be controlled and harvests cannot be projected. The defining characteristic of all ecosystems, including those managed and not is uncertainty and unpredictability.

Societies respond to uncertainty through social learning. Frequently, this involves learning at community level and not as individuals (Edwards, Ranson and Strain, 2002; Tompkins and Adger, 2005; Zinn, 2008). Trial and error learning are improved with adaptive management. In light of this, adaptive management can be viewed as a rediscovery of traditional systems of knowledge and management (Berkes, Colding and Folke, 2000; Mazzocchi, 2006; Gómez-Baggethun, Corbera and Reyes-García, 2013). Even though there is no uncertainty and mainly dissimilarities between the two, adaptive management may be regarded as the scientific analogue of traditional ecological knowledge because of its incorporation of uncertainly into management strategies and its stress on practices that discuss resilience (Berkes *et al*. 2000. Through reacting to and handling reactions from ecosystems, instead of obstructing them out, adaptive management strives to circumvent ecological thresholds at scales that threaten the presence of social and economic activities, as done by other traditional knowledge systems. The process of designing substitute resource management systems and understanding the social mechanisms behind them is drawn on management practices based on traditional ecological knowledge.

**Critical Requirements for a Successful Spatial Planning Framework for Resilience**

Busayo *et al*. (2019: 8) propose five 'Ps' to safeguard future resilience vis-a-vis the theoretical framework (resilience theory). These are policy, public participation, programme implementation, political will and programme monitoring. At a time where severe changes to

the global climate are being witnessed, policies on the application of township spatial planning and climate change adaptation are crucial. The significant stakeholders must articulate a vibrant policy on programmes linked to environmental issues. The involvement of the public particularly the resident of a particular community or the intended end user in decision-making is critical. Communal participation or the bottom up approach to planning in this context is a medium for consulting residents' selcted by key issues of climate change adaptation and planning over a long period in a certain area. There should be clear definition of spatial planning and climate change adaptation from the start because it is alleged to be connected. Innovative spatial planning is the tool for sustained climate change adaptation.

Community participation is vital in appreciating the people's natural resources, traditional institutions and knowledge system (Mercer, 2010). Therefore, to reinforce their adaptive capacity and to shape their resilience to climate change and environmental changes, government and the external agencies must reinforce and take advantage of the already present traditional knowledge systems with whichthe rural population is generally responding to the environmental stresses. Henceforth, attention would be to design and apply applicable beneficial interventions, through active community participation with the aim of reducing the impact of climate change by augmenting their resilience and mitigating over-arching poverty and well-being issues (Low, 2013).

Political action can be instrumental in advocating a course of development. It is vital that any developmental phase ought to have the assistance of the political force. Political parties and governments have played a critical role in the formulation and implementation of spatial planning policies and programmes. For example, the African National Congress (ANC) of South Africa conveyed the inclusive approach of development by Nelson Mandela in 1994 (Turok, 2012). Partnerships with key mass organisations in collaboration with non-governmental organisations (NGOs) and research organisations are crucial for the successful implementation of spatial planning policies as tools for resilience. The growth of a sustainable and resilient community can be established through government involvement and partnerships (Derret, 2009). The spatial adaptation procedure is not complete without the monitoring stage, as monitoring provides room for assessing the executionofgrowth tactics and on-going events to enlighten and improve future requirements. This helpsin figuring out the initiatives that are

meeting the proposed objectives and the ones that are not working according to the desired goals, thus, enhancement can be made on a case by case basis.

Climate governance is predominantly appropriate for integrated planning and policy-making across several sectors. Climate governance has gradually been embraced as a social science topic, particularly within the urban planning literature. It strongly advocates for national policy frameworks (as supported by the UNFCCC) that enable a strong top-down approach that necessitates synchronised governance institutions that are capable of translating higher-level policy into local action plans (Corfee-Morlot *et al*. 2009). Corfee-Morlot and Cochran (2011) have developed the concept of multilevel risk governance, that emphases on how cross-scale connections amongst national and local governments may authorise local authorities to support 'linked-up' action with other governance actors. Vertical and horizontal incorporation permits two-way advantages. These are locally-led or bottom-up interventions where local activities impact on national action and nationally- led or top-down strategies which allow frameworks that empower climate change resilience programmesto be implemented (Corfee-Morlot *et al*. 2009).

It is debated that such integration benefits all stages of the policy-making process, including agenda setting and strategic planning; policy formulation; local implementation; monitoring and evaluation; and information sharing, that is particularly important for promoting cross-scale learning (*ibid*.). Civil society is a vital governance actor and has an essential part to play in climate policy –making (Reid *et al*. 2011), mostly in building efficient and effective communication channels that aid the meaningful participation of vulnerable societies (Corfee-Morlot *et al*. 2009). For example, in Zimbabwe there is the climate change youth network coalition of 2009 as a platform for sharing information on views, ideas and experiences on climate change information with the aim of raising youth awareness on climate change and increasing youth participation in international, national and regional climate change agendas (Reid *et al*. 2011). The climate change youth network shows ways in which civil society might shape the social and political capital of marginalised societies so that they can have accessibility to and manipulate decision-making procedures that they have customarily been eliminated from. Empowerment is very important especially in the case of Zimbabwe where liberal democracies are frail.

Responding to the growing acknowledgment, the uncertainty of climatic inconsistency and weather extremes needs more flexible governance structures that havethe capacityto cope with numerous risks facing communities. Climate governance identifies that national policy frameworks supported by the UNFCCC enable atop-down approach requiring corresponding governance organisations that have the ability to transform higher-level policy into local action plans (Corfee-Morlot *et al*. 2009). Drawing from this viewpoint, Corfee-Morlot et al. (2011) developed the notion of multilevel risk governance which focuses on how cross-scale connections concerning national and local governments might empower local authorities in supporting 'linked-up' action with other governance actors. All stages of policy-making process that compriseof agenda setting, strategic planning, policy formulation; local execution; monitoring and evaluation; and information distribution, that is mainly significant for encouraging cross-scale education benefit from integration.

Civil society is a significant governance actor that has a significant part to play in climate policy–making (Reid *et al*. 2011), mainly in developing effective communication networks that aid the significant participation of vulnerable communities (Corfee-Morlot *et al*. 2009).In Zimbabwe, in 2009, the Zimbabwe Climate Change Youth Network (ZCCYN), a youth network coalition dealing with climate change was formed. Its aim wasto act as a platform for sharing views, ideas and experiences concerning climate change with a vision of raising young boys' and girls' responsiveness on climate change and improving their contribution in national, regional and international climate change programmes (Reid *et al*. 2011:18). The ability of civil society to shape the social and political capital of marginalised groups is proven through youth network. They can therefore have access and impact decision-making procedures that they have traditionally been excluded from. Empowerment and participation are highly significant especially in Zimbabwe where liberal democracies are weak (cf. Makwerere, 2019).

Spatial planning can aid in the resilience of rural communities to climate change through integrating climate information, early warning and climate adaptation products into development plans (Jabareen, 2013). The climate products and services would be accessible and used efficiently and effectively for the development of warnings for communities and in the drafting of medium and long-term climate-resilient development plans. The outcomes of such integration include risk profiles and maps for floods, thunderstorms, bushfires and droughts, malaria and meningitis (length of transmission period and geographic range), risk

zoning based on hazard and risk maps for all ecological regions and the development of rainy season outlooks. There should be an integration of the shocks and stresses experienced in rural areas in development plans encompassing issues of agricultural activities, water, environment and health sectors. Shocks and stresses can also be coopted in the national land-use plan, the national disaster risks management strategy and the local development plans of all rural district councils. Multi hazard early warning systems should accompany development plans and a financial sustainability strategy for the early warning system and the centralised national hydro climatic data and hazard information and knowledge system is developed (Pulwarty and Sivakumar, 2014).

The need to integrate spatial planning approach into the built environment is vital bearing in mind climate change adaptation long term planning regulations and standards (Busayo *et al*. 2019). Since rural livelihoods are highly dependenton natural resources and climate, it is therefore, crucial to think and view communities as systems made up of people and ecological elements (Ziervogel, 2006). This would ensure building community resilience in both the human and ecological features. Reconsidering the community as systems would help in the application of resilience principles. Resilience considers every part of a system whether a village, forest or farm as connected (Adger, 2000). This means that whatever happens to one part of a system can affect many other parts.

Implemented projects should have continuous monitoring and evaluation to assess the success of the implemented mechanisms. Project results should be monitored annually and evaluated periodically before, during and after project implementation in compliance with the requirements or goals of the project. The everyday project management and consistent monitoring of project outcomes and risks and social and environmental risks are responsibilities of the project manager. A Project Board can be formed to hold project appraisals to evaluate project performance and appraise the plans for the following year. Corrective action is needed to ensure results are responsive to the needs of the people. It is crucial to have project review after implementation to draw lessons learned and discuss opportunities for scaling up and highlighting project outcomes and lessons learned with stakeholders.

**Conclusion and Way Forward**

Climate change is projected to have intense impacts on Zimbabwe, including heightened water stress, increased incidence of drought, declines in crop and livestock productivity, change in wildlife ranges and an increase in wildfire incidents. Mitigating and adapting to climate change means incorporating climate risks into all development decisions and development planning. The consideration and incorporation of climate risk into policies, plans and practice, development efforts are more resilient to climate uncertainty and more likely to reach their objectives.

The absence of resilience strategies in rural areas to climatic accidents appears to be one of the major explanations for the change of climatic accidents into environmental, economic and social tragedies for local societies. Thus, the incorporation of actions and events geared towards the development of community resilience appears to be of paramount importance. This can be attained by incorporating prevention and risk-management instruments into already prevailing social safety nets within the framework of food security and poverty reduction policies. The initiatives to mitigate climate change are at risk and require community engagement and effective planning frameworks. The solutions to promote resilient communities are unlikely to succeed if they do not take into consideration both the short and long-term shocks and stresses related to climate change.

For an effective and responsive adaptive capacity to climate change opportunities and approachesto social protection should be examined. This would enable for the provision of adaptation and for the development of climate-resilient programmes. Infrastructure development in the rural areas should be a key aspect and a major objective of the policy-makers so that they can be accessible and can be driven towards development. Participation of the local workforce is imperative especially from the most vulnerable households, as it would ensure the generation of non-agricultural income. Funding is a crucial factor for climate change resilient principles, policies put forward by planners should be backed by an effective financial policy to ensure successful implementation. Spatial planning should not be biased towards urban areas but should also strike a balance and formulate policies in line with rural resilience.

References

Adelekan, I, Johnson, C, Manda, M, Matyas, D, Mberu, B, Parnell, S, Pelling, M, Satterthwaite,

D and Vivekananda, J, 2015. Disaster Risk and Its Reduction: An Agenda for Urban Africa. *International Development Planning Review*, *37*(1), 33-43.

Adger, W.N, 2000. Social and Ecological Resilience: Are They Related? *Progress in Human Geography*, *24*(3), 347-364.

Allison, E.H, Perry, A.L, Badjeck, M.C, Neil Adger, W, Brown, K, Conway, D, Halls, A.S, Pilling, G.M, Reynolds, J.D, Andrew, N.L and Dulvy, N.K, 2009. Vulnerability of National Economies to The Impacts of Climate Change on Fisheries. *Fish and Fisheries*, *10*(2), 173-196.

Asadzadeh, A, Kötter, T, Salehi, P and Birkmann, J, 2017. Operationalizing A Concept: The Systematic Review of Composite Indicator Building for Measuring Community Disaster Resilience. *International Journal of Disaster Risk Reduction*, *25*, 147-162.

Barua, A, Katyaini, S, Mili, B and Gooch, P, 2014. Climate Change and Poverty: Building Resilience of Rural Mountain Communities in South Sikkim, Eastern Himalaya, India. *Regional Environmental Change*, *14*(1), 267-280.

Barua, A, Katyaini, S, Mili, B and Gooch, P, 2014, 'Climate Change and Poverty: Building Resilience of Rural Mountain Communities in South Sikkim, Eastern Himalaya, India', *Regional Environmental Change*, 14(1), 267–280. Https://Doi.Org/10.1007/S1011313471-1.

Batty, M, Bettencourt, L. M and Kirley, M. (2019). Understanding Coupled Urban-Natural Dynamics as The Key to Sustainability: The Example of The Galapagos. In *Urban Galapagos* (Pp. 23-41). Springer, Cham.

Belay, G.D, Mohammadi, H, Ardalan, A, Bavani, A.M, Hosseinzadeh-Attar, M.J and Adera, A, 2017. Climate Change Intervention and Adaptation in Ethiopia: A Critical Appraisal of Systematic Review. *Iranian Journal of Health, Safety and Environment*, *4*(3), 812-823.

Belay, G.D, Mohammadi, H, Ardalan, A, Bavani, A.M, Hosseinzadeh-Attar, M.J and Adera, A, 2017, 'Climate Change Intervention and Adaptation in Ethiopia. A Critical Appraisal and Systematic Review', *Iranian Journal of Health*, 4(3), 812–823.

Berkes, F and Berkes, M. K. (2009). Ecological Complexity, Fuzzy Logic and Holism in Indigenous Knowledge. *Futures, 41*(1), 6-12.

Berkes, F, 1989. *Common Property Resources. Ecology and Community-Based Sustainable Development*. Belhaven Press with The International Union for Conservation of Nature and Natural Resources.

Berkes, F, 1993. Traditional Ecological Knowledge in Perspective. In *Traditional Ecological*

*Knowledge: Concepts and Cases* (Vol. 1). Canadian Museum of Nature/International Development Research Centre, Ottawa.

Berkes, F, Colding, J and Folke, C, 2000. Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*, *10*(5), 1251-1262.

Berkes, F, Colding, J and Folke, C. (2000). Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*, *10*(5), 1251-1262.

Brazier, A, 2015. *Climate Change in Zimbabwe: Facts for Planners and Decision-makers*. Konrad-Adenauer-Stiftung.

Brooks, N, Adger, W.N and Kelly, P.M, 2005. The Determinants of Vulnerability and Adaptive Capacity at The National Level and The Implications for Adaptation. *Global Environmental Change*, *15*(2), 151-163.

Brown, D, Chanakira, R.R, Chatiza, K, Dhliwayo, M, Dodman, D, Masiiwa, M, Muchadenyika, D, Mugabe, P and Zvigadza, S, 2012. *Climate Change Impacts, Vulnerability and Adaptation in Zimbabwe* (Pp. 1-40). London, UK: International Institute for Environment and Development.

Bull-Kamanga, L, Diagne, K, Lavell, A, Leon, E, Lerise, F, Macgregor, H, Maskrey, A, Meshack, M, Pelling, M, Reid, H and Satterthwaite, D, 2003. From Everyday Hazards to Disasters: The Accumulation of Risk in Urban Areas. *Environment and Urbanization*, *15*(1), 193-204.

Busayo, E.T, Kalumba, A.M and Orimoloye, I.R, 2019. Spatial Planning and Climate Change Adaptation Assessment: Perspectives from Mdantsane Township Dwellers in South Africa. *Habitat International*, P.101978.

Chepchirchir, S, Kwanya, T and Kamau, A. (2019). Maximising the Socioeconomic Value of Indigenous Knowledge Through Policies and Legislation in Kenya. *Global Knowledge, Memory and Communication*, *68*(1/2), 60-75.

Chikumbu, A. (2019). Disease and Health in Zimbabwe: A Bibliographical Essay. Available Online: Https://S3.Amazonaws.Com/Academia.Edu.Documents/59246995/Disease_And_Health_In_Zimbabwe20190514-116831-Eu2n99.Pdf?Response-Content-Disposition=Inline%3B%20filename%3ddisease_And_Health_In_Zimbabwe.PdfandX-Amz-Algorithm=AWS4-HMAC-SHA256andX-Amz-Credential=AKIAIWOWYYGZ2Y53UL3A%2F20191210%2Fus-East-1%2Fs3%2Faws4_RequestandX-Amz-Date=20191210T210453ZandX-Amz-

Expires=3600andX-Amz-Signedheaders=HostandX-Amz-Signature=De84ae77ce5af03e8c3229c0858e0f86da80417638cccbd5a426e15906372d0b

Colding, J and Barthel, S. (2019). Exploring the Social-Ecological Systems Discourse 20 Years Later. *Ecology and Society*, *24*(1).

Connolly-Boutin, L and Smit, B, 2016. Climate Change, Food Security and Livelihoods in Sub-Saharan Africa. *Regional Environmental Change*, *16*(2), 385-399.

Corfee-Morlot, J, Cochran, I, Hallegatte, S and Teasdale, P. J. (2011). Multilevel Risk Governance and Urban Adaptation Policy. *Climatic Change, 104*(1), 169-197.

Corfee-Morlot, J, Kamal-Chaoui, L, Donovan, M. G, Cochran, I, Robert, A and Teasdale, P. J. (2009). Cities, Climate Change and Multilevel Governance. OECD Environmental Working Papers N° 14, 2009, OECD Publishing

Cutter, S.L, Ash, K.D and Emrich, C.T, 2014. The Geographies of Community Disaster Resilience. *Global Environmental Change*, *29*, 65-77.

Cutter, S.L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E and Webb, J, 2008. A Place-Based Model for Understanding Community Resilience to Natural Disasters. *Global Environmental Change*, *18*(4), 598-606.

Dasgupta, A and Baschieri, A, 2010. Vulnerability to Climate Change in Rural Ghana: Mainstreaming Climate Change in Poverty-Reduction Strategies. *Journal of International Development*, *22*(6), 803-820.

Davoudi, S, Brooks, E and Mehmood, A. 2013. Evolutionary Resilience and Strategies for Climate Adaptation. Planning Practice and Research 28(3):307-322.

Davoudi, S, Shaw, K, Haider, L.J, Quinlan, A.E, Peterson, G.D, Wilkinson, C, Fünfgeld, H, McEvoy, D, Porter, L and Davoudi, S. 2012. Resilience: A Bridging Concept or A Dead End? 'Reframing' Resilience: Challenges for Planning Theory and Practice. Interacting Traps: Resilience Assessment of A Pasture Management System in Northern Afghanistan. Urban Resilience: What Does It Mean in Planning Practice? Resilience as A Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note. Planning Theory and Practice 13(2): 299–333.

De Bruijn, K, Buurman, J, Mens, M, Dahm, R and Klijn, F, 2017. Resilience in Practice: Five Principles to Enable Societies to Cope with Extreme Weather Events. *Environmental Science and Policy*, *70*, 21-30.

Derrett, R, 2009. How Festivals Nurture Resilience in Regional Communities. In *International*

*Perspectives of Festivals and Events* (Pp. 127-144). Routledge.

*Dube, T and Phiri, K. (2013), Rural Livelihoods Under Stress: The Impact of Climate Change on Livelihoods in South Western Zimbabwe, American International Journal of Contemporary Research*, *3*(5), 11-25.

Edwards, R, Ranson, S and Strain, M. (2002). Reflexivity: Towards A Theory of Lifelong Learning. *International Journal of Lifelong Education*, *21*(6), 525-536.

Francis, R and Bekera, B, 2014. A Metric and Frameworks for Resilience Analysis of Engineered and Infrastructure Systems. *Reliability Engineering and System Safety*, *121*, 90-103.

Gall, M, Borden, K.A and Cutter, S.L, 2009. When Do Losses Count? Six Fallacies of Natural Hazards Loss Data. *Bulletin of The American Meteorological Society*, *90*(6), 799-810.

Gligor, D, Gligor, N, Holcomb, M and Bozkurt, S. (2019). Distinguishing Between the Concepts of Supply Chain Agility and Resilience: A Multidisciplinary Literature Review. *The International Journal of Logistics Management*, *30*(2), 467-487.

Gómez-Baggethun, E, Corbera, E and Reyes-García, V. (2013). Traditional Ecological Knowledge and Global Environmental Change: Research Findings and Policy Implications. *Ecology and Society: A Journal of Integrative Science for Resilience and Sustainability*, *18*(4), 72-84.

Gukurume, S, 2012. Interrogating Foreign Aid and The Sustainable Development Conundrum in African Countries: A Zimbabwean Experience of Debt Trap and Service Delivery. *International Journal of Politics and Good Governance*, *3*(3.4), 1-20.

Gukurume, S, 2013. Climate Change, Variability and Sustainable Agriculture in Zimbabwe" S Rural Communities. *Russian Journal of Agricultural and Socio-Economic Sciences*, *14*(2).

Hellmuth, M.E, Moorhead, A, Thomas, M.C and Williams, J, 2007. Climate Risk Management in Africa: Learning from Practice.

Holling, C.S. (1973). Resilience and Stability of Ecological Systems. *Annu. Rev. Ecol. Syst*, 4, 1–23.

Holling, C.S, 2017. Adaptive Environmental Assessment and Management.

Holling, C.S, Gunderson, L.H and Light, S, 1995. *Barriers and Bridges to The Renewal of Ecosystems*. New York: Columbia University Press.

Jabareen, Y, 2013. Planning the Resilient City: Concepts and Strategies for Coping with Climate Change and Environmental Risk. *Cities*, *31*, 220-229.

Kangalawe, R.Y and Lyimo, J.G, 2013. Climate Change, Adaptive Strategies and Rural Livelihoods in Semiarid Tanzania.

Kellogg, W. W. (2019). *Climate Change and Society: Consequences of Increasing Atmospheric Carbon Dioxide*. Routledge

Kronik, J, Verner, D, Mearns, R and Norton, A, 2010. The Role of Indigenous Knowledge in Crafting Adaptation and Mitigation Strategies for Climate Change in Latin America. *Social Dimensions of Climate Change: Equity and Vulnerability in A Warming World. World Bank, Washington, DC, USA. [Online] URL: Https://Openknowledge. Worldbank.Org/Handle/10986/2689*, 145-169.

Low, A, 2013. *A Voice of One's Own: An Investigation of Developing World Agency in Oxfam International's 2009 Climate Change Campaign* (Doctoral Dissertation, Université d'Ottawa/University of Ottawa).

Madzwamuse, M, 2010. Climate Change Vulnerability and Adaptation Preparedness in South Africa. *Heinrich Böll Stiftung South Africa*.

Magis, K, 2010. Community Resilience: An Indicator of Social Sustainability. *Society and Natural Resources*, 23(5), 401-416.

Makwerere, D. (2019). Democracy, Habermasian Sphere, Social Media and Youth Participation in Governance in Zimbabwe: Youth in Governance Processes in Africa. In: *Participation of Young People in Governance Processes in Africa* (pp. 127-147). IGI Global.

Mashizha, T.M, Ncube, C, Dzvimbo, M.A and Monga, M, 2017. Examining the Impact of Climate Change on Rural Livelihoods and Food Security: Evidence from Sanyati District in Mashonaland West, Zimbabwe. *Journal of Asian And African Social Science and Humanities (ISSN 2413-2748)*, *3*(2), 56-68.

Mazzocchi, F. (2006). Western Science and Traditional Knowledge. *EMBO Reports, 7*(5), 463-466.

Mcleman, R.A and Hunter, L.M, 2010. Migration in The Context of Vulnerability and Adaptation to Climate Change: Insights from Analogues. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(3), 450-461.

Mearns, R and Norton, A, 2010. Equity and Vulnerability in A Warming World: Introduction and Overview. *Social Dimensions of Climate Change: Equity and Vulnerability in A Warming World. Washington, DC: World Bank*.

Meerow and Joshua P. Newell (2016) Urban Resilience for Whom, What, When, Where and

Why? Urban Geography, DOI: 10.1080/02723638.2016.1206395

Meerow, S and Newell, J. P. (2019). Urban Resilience for Whom, What, When, Where and Why? *Urban Geography*, *40*(3), 309-329.

Meerow, Sara, Newell, Joshua P and Stults, Melissa. (2016). Defining Urban Resilience: A Review. Landscape and Urban Planning, 147, 38–49.

Mekuyie, M, Jordaan, A and Melka, Y, 2018, 'Understanding Resilience of Pastoralists to Climate Change and Variability in The Southern Afar Region, Ethiopia', Climate Risk Management, 20, 64–77.

Mercer, J, 2010. Disaster Risk Reduction or Climate Change Adaptation: Are We Reinventing the Wheel? *Journal of International Development: The Journal of The Development Studies Association*, *22*(2), 247-264.

Mhlanga, C, Muzingili, T and Mpambela, M. (2019). Natural Disasters in Zimbabwe: The Primer for Social Work Intervention. *African Journal of Social Work, 9*(1), 46-54.

Mkodzongi, G and Lawrence, P. (2019). The Fast-Track Land Reform and Agrarian Change in Zimbabwe.Review of African Political Economy, 46:159, 1-13, DOI:10.1080/03056244.2019.1622210

Moser, S.C, 2010. Now More Than Ever: The Need for More Societally Relevant Research on Vulnerability and Adaptation to Climate Change. *Applied Geography*, *30*(4), 464-474.

Moyo, S, Chambati, W and Yeros, P. (2019). Land and Natural Resources in Zimbabwe: Scramble and Resistance. In *Reclaiming Africa* (Pp. 225-253). Springer, Singapore.

Mutsamba, E. F, Nyagumbo, I and Mupangwa, W. (2019). Forage and Maize Yields in Mixed Crop-Livestock Farming Systems: Enhancing Forage and Maize Yields in Mixed Crop-Livestock Systems Under Conservation Agriculture in Sub-Humid Zimbabwe. *NJAS-Wageningen Journal of Life Sciences*, 100317.

Muzerengi, T and Tirivangasi, H. M. (2019). Small Grain Production as An Adaptive Strategy to Climate Change in Mangwe District, Matabeleland South In Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies, 11*(1), 1-9.

Nhemachena, C and Mano, R, 2007. *Assessment of The Economic Impacts of Climate Change on Agriculture in Zimbabwe: A Ricardian Approach*. The World Bank.

Nyahunda, L and Tirivangasi, H.M, 2019. Challenges Faced by Rural People in Mitigating the Effects of Climate Change in The Mazungunye Communal Lands, Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, *11*(1), 1-9.

Ofoegbu, C, Chirwa, P, Francis, J and Babalola, F, 2017. Assessing Vulnerability of Rural

Communities to Climate Change: A Review of Implications for Forest-Based Livelihoods in South Africa. *International Journal of Climate Change Strategies and Management*, *9*(03), 374-386.

Pierotti, R and Wildcat, D. (2000). Traditional Ecological Knowledge: The Third Alternative (Commentary). *Ecological Applications*, *10*(5), 1333-1340.

Pitzer, V. E, Meiring, J, Martineau, F. P, Watson, C. H, Kang, G, Basnyat, B and Baker, S. (2019). The Invisible Burden: Diagnosing and Combatting Typhoid Fever in Asia And Africa. *Clinical Infectious Diseases: An Official Publication of The Infectious Diseases Society of America*, *69*(Supplement_5), S395-S401.

Schipper, E.L.F and Langston, L, 2015. A Comparative Overview of Resilience Measurement Frameworks. *Analysing Indicators and Approaches.* Overseas Development Institute.

Schneider, S.H and Lane, J, 2006. Dangers and Thresholds in Climate Change and The Implications for Justice. *Fairness in Adaptation to Climate Change*, 23-51.

Seeliger, L and Turok, I. 2013. Towards Sustainable Cities: Extending Resilience with Insights from Vulnerability and Transition Theory. Sustainability 5: 2108–2128.

Seeliger, L and Turok, I. 2014. Averting A Downward Spiral: Building Resilience in Informal Urban Settlements Through Adaptive Governance. Environment and Urbanisation 26(1): 184–199.

Shah, K. U, Dulal, H. B and Awojobi, M. T. (2019). Food Security and Livelihood Vulnerability to Climate Change. *Food Security in Small Island States*, 219.

Shanganlall, A, Ferentinou, M, Karymbalis, E and Smith, A. (2019). A Coastal Susceptibility Index Assessment of Kwazulu-Natal, East Coast of South Africa. In *IAEG/AEG Annual Meeting Proceedings, San Francisco, California, 2018-Volume 5* (Pp. 93-100). Springer, Cham.

Shao, W, Gardezi, M and Xian, S, 2018. Examining the Effects of Objective Hurricane Risks and Community Resilience on Risk Perceptions of Hurricanes at The County Level in The US Gulf Coast: An Innovative Approach. *Annals of The American Association of Geographers*, *108*(5), 1389-1405.

Solomon, S, 2007, December. IPCC (2007): Climate Change the Physical Science Basis. In *AGU Fall Meeting Abstracts*.

Stavi, I and Lal, R, 2015. Achieving Zero Net Land Degradation: Challenges and Opportunities. *Journal of Arid Environments*, *112*, 44-51.

Stoll, P. T and Von Hahn, A. (2008). Indigenous Peoples, Indigenous Knowledge and Indigenous Resources in International Law. *Indigenous Heritage and Intellectual Property: Genetic Resources, Traditional Knowledge and Folklore, 2nd Edt. Kluwer Law International, London*, 7-57.

Stringer, L.C, Dyer, J.C, Reed, M.S, Dougill, A.J, Twyman, C and Mkwambisi, D, 2009. Adaptations to Climate Change, Drought and Desertification: Local Insights to Enhance Policy in Southern Africa. *Environmental Science and Policy*, *12*(7), 748-765.

Takayindisa, F. M, Thobejane, T.D, Mukwevho, M. H and Nyathi, L. (2019). Economic Effects of Drought Within Family Settings: The Case of Masvingo, Zimbabwe (From 2000 To 2016). *Journal of Gender, Information and Development in Africa (JGIDA), 8*(Special Issue 2), 131-149.

Tanner, T, Lewis, D, Wrathall, D, Bronen, R, Cradock-Henry, N, Huq, S, Lawless, C, Nawrotzki, R, Prasad, V, Rahman, M.A and Alaniz, R, 2015. Livelihood Resilience in The Face of Climate Change. *Nature Climate Change*, *5*(1), 23.

Tompkins, E. L and Adger, W. N. (2005). Defining Response Capacity to Enhance Climate Change Policy. *Environmental Science and Policy*, *8*(6), 562-571.

Turok, I. 2014. The Resilience of South African Cities A Decade After Local Democracy. Environment and Planning A, 46(4), 749-769

Turok, I, 2012. *Urbanisation and Development in South Africa: Economic Imperatives, Spatial Distortions and Strategic Responses*. London: Human Settlements Group, International Institute for Environment and Development.

Turpie, J and Visser, M, 2013. The Impact of Climate Change on South Africa's Rural Areas. *Financial and Fiscal Commission*, *14*, 100-160.

Van Assche, K, Verschraegen, G, Valentinov, V and Gruezmacher, M. (2019). The Social, The Ecological and the Adaptive. Von Bertalanffy's General Systems Theory and The Adaptive Governance of Social-Ecological Systems. *Systems Research and Behavioral Science*, *36*(3), 308-321.

Vilakazi, B. S, Zengeni, R and Mafongoya, P. (2019). Indigenous Strategies Used by Selected Farming Communities in KwaZulu Natal, South Africa, To Manage Soil, Water and Climate Extremes and To Make Weather Predictions. *Land Degradation and Development*, *30*(16), 1999-2008.

Ziervogel, G, Bharwani, S and Downing, T.E, 2006, November. Adapting to Climate Variability: Pumpkins, People and Policy. I*Natural Resources Forum*,30( 4, 294-305l

Zinn, J. O. (2008). Heading into The Unknown: Everyday Strategies for Managing Risk and Uncertainty. *Health, Risk and Society*, *10*(5), 439-450.https://doi.org/10.1080/13698570802380891

## B2: Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions[31]

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### Introduction

Although the effects of climate change destroy infrastructure in both urban and rural areas, there is a general scarcity of literature on climate change resilience of rural infrastructure. In this regard, the article explores climate change resilience of rural infrastructure. Considering that infrastructure is essential for development in most cases rural communities are affected more than urban communities during a disaster. Rural communities are devastated by disasters since their infrastructure is often built using poor quality materials and methods, which do not adhere to building codes. In contrast, their urban counterparts are governed by building by-laws. In the case of Zimbabwe, the low infrastructure adaptation to climate change is related to high vulnerability of rural economies, poverty and poor governance (Government of Zimbabwe (GoZ), 2015).

Unlike developed countries, developing countries contend with low taxation of local service, low population density and limited legislative capacity, which hinders infrastructure adaptation to climate change (Chouinard *et al.* 2017). Vulnerability of rural infrastructure to climate change in Zimbabwe, for example, is compounded by poor settlement planning where communities settle in flood prone areas (GoZ, 2015). Although these factors expose rural areas to climate change challenges, urban informal settlements are similar with poor quality housing, infrastructure and highly vulnerable communities. This article, therefore, explores climate resilient rural infrastructure policy in countries of both the developed and developing countries. The various experiences from different countries can inform on the implications and achievements of climate resilience infrastructure policies in different countries. The study also assesses climate change threats to the viability of rural infrastructure in different contexts.

[31]Chirisa, I & Nel, V. (2021). Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions. *Sustainable and Resilient Infrastructure*, 1-11.

The study combined literature and documentary reviews. Project reports, government policies on climate change adaptation, local government climate change strategies and opinions of other researchers concerning such initiatives were reviewed. From the review, the different aspirations and perceptions of scholars and institutions and differences across countries were determined. Results were classified in terms of common themes found in infrastructure policies and discussed.

**Conceptual and Theoretical Perspectives**

Climate change can be defined as the shifts in meteorological conditions lasting a year or longer (Burroughs, 2001). These include single or multiple recordings of metrological variables, including rainfall, temperature, wind patterns, precipitation and sunshine hours. Although climate change is associated with positive opportunities, greater concern is given to the negative implications of climate change on performance and management of infrastructure (Dany and Lebel, 2020; Fant *et al*. 2020; Fielding, Nauges and Wheeler, 2020; Verschoor *et al*. 2020). Climate change effects, such as increased occurrence and severity of floods, cyclones, temperature extremes and hailstorms all destroy infrastructure and the delivery of infrastructure services across the globe (Maslin, 2014). These climate change threats vary from one area to another. It is also critical to note that climate change is no longer merely a scientific concern, but also an economic and social issue (*ibid.*).

The climate change-infrastructure nexus explains the relationship between climate change and rural infrastructure systems in a particular area. These effects include structural integrity and design lifespan reduction, erosion and disruption of services, increasing or reducing the demand for particular services, increasing costs of maintenance and supply of infrastructure and new demands on infrastructure management authorities (Great Britain, Department for Environment, Food and Rural Affairs, 2011; OECD, 2018). Though the effects can be generalised, climate change induced impacts on infrastructure vary with local climate conditions and vulnerability.

The meaning of a rural area differs from one country to another, but is usually defined in terms of population size, population density, agro-based or nature related livelihood activities and primary industry-based economies (Frohlich *et al*. 2013; Dufty-Jones and Connel, 2016;

Khayesi, 2018). However, these attributes are defined differently for each country. The common terms synonymous with rural areas are small towns in Canada; small towns, boroughs or counties in Britain; and local service districts, shires and regions in Australia. Rural areas are different from urban areas due to the attributes that define them (population size, population density, administration, economic activities) (*ibid*.). In the context of this article, rural areas are defined by country specific legislation.

Another key definition for this article is systems thinking. A system could simply be described as an entity that has inputs, processes and outputs, which defines it as a functional entity (Fiksel, 2006). Most aspects of a society including space (rural or urban, global or local) and infrastructure operate as systems. Problems associated with them could be described as systemic, because they might be deep-rooted and require attention for functionality (Teel, 2019).

Infrastructure is defined by the existence of both hard and soft components. Hard components comprise the physical assets that allow people to meet their service needs while soft infrastructure are institutions responsible for managing physical facilities (Gibson, 2017). As such, the policy to improve rural infrastructure climate resilience must not only address the hard engineering component, but also the institutional and soft component. There are various theoretical propositions explaining the importance and structure of infrastructure (Little, 2005; Frangopol and Liu, 2007; Islam, Jasimuddin and Hasan, 2015; Milani and Kripka, 2020). Two are considered in this article, the infrastructure systems theory and the infrastructure-led development theory. Systems thinking and approach that pertains to climate change incorporation and innovation is often found missing in literature, policy and practice across regions of the Planet Earth (Asheim, 2019; Conway *et al*. 2019; Terzi *et al*. 2019). Yet Landman *et al*. (2019:2) stressed that, "To address these systemic disasters and flawed paradigms of practice, there is a need to abandon outdated approaches based on a worldview that are unable to deal with living and evolving systems and shift to an alternative interpretation of sustainability and urban environments to enable the co-evolution of human and natural systems based on an ecological worldview."

The infrastructure systems theory regards infrastructure as a system comprising various units, which are mutually dependent on each other (Albrecht, 1998). Therefore, the functionality of

one infrastructure component depends on the functionality of other infrastructure units within the same area or beyond a local area. Infrastructure can be perceived as an interlinked network (Turner, 2018). Other than the physical linkages, infrastructure systems are also linked in terms of policy-making organisations. Infrastructure units are embedded in a complex environment characterised by different risks and uncertainties (Oughton *et al*. 2018). Among these risks is climate change. This theoretical framework is relevant, because the systems theory of infrastructure has an implication on the effectiveness of policy to improve rural infrastructure resilience to climate change.

The other theoretical foundation of this article is the infrastructure-led development theory. This is an economic theory, which posits that infrastructure forms the backbone of economic growth and development through multiplier effects on other sectors of the economy (Agenor, 2010). Infrastructure in rural areas is important in advancing agricultural productivity and other sectors on which rural economies are hinged for social and economic wellbeing (Africa Development Bank, 2011).

Infrastructure resilience can be defined as the ability of infrastructure facilities, such as roads and bridges, to adapt to disaster threats now and in the future by either limiting vulnerability or enhancing adaptive capacity (World Bank, 2011, 2012). Infrastructure resilience is both a goal and a process aimed at eliminating or reducing the impacts of climate change shocks on systems through a range of strategies. Resilience is measured by the level of resistance or adaptiveness of infrastructure to certain shocks, which in this case is climate change (Teel, 2019). In addition to adaptiveness, other measures of the degree of resilience are reliability of infrastructure services, flexibility and agility (Mayada, 2013). Adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (Eisenack, 2012).

To reduce vulnerability of rural infrastructure to climate change, various strategies are used, which include creating redundancy, diversification and hardening. Redundancy is a strategy that creates additional infrastructure capacity that can be used when the original infrastructure fails. In the case of climate change threats, the availability of infrastructure service is not compromised. Diversification implies having alternative forms of infrastructure to cover risks so that a risk affecting one type will not affect another type of infrastructure (e.g, solar power

to compensate for calm days when wind generation fails). Hardening deals with improving structural integrity to withstand the effects of structural shocks and hazards (Mayada, 2013).

Furthermore, there are various principles to improve rural infrastructure resilience to climate change. First, any strategy to improve resilience should be integrated with the socio-economic context and development plans of an area. Second, infrastructure adaptation policies should be framed in a systematic way addressing the interdependences between different components of rural infrastructure systems (Lowry *et al*. 2015). To function effectively, infrastructure units should be integrated.

**Regional Lessons and Developments**

This section summarises rural infrastructure climate resilience policies and practices in North America, South America, Australia, Asia and Africa. Consideration is given to climate change threats to infrastructure and adoption of climate change resilient policies at both national and local levels.

***United States of America***

In North America, rural areas in New York State are referred to as counties. New York's counties are prone to climatic hazards, such as heat extremes, snow, hurricanes, sea level rise, storm surges, flooding and heavy precipitation. Mainly located along waterways and coastal areas, New York's counties are exposed to disasters and suffer high social and economic losses from hurricanes and flooding (Wilbanks and Fernandez, 2014; Robinson, 2018).

Various strategies were adopted to reduce the vulnerability of buildings to climate change in New York at a state level. These strategies include flood resilient building materials to improve the resilience of buildings to increased precipitation and flooding (NYSERDA, 2018). The use of resistant building materials is incorporated into New York building codes for flood resilience construction and backflow prevention (NYSERDA, 2018). These codes are used in flood prone zones to improve the structural integrity of building foundations. This reflects an engineering approach to improve rural infrastructure resilience to climate change. The use of green infrastructure is another strategy adopted to improve adaptability. This helps to reduce surface infrastructure (roads and concrete pavements) damage caused by intense overflows during flooding through increasing infiltration. Not only does green infrastructure help control

negative effects of storm water and floods, but also critical in controlling the effect of temperature extremes on building and off-site infrastructure (NYSERDA, 2018).

Increased frequency of coastal flooding, particularly in the rural coastal regions, differ from the conditions that prevailed when buildings were developed (California Energy Commission, 2009; Kahl and Roland-Holst, 2012; Gibson, 2017). Flooding affects structural integrity and the expected life span of buildings and roads. Other than floods, high temperatures are likely to reduce the energy transmission efficiency of power lines and causes softening or buckling of rods (Gibson, 2017). An increase in temperature and droughts has indirect impacts such as an increased demand for water, which requires additional rainwater harvesting infrastructure and expansion of irrigation infrastructure capacity. However, the occurrence and impacts of these climate change events vary by region and so does their associated impacts on infrastructure. In effect, California has the additional challenge of droughts and wildfires (Wallace-Wells, 2019).

In response to such climate change threats, there are emerging initiatives, including the 2008 Governor's Decree in California for all land-use planning to consider climate change issues (Nolon, 2012). The other alternative is federal funding for research and projects related to improving climate change resilience, including infrastructure-oriented initiatives (Keenan, 2019). Engineers, architects and spatial planners are the professionals guiding the research for advancing infrastructure resilience to climate change (World Bank, 2012; Gibson, 2017). The research outcomes include adjustment of building codes at national level, despite challenges to implement them (Gibson, 2017). Furthermore, the unwillingness of stakeholders in both public and private sectors (building materials manufacturing companies and construction companies) to adopt new building standards due to the associated costs, is a serious challenge to implementation (*ibid.).*

***Canada***

Although the type of climate change threats varies by geographical location, some of the typical climate change hazards in Canada's prairies include heavier precipitation, floods and the rise in summer temperatures. These have a tendency to damage roads and sub-surface water infrastructure (Boyle *et al*. 2013). The resulting effects can reduce the availability of infrastructure services and lessen infrastructure's life span (transport, water, buildings and

marine infrastructure). Rural specific climate change impacts on infrastructure in inland Prairie Provinces like Alberta and Saskatchewan. Impacts include high temperatures that contribute to water loss and consequently the underutilisation of hydro-electric power infrastructure (*ibid.*). Infrastructure in the rural coastal parts of Quebec is also vulnerable to shoreline erosion.

To improve infrastructure climate resilience on the Canadian boreal forests (Ontario, Quebec), initiatives were taken at federal and local government levels. Federal initiatives included funding research related to carbon pricing of infrastructure facilities and infrastructure climate change resilience programmes (Infrastructure Canada, 2018). However, the distribution of infrastructure climate resilience funds in Canada is critiqued for its bias in supporting projects in the northern parts of Canada (Boyle *et al*. 2013). Besides funding support, the adjustment of national infrastructure design codes and standards to suit climate change dynamics is under consideration. The implementation of the new design codes is challenged over a lack of an implementation framework at lower levels of government (*ibid.*).

Some local governments in rural Quebec have developed separate infrastructure adaptation plans. The Quebec Climate Change Adaptation Strategy 2013–2020, is one such strategy that enhances infrastructure resilience to climate change threats by modification of land-use in certain areas (Boyle *et al.* 2013). Contrary to the positive initiatives in Quebec, other authorities in the prairies, like Saskatchewan, do not have infrastructure climate change adaptation policies or plans. Thus, infrastructure planning for climate resilience remains *ad-hoc* and uncoordinated.

***South America***

In South America, reduced precipitation has altered the water flow patterns and consequently, the design of irrigation infrastructure of Limani in the Chile Basin (Vicuna *et al*. 2014). Various policy initiatives at both national and local government levels are at play. Some of the policy initiatives have the participation of local communities in resilience-building and sustainability enhancement, hence local governance promotion on matters that affect communities at local level (Saha and Paterson, 2008; Rametsteiner, 2009). The other is the promotion of suitable technology by small firms as they interact with the environment (Vonortas, 2002).

Furthermore, traditional knowledge of areas vulnerable to floods is used by communities in rural Chile to save lives (Eriksen *et al*. 2011). This reflects the importance of integrating initiatives with local knowledge systems (Lowry *et al*. 2015). In the case of Curitiba, Brazil, not only is policy directed at changing engineering design, but equal focus is given to spatial land-use planning to complement engineering efforts (Ludena and Netto, 2011; Jha *et al*. 2017). Urban and rural planning is important in positioning infrastructure, since climate change projections have deemed some areas unviable (Collins *et al*. 2011).

***Asia***

In Asia, local knowledge systems are critical in fostering agricultural, transport and human settlement resilience to climate change (Nakashima *et al*. 2018). Indigenous knowledge systems are integrated successfully in improving human settlements and rural roads during flooding in countries, including Indonesia, Nepal, South Korea and China (Devkota and Lal, 2017). This is because rural residents are well aware of areas that are more prone to environmental and climate change hazards. Therefore, these knowledge systems have a potential to be integrated in spatial land-use planning of rural regions. This knowledge remains critical in planning rural settlements to reduce climate change vulnerability.

Climate change threats to infrastructure in the rural parts of Vietnam include floods, droughts and temperature extremes. Strategies employed to address these issues include the productive rural infrastructure programme, which aims to improve the climate resilience component of infrastructure in Vietnam. Under this programme, the government is responsible for technical assistance, training and capacity development. At the local level, bioengineering and green infrastructure projects were promoted to reduce the impact of flood runoff on surface infrastructure. Infrastructure design standards were also adjusted in line with the green infrastructure initiatives (Asian Development Bank, 2018). Furthermore, training was not restricted to federal level, but extended to community level. Despite these positive developments, the main challenge is mainstreaming the bioengineering standards into traditional design standards. Even though there is a reluctance to integrate the programme fully into national policy, it is still in the experimental stages of adoption (*ibid*.).

Rural areas in India and Bangladesh are characterised by remoteness, agro-based livelihoods and unmonitored construction and residential development (Mallick, 2013). Some of the

climate change hazards that would influence infrastructure include erratic rainfall, storms, increasing hot arid summers, droughts and reduced drinking water (Barua *et al*. 2013). Droughts reduce the utilisation capacity of water and irrigation infrastructure where such infrastructure is available (Boyle *et al*. 2013).

Some of the threats in the Himalayas in India include glacier melts and flooding in the areas below the mountains (Government of India, Ministry of Environment and Forests, 2014). Likewise, these threaten roads, irrigation canal infrastructure and power lines in rural Bangladesh. In the Eastern Himalaya, India and rural Bangladesh, infrastructure climate resilience depends on structural characteristics and socio-economic factors. The socio-economic factors include wealth and traditional knowledge systems on climate change and adaptation, though the value of these factors has begun to fade (Barua *et al*. 2013). In terms of policy to deal with climate change threats in rural Bangladesh, a national Climate Change Action Plan was formulated. Despite the unclear promises of infrastructure resilience considerations in the plan, little attention is given to rural infrastructure like roads, at national level (Government of the People's Republic of Bangladesh, Ministry of Environment and Forests, 2015).

***Australia***

Australia's National Climate Change Adaptation Framework of 2007 is the national framework directing policy and efforts across different sectors, including infrastructure. The role of the government is broadened to include funding research and local government climate change adaptation initiatives, called Local Adaptation Pathways. Through the initiative, locally based data is gathered on specific infrastructure vulnerabilities. In addition to national government initiatives, local governments, particularly in the western parts of Australia, have also drafted technical guides on the design of roads and bridges in their jurisdictions (Vallejo and Mullan, 2017).

In some rural areas regional governments assume responsibility for planning infrastructure, particularly where infrastructure is shared (Cuthill, 2010; Yusta *et al*. 2011). There are contrasting findings about the effectiveness of regional governments to foster climate change adaptiveness of infrastructure. In cases where regional authorities have plans in place to improve infrastructure adaptiveness, traditional infrastructure standards hinder effective

implementation of climate change standards. Furthermore, federal government support for local climate change resilience initiatives is weaker (Chouinard *et al*. 2017). In some cases, like in rural parts of New Brunswick, local authorities' attempts to enhance climate change adaptiveness of infrastructure are hindered by the lack of legislative powers and poor financing capacity. For example, approximately 70% of the areas in New Brunswick are unincorporated without taxation capacity, which makes financing infrastructure climate change initiatives a challenge (Chouinard *et al*. 2017). This signifies an institutional challenge in implementing infrastructure climate change resilience initiatives.

***Africa***

Like other continents, African cities and rural areas are subject to high risks arising from climate change (World Bank, 2011; Wisner *et al*. 2015). Climate change threats include droughts, heat waves, climate extremes, sea level rise and salinisation along coastal areas, threatening the integrity and functioning of infrastructure in Africa (Kennedy and Corfee-Morlot, 2013; Khayesi, 2018). For example, temperature extremes and variation in precipitation have had a degrading effect on roads in Malawi, Mozambique and Zambia (Chinowsky *et al*. 2014). The water, power and irrigation infrastructure in the transboundary basins like the Orange Basin and the Zambezi River Basin, are highly susceptible to climate variability (Ragffaelo *et al*. 2015). Based on climate change projections, electricity generation and irrigation agriculture are likely to decline resulting in diminished infrastructure capacity by 2050 in the Zambezi basin (*ibid.).* Droughts have reduced the operating capacity of the Kariba hydroelectric plant, resulting in a 40% decline in built infrastructure capacity (GoZ, 2015). Likewise, increased droughts and temperatures in East Africa have reduced the capacity to use rainwater harvesting infrastructure (FAO, 2014). Increasing droughts have a detrimental effect on the livelihoods of small-scale subsistence farmers and pastoralists in Ethiopia, Kenya and Tanzania through disruption of water and irrigation infrastructure (Melore and Nel, 2020). Droughts have also resulted in underutilisation of such infrastructure in these areas (FAO, 2014).

Amidst the diversity of climate change infrastructure risks and given the importance of infrastructure in sustaining rural economies, regional and national authorities have taken different initiatives. At the regional level of sub-Saharan Africa, emphasis is on climate change, agriculture and agriculture infrastructure (Alves, 2013; Ardrabo, 2015; Cervigni *et al*. 2015).

Policies include theAfrican Union Strategy on Climate Change, the Southern African Development Corporation (SADC) Climate Change Strategy and Action Plan of 2015. In addition to these initiatives are climate change- infrastructure resilience initiatives proposed at the 27–29 April 2015 Africa Climate Resilient Infrastructure Summit in Addis Ababa. In line with the policy initiatives, most African Union member countries have devised national climate change adaptation strategies (Ragffaelo *et al*. 2015; Teel, 2019).

In Zimbabwe, one of the responses is the formulation of a National Climate Change Response Strategy in 2016, which provides for integration of climate change issues in planning at all levels (GoZ, 2015). This aims to improve climate resilience in all sectors of the economy, including energy infrastructure and through research initiatives. Specifically, the policy aims at green infrastructure with low carbon emissions, particularly energy infrastructure and resilient transport infrastructure planning (GoZ, 2015). Furthermore, the national policy advocates for the revision of building codes to improve climate adaptiveness of building structures in all areas, including rural areas. Following the African Union climate change strategy, other member states like South Africa and Ghana, have implemented similar national policies to foster climate change responsiveness. This includes infrastructure facilities in both urban and rural areas (Khayesi, 2018; Phinzi and Ngetar, 2019; Melore and Nel, 2020).

In dealing with climate change threats to coastal infrastructure, the government of Egypt instituted the Alexandria Research Centre for Adaptation to Climate Change to improve institutional capacity to deal with climate change (Ardrabo, 2015). However, these interventions were meant for urban areas. This manifests a disregard of policy to rural areas with different challenges to urban areas. The result is a general neglect of infrastructure adaptation to climate change resilience in rural institutions. Similarly, integrated coastal management initiatives to mitigate the impacts of coastal flooding on infrastructure in rural coastal areas in Mozambique and South Africa are thwarted by limited capacity of rural local governments to implement such initiatives (Rosendo *et al.* 2018). In the small towns or rural areas in South, West and East Africa, one of the challenges to foster infrastructure adaptation is lack of capacity, where rural areas are regulated at a higher level of governance (Wisner *et al.* 2015).

Some strategies for community resilience enhancement include the development of alternative forms of infrastructure to meet new needs. Pastoralist communities in Kenya expanded dams and cattle watering infrastructure, developed rainwater harvesting infrastructure and constructed dams to increase water holding capacity (Mureithi *et al*.2019; Nthiga, 2019; Teel, 2019). Other strategies to reduce the vulnerability of rural infrastructure to climate change include land-use plans and zoning regulations, which place infrastructure and buildings in areas less prone to flooding and other natural hazards (World Bank, 2011). Therefore, land-use plans, which take into account climate change hazards, are influential in reducing infrastructure vulnerability in rural areas. However, there is lack of land-use planning for some of the remote rural areas in Africa, such as Zimbabwe (GoZ, 2015; Ariti *et al*.2019; Phinzi and Ngetar, 2019; Zenebe *et al*. 2019).

**Discussion**

Policy can be defined as a set of actions designed to achieve a particular objective (Sapru, 2004). Infrastructure policies are strategies, plans, regulations, programmes or any other initiative designed to address infrastructure management related issues, which in this case is rural infrastructure vulnerability to climate change (Sapru, 2004; Howlett and Mukherjee, 2017).

From across the regions reviewed, there are initiatives to improve infrastructure climate change resilience at different levels of planning and implementation (Giordano, 2012; Kennedy and Corfee-Morlot, 2013; Cervigni *et al*. 2015). These initiatives focus on both the hard and soft components of infrastructure. The defining characteristics of climate-resilient infrastructure is that it is planned, designed, built and operated in a way that anticipates, prepares for and adapts to changing climate conditions (Bocchini *et al*. 2014). However, for the case studies reviewed in this article, greater emphasis was placed on the engineering aspect across all continents. In parts of the developing regions – Africa, Asia and Latin America, building and infrastructure standards are modified, but implementation is still in experimental stages (Ugwu and Haupt, 2007; Africa Development Bank, 2011; Alves, 2013). The challenges of building climate-resilient infrastructure vary by country. Various countries predominantly face the challenge of building infrastructure to manage the risk of natural disasters. In addition, most of the policies are taken at national level with little regard to the resources and experiences in rural regions (Adger, 1999; Magadza, 2000). Yet, rural regions with their distinctive characteristics require

unique climate change infrastructure resilience improvement strategies. Rural infrastructure climate change resilience, unless addressed at local level, is likely to continue as a pipedream (Harrison and Williams, 2008).

Generally missing in developing regions is a systems approach to infrastructure planning and implementation. Governments normally pronounce policy at a central level that is not backed by practical support at local level by households and communities. Rural areas are viewed by politicians as the 'fishponds for votes' during election times. After elections, promises might not be fulfilled even if the main promise is infrastructure development or maintenance (Phago, 2012). The specific and unique infrastructure challenges in rural areas comprise long distances, low capacity for maintenance or climate change implementation and regulation of building and settlement location. There were some positive aspects in the review, such as indigenous and local knowledge utilisation, diversity of infrastructure and use of local materials through indigenous knowledge systems. There exists an interlinked nature of infrastructure (systems approach), which should not be ignored. It is imperative, therefore, to address redundancy / modularity, diversity (functional diversity) and 'hardening' or robustness.

Land-use planning is used to identify the safest places for development and setting of settlements and infrastructure as a way to mitigate climate change (La Rosa and Privitera, 2013). Spatial planning has the potential to improve climate change effects in human settlements and other infrastructure and is adopted in rural regions. However, in some rural regions the probability of such mitigation remains slim given the lack of planning (haphazard settlement in Canada where human settlement development in rural areas is unplanned and occurs spontaneously) (Mimura, 1999). Therefore, the general neglect of rural areas has an impact on settlement and infrastructure planning and consequently, the resilience or vulnerability of such infrastructure to climate change threats. By their nature of isolation, lack of responsive government, subsistence economies, lack of taxation and infrastructure financing capacity, leaves infrastructure in rural areas subject to the impacts of climate change in their diversity.

The positive impact of local knowledge on adaptiveness of local infrastructure to climate change is a positive attribute that is effectively harnessed in fostering climate change resilience. This substantiates the principle where infrastructure resilience has to integrate local skills and

knowledge into local systems. Indigenous knowledge and local practices are increasingly recognised and used as a valuable resource for planning climate change adaptation. From the study, it was noted that vulnerable communities use indigenous practices such as natural resource management, to plan adaptation and disaster risk reduction at local level. As such, indigenous knowledge systems have a potential for integration in substantive infrastructure climate resilience initiatives.

Overall, the continuous adjustment of infrastructure design standards remains an engineering avenue to be explored to improve human settlement and infrastructure resilience to climate change. However, this strategy has to be complemented by legalisation of the standards and effective implementation. In addition to legalisation of climate change response standards, there is the need for massive political support for climate change adaptive building standards from communities, construction companies and building materials manufacturers. Without their support, implementation of climate change adjusted building standards may be tenuous. The mainstreaming of climate change considerations in all land-use planning and infrastructure development in rural areas is long overdue.

*Conclusion*

This article explored strategies adopted by countries to enhance the climate change resilience of rural regions in North and South America, Asia, Australia and Africa. Findings reveal that most policy is at the initial stages of drafting and plans are formulated at national levels (climate change strategies, including infrastructure issues). However, few regions have implicit rural infrastructure climate change adaptive plans in place. Common strategies include climate change plans, transformation of construction and infrastructure standards, research, evolution of governance and funding policies, infrastructure investment policy and land-use planning. All these strategies are adopted to enhance infrastructure resilience to unique climate change threats or opportunities posed within regions. However, by their nature of isolation, lack of responsive government and subsistence economies, lack of taxation and infrastructure financing capacity, makes infrastructure in rural areas vulnerable to the impacts of climate change. This is not only likely to affect the integrity of infrastructure systems, but has far reaching implications for rural economies and livelihoods.

Based on these experiences of initiatives to improve rural infrastructure for climate change resilience across the globe, a number of lessons are available in both developing and developed regions. The case studies elaborated the benefit of integrating infrastructure resilience attempts with indigenous knowledge systems. This does not only help in the design of infrastructure, but is relevant for land- use plans to reduce the susceptibility of human settlements and complementary infrastructure to climate change. Furthermore, the article demonstrates the need for contextualisation of initiatives such that they address the climate change threats specific to a region. Contextualisation is necessary to ensure that policies developed are within the capacity of institutions responsible for managing rural infrastructure, since capacity deficiency is demonstrated as a major challenge for rural authorities to implement infrastructure climate change resilience policy crafted at national levels.

The study acknowledges the need for a systems approach to the planning of rural infrastructure components. In other words, there is need to consider the attributes of an entire system to solve a particular problem. Research on climate change challenges in specific rural areas forms the basis for informing any initiatives to foster critical infrastructure resilience to climate change threats, since the threats are contextual and, therefore, unique to a particular region.

**References**


Adger, W.N, (1999). Social vulnerability to climate change and extremes in coastal Vietnam. *World development*, *27*(2), 249-269.

Africa Development Bank, (2011). Infrastructure *and Growth in Zimbabwe: An Action Plan for Sustained, Strong Economic Growth.* s.l.: Africa Development Bank.

Agenor, P, (2010). A Theory of Infrastructure-led Development. *Journal of Economic Dynamics and Control*, 34(5), 932-950.

Albrecht, R, (1998). *Systems: Theory and Practice.* Verlag: Springer.

Alves, A.C, (2013). China's 'win-win' cooperation: Unpacking the impact of infrastructure-for-resources deals in Africa. *South African Journal of International Affairs*, *20*(2), 207-226.

Ardrabo, A, (2015). *Adaptation to Climate Change in African Coastal Cities,* Canada: International Development Research Centre.

Ariti, A. T, van Vliet, J and Verburg, P. H. (2019). The Role of Institutional Actors and Their Interactions in the Land Use Policy Making Process in Ethiopia. *Journal of Environmental Management*, 237, 235-246.

Asheim, B. T. (2019). Smart Specialisation, Innovation Policy and Regional Innovation Systems: What About New Path Development in Less Innovative Regions? *Innovation: The European Journal of Social Science Research*, 32(1), 8-25.

Asian Development Bank, (2018). *Vietnam: Promoting Climate Resilient Infrastructure in Northern Mountain Provinces,* s.l.: Asian Development Bank.

Barua, A, Katyaini, S, Mili, B and Gooch, B, (2013). Climate Change and Poverty: Building Resilience of Rural Mountain Communities in South Sikkim, Eastern Himalaya, India. *Reg Enviro Change,* Volume 2014, 267-280.

Bocchini, P, Frangopol, D.M, Ummenhofer, T and Zinke, T, (2014). Resilience and sustainability of civil infrastructure: Toward a unified approach. *Journal of Infrastructure Systems*, *20*(2), 04014004.

Boyle, J, Cunningham, M and Dekens, J, (2013). Climate *Change Adaptation and Canadian Infrastructure: A Review of the Literature.* s.l.: International Institute for Sustainable Development.

Burroughs, W, (2001). *Climate Change: A Multi-Disciplinary Approach.* Cambridge: Cambridge University Press.

California Energy Commission, (2009). *Projections of Potential Flood Regime Changes in California: Final Report.* California: California Energy Commission.

Cervigni, R, Liden, R, Neumann, J.E and Strzepek, K.M. eds, (2015). *Enhancing the climate resilience of Africa's infrastructure: the power and water sectors*. The World Bank.

Chinowsky, P, Schweikrt, A. E, Strzeperk, N and Strzeperk, K, (2014). Infrastructure and Climate Change: A Study of Impacts and Adaptations in Malawi, Mozambique and Zambia. *Climate Change, Volume* 2015, 49-62.

Chouinard, O, Plante, S, Weissenberger, S. N. M and Guillemot, J, (2017). The Participative Action Research Approach to Climate Change Adaptation in Atlantic Canadian Coastal Communities. In: W. Filho and J. Keenan, eds. *Climate Change Adaptation in North America: Fostering Resilience and the Regional Capacity to Adapt.* Switzerland: Springer, 67-87.

Collins, L, Ellis, K and Lemma, A, (2011). *Climate Compatible Development in the Infrastructure Sector: An Overview- of the Opportunities and Challenges at the Nexus of Climate Change, Infrastructure and Development,* s.l.: Institution of Civil Engineers.

Conway, D, Nicholls, R. J, Brown, S, Tebboth, M. G, Adger, W. N, Ahmad, B and Said, M. (2019). The Need for Bottom-Up Assessments of Climate Risks and Adaptation in Climate-Sensitive Regions. *Nature Climate Change*, 9(7), 503-511.

Cuthill, M. (2010). Strengthening the 'social' in sustainable development: Developing a conceptual framework for social sustainability in a rapid urban growth region in Australia. *Sustainable development*, *18*(6), 362-373.

Dany, V and Lebel, L. (2020). Integrating Concerns with Climate Change into Local Development Planning in Cambodia. *Review of Policy Research*, 37(2), 221-243.

Devkota, S and Lal, A, (2017). Local Knowledge for Adressing Climate Change Risks at Local Level: A Case Study form Nepal. In: Rieux. K *et al*. eds. *Identifying Emerging Issues in Disaster Risk Reduction, Climate Change and Development: Shaping Debates and Policies.* Switzerland: Springer, 211-230.

Dufty-Jones, R and Connel, J, (2016). *Rural Change in Australia: Population, Economy and Environment.* London: Routledge.

Eisenack, K, (2012). Archetypes of adaptation to climate change. In: *Human-Nature Interactions in the Anthropocene* (pp. 125-140). London: Routledge.

Eriksen, S. A. P, Bahinpati, C and Martin's, R, (2011). When not Every Response to Climate Change is A Good One: Identifying Principles for Sustainable Adaptation. *Climate and Development,* 3(1), 7-20.

Fant, C, Boehlert, B, Strzepek, K, Larsen, P, White, A, Gulati, S and Martinich, J. (2020). Climate Change Impacts and Costs to US Electricity Transmission and Distribution Infrastructure. *Energy*, 195, 116899. Available online: https://doi.org/10.1016/j.energy.2020.116899.

FAO (Food and Agricultural Organisation), (2014). *Adapting to Climate Change through Land and Water Management in Eastern Africa: Results of Pilot Projects in Ethiopia, Kenya and Tanzania,* s.l.: Food and Agricultural Organisation.

Fielding, K, Nauges, C and Wheeler, S.A. (2020). The relationship between country and individual household wealth and climate change concern: The mediating role of control. Available online: http://publications.ut-capitole.fr/34666/1/wp_tse_1086.pdf.

Fiksel, J. (2006). Sustainability and resilience: toward a systems approach. Sustainability: *Science, Practice and Policy*, 2(2), 14-21.

Frangopol, D. M and Liu, M. (2007). Maintenance and Management of Civil Infrastructure Based on Condition, Safety, Optimization and and Life-Cycle Cost. *Structure and Infrastructure Engineering*, 3(1), 29-41.

Frohlich, L, Schreinemachers, P, Stahr, K and Clemens, G, (2013). *Sustainable Landuse and Rural Development in Southeast Asia: Innovations and Policies for Mountainous Areas.* Switzerland: Springer.

Gibson, R. J, (2017). *Built to Last: Challenges and Opportunities for Climate Smart Infrastructure in California.* s.l.: Union of Concerned Scientists.

Giordano, T, (2012). Adaptive planning for climate resilient long-lived infrastructures. *Utilities Policy, 23*, 80-89.

Government of India, Ministry of Environment and Forests, (2014). *Adaptation to Climate Change with a Focus on Rural Areas in India*, s.l.: Government of India, Ministry of Environment and Forests.

Government of the People's Republic of Bangladesh, Ministry of Environment and Forests, (2015). *Climate Change and Infrastructure in Bangladesh: Information Brief*, s.l.: Government of the People's Republic of Bangladesh, Ministry of Environment and Forests.

Government of Zimbabwe (GoZ), (2015). *Zimbabwe's National Climate Change Response Strategy*, Harare: Ministry of Environment, Water and Climate.

Great Britain, Department for Environment, Food and Rural Affairs, (2011). *Climate Resilient Infrastructure: Preparing Infrastructure for a Changing Climate.* Britain: Department for Environment, Food and Rural Affairs.

Harrison, M and Williams, J.B, (2008). Communicating seasonal forecasts. In: *Seasonal climate: Forecasting and managing risk* (pp. 293-313). Springer, Dordrecht.

Howlett, M and Mukherjee, I, (2017). *Handbook of Policy Formulation.* Cheltenham: Edward Elgar.

Infrastructure Canada, (2018). *Disaster Mitigation and Adaptation Fund: Strengthening the Resilience of Canadian Communities: Applicant's Guide.* s.l.: Infrastructure Canada.

Islam, M. Z, Jasimuddin, S. M and Hasan, I. (2015). Organisational Culture, Structure, Technology Infrastructure and Knowledge Sharing. *Vine*. 45(1), 67-88.

Jha, A, Minner, T and Stanton- Geddes, Z, (2017). *Building Urban Resilience: Principles, Tools and Practice.* Washington DC: World Bank.

Kahl, F and Roland- Holst, D, (2012). *Climate Change in California: Risk and Response.* London: University of California Press.

Keenan, J, (2019). *Climate Adaptation Finance and Investment in California.* Oxon: Routledge.

Kennedy, C and Corfee-Morlot, J, (2013). Past performance and future needs for low carbon climate resilient infrastructure–An investment perspective. *Energy Policy, 59*, 773-783.

Khayesi, M, (2018). *Rural Development Planning in Africa.* New York: Palgrave McMillan.

La Rosa, D and Privitera, R, (2013). Characterization of non-urbanized areas for land-use planning of agricultural and green infrastructure in urban contexts. *Landscape and Urban Planning, 109*(1), 94-106.

Landman, K, du Plessis, C, Nel, V and Nel, D, (2019). Directives for Resilient and Regenerative Cities. Paper presented at the international council for research and innovation in building and construction (CIB), World Building Congress 2019 – constructing smart cities, Hong Kong Polytechnic University, Hong Kong, 17–21 June 2019.

Little, R. G. (2005). Tending the Infrastructure Commons: Ensuring the Sustainability of Our Vital Public Systems. *Structure and Infrastructure Engineering*, 1(4), 263-270.

Lowry, K, Funchs, R and Bettinger, K, (2015). *Urban Climate Change Adaptation and Resilience: A Training Manual,* Honolulu: Institute for Global Environmental Strategies.

Ludena, C and Netto, M, (2011). *Brazil: Mitigation and Adaptation to Climate Change,* s.l.: Inter- American Development Bank.

Magadza, C.H, (2000). Climate change impacts and human settlements in Africa: prospects for adaptation. *Environmental Monitoring and Assessment*, 61(1), 193-205.

Mallick, F, (2013). Habitat and Infrastructure: A Localised Approach to Resilience. In: R. Shaw, F. Malick and A. Islam, eds. *Climate Change Adaptation Actions in Bangladesh.* Japan: Springer, 331-340.

Maslin, M, (2014). *Climate Change: A Very Short Introduction.* Oxford: Oxford University Press.

Mayada, O, (2013). *The Resilience of Networked Infrastructure Systems: Analysis and Measurement.* Singapore: World Scientific Publishing.

Melore, T.W and Nel, V, (2020). Resilience of informal settlements to climate change in the mountainous areas of Konso, Ethiopia and QwaQwa, South Africa. *Jàmbá: Journal of Disaster Risk Studies*, 12(1), 9.

Milani, C. J and Kripka, M. (2020). Evaluation of Short Span Bridge Projects with a Focus on Sustainability. *Structure and Infrastructure Engineering*, 16(2), 367-380.

Mimura, N, (1999). Vulnerability of Island Countries in the South Pacific to Sea Level Rise and Climate Change. *Climate research*, *12*(2-3), 137-143.

Mureithi, S. M, Verdoodt, A, Njoka, J. T, Olesarioyo, J. S and Van Ranst, E. (2019). Community-Based Conservation: An Emerging Land Use at the Livestock-Wildlife Interface in Northern Kenya. In: *Wildlife Management-Failures, Successes and Prospects*. IntechOpen.

Nakashima, D, Krupnik, I and Rubis, G, (2018). *Indigenous Knowledge for Climate Change Assessment and Adaptation.* Cambridge: Cambridge University Press.

Nolon, J.R. (2012). Land Use and Climate Change: Lawyers Negotiating Above Regulation. *Brook. L. Rev*, 78, 521.

Nthiga, S. I. (2019). Factors Influencing Adoption and Utilisation of Rainwater Harvesting Technologies at Household Level in Evurore Ward, Mbeere North Sub-County, Kenya (Doctoral dissertation, University of Nairobi).

NYSERDA, (2018). *New York Climate Resilience Strategies for Buildings in New York State,, New* York: NYSERDA.

OECD, (2018). *Resilient Infrastructure for a Changing Climate,* Argentina: OCED.

Oughton, E, Usher, W, Tyler, P and Hall, J, (2018). Infrastructure as A Complex Adaptive System. *Complexity, Volume* 2018, 1-11.

Phago, K, (2012). Local government in South Africa: twinning election campaigns and service delivery. *Politeia*, *31*(1), 60-73.

Phinzi, K and Ngetar, N. S. (2019). Land Use/Land Cover Dynamics and Soil Erosion in rhe Umzintlava Catchment (T32E), Eastern Cape, South Africa. *Transactions of the Royal Society of South Africa*, 74(3), 223-237.

Ragffaelo, C, Liden, R, Neumann, J and Strezepek, K, (2015). *Enhancing the Climate Resilience of Africa's Infrastructure: The Power and Water Sectors.* Washington DC: World Bank.

Rametsteiner, E. (2009). Governance concepts and their application in forest policy initiatives from global to local levels. *Small-scale Forestry*, 8(2), 143-158.

Robinson, K, (2018). *New York 2140.* s.l.:Little Brown Book Group.

Rosendo, S, Celliers, L and Mechisso, M, 2018. Doing More with the Same: A Reality Check on the Ability of Local Government to Implement Coastal Management for Climate Change Adaptation. *Marine Policy* ,87(2018), 29-39.

Saha, D and Paterson, R. G. (2008). Local government efforts to promote the "Three Es" of sustainable development: survey in medium to large cities in the United States. *Journal of Planning Education and Research*, 28(1), 21-37.

Sapru, R, (2004). *Public Policy: Formulation, Implementation and Evaluation.* 2nd ed. New Dehli: Sterling Publishers.

Teel, W. S. (2019). Catching Rain: Sand Dams and Other Strategies for Developing Locally Resilient Water Supplies in Semiarid Areas of Kenya. In: *Agriculture and Ecosystem Resilience in Sub Saharan Africa* (pp. 327-342). Springer, Cham.

Terzi, S, Torresan, S, Schneiderbauer, S, Critto, A, Zebisch, M and Marcomini, A. (2019). Multi-risk Assessment in Mountain Regions: A Review of Modelling Approaches for Climate Change Adaptation. *Journal of Environmental Management*, 232, 759-771.

Turner, C, (2018). *Regional Infrastructure Systems: The Political Economy of Regional Infrastructure.* Cheltenham: Edward Elgar.

Ugwu, O. O and Haupt, T.C, (2007). Key performance indicators and assessment methods for infrastructure sustainability—a South African construction industry perspective. *Building and Environment*, *42*(2), 665-680.

Vallejo, L and Mullan, M, (2017). *Climate Resilient Infrastructure: Getting the Policies Right,* Paris: OCED Publishing.

Verschoor, M, Albers, C, Poortinga, W, Böhm, G and Steg, L. (2020). Exploring relationships between climate change beliefs and energy preferences: A network analysis of the European Social Survey. Journal of Environmental Psychology, 101435. Available online: https://doi.org/10.1016/j.jenvp.2020.101435.

Vicuna, S, Alvarez, P, Melo, O, Dale, L and Meza, F. (2014). Irrigation Infrastructure Development in the Limarí Basin in Central Chile: Implications for Adaptation to Climate Variability and Climate Change. *Water International*, *39*(5), 620-634.

Vonortas, N. S. (2002). Building competitive firms: technology policy initiatives in Latin America. *Technology in Society*, 24(4), 433-459.

Wallace-Wells, D, (2019). *The Uninhabitable Earth: Life After Warming.* s.l.:Crown.

Wilbanks, T and Fernandez, S, (2014). *Climate Change and Infrastructure, Urban Systems and Vulnerabilities.* London: Island Press.

Wisner, B, Pelling, M, Mascarenhas, A and Holloway, A, (2015). Small Cities and Towns in Africa: Insights into Adaptation Challenges and Potential. In: S. Pauleit, A. Coly, S. Fohlmeister and P. Gasparini, eds. *Urban Vulnerability and Climate Change in Africa: A Multidisciplinary Approach.* New York: Springer, 153-196.

World Bank, (2011). *Guide to Climate Change Adaptation in Cities,* Washington DC: World Bank.

World Bank, (2012). *Building Urban Resilience: Principles, Tools and Practice.* Washington DC: World Bank.

Yusta, J. M, Correa, G. J and Lacal-Arántegui, R. (2011). Methodologies and applications for critical infrastructure protection: State-of-the-art. *Energy Policy, 39*(10), 6100-6119.

Zenebe, A, Girma, A, Guyassa, E, Asfaha, T. G, Munro, R. N, Haile, M and Nyssen, J. (2019). Land use and suitability for rainfed agriculture. In: *Geo-trekking in Ethiopia's Tropical Mountains* (pp. 373-386). Springer, Cham.

## B3: Resilience Thinking in the Rural Human Settlements' Development and Management[32]

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### Introduction

Resilience has a long history. However, it only emerged as a public policy debate post-2000 becoming a more widely adopted concept dominating policies and projects. The environmental challenges that human settlements continue to face manifest themselves in different forms making resilience an evolving concept (Leichenko, 2011; Serre, Barroca and Laganier, 2012; Salinas Rodriguez *et al*. 2014; Patel *et al*. 2017). Diverse definitions of resilience exist within different research traditions and disciplines, including sociology, psychology, medicine, engineering, economics, ecology and political science (Hutter *et al.* 2013; Wiig and Fahlbruch, 2019). This diversity has affected decision-making in different human settlements across the globe. In practice, resilience has tended to be characterised by trade-offs between multiple and, at times, competing objectives (Ernstson *et al*. 2010). Consequently, managers, planners and regulatory practitioners have called for conceptual tools to help them develop risk management strategies, establish appropriate compromises and justify their decisions in the contested policy settings (Somers, 2009; Jha, Miner and Stanton-Geddes, 2013; Sharifi, 2016).

A systems resilience perspective defines how the interrelationship of the elements a system retains enabling its functionality in the context of a storm by adapting to the changes in the situation (Nuryanti *et al*. 2017). Depending on the nature and extent of its operational boundaries, a system can constitute smaller systems that are interacting with other systems beyond its boundaries. As a case in point, a family is a sub-system comprising members that can interact with members of other families constituting a community of families representing a wider system. Resilience means that the functions of a system remain robust in a crisis situation where the quality of its resilience is a product of the functional relationships of the

[32]Chirisa, I & Nel, V. (2021). Resilience Thinking in the Rural Human Settlements' Development and Management. International Journal of Rural Management, 09730052211001674.

subsystems.

The concept of a human settlement is both social and physical. Human settlement is a place where people live (Živković 2019). The human settlement comes in many forms and can be permanent and temporary, rural and urban, mobile and sedentary, disseminated and agglomerated. Settlements are therefore, given meaning by three interrelated concepts, namely, functions; population sustaining itself from functions and also morphology; the physical manifestation of population sustaining itself from functions in a particular locale (Musvoto 2014). An understanding of human settlement typology would be incomplete without a consideration of their geographic location and distribution. Settlements are defined by their relative location within and adjacent to urban cores and their economic divisions: whether located in the core of cities; on their fringe or periphery, or at some distance from cities (Kilian *et al*. 2005). The other factor, that is used to differentiate human settlements, is population size. The exact size may vary from country to country; to be classified as "urban". For example, in Denmark, a settlement needs only 250 people, compared to Greece, where "urban" is defined as a settlement of 10,000 or more (Khullar 2016).

Climate change is projected to have profound impacts on Zimbabwe, including heightened water stress, increased incidence of drought, declines in crop and livestock productivity, change in wildlife ranges, an increase in wildfire incidents and the possible expansion of malaria zones (Jiri *et al*. 2017). Resilience practices have improved the capacity of rural communities to adapt to climate change through promotion of climate-smart agriculture practices, improvements in smallholder farmer's access to markets and improving stakeholders' capacities for participatory planning at district level (Makate, 2019; Mutenje *et al*. 2019). Sustainable development initiatives in Zimbabwe are characterised by weak implementation and low impact on the ground. The institutional and infrastructural challenges observed in the case of rural Zimbabwe were shown to execrate vulnerability to climate change and inhibit the realisation of African Union (AU) Agenda 2063 as they restrict access to the very natural capital needed by communities to improve socio-economic well-being and reduce vulnerability (Dube *et al*. 2018).

The present article suggests a conceptual broadening of resilience that can corroborate a variety of diverse perspectives that draw on the practical experiences in the different disciplines. The

major concern of the article is to create an understanding of how ideas of resilience can be translated into practice and how practices of resilience can, in turn. be theorised and explained. Thus, the article discusses how resilience theory can be integrated into the planning and development of rural human settlements. Resilience is largely applied in disaster research (Jackson, 2007; Cutter *et al*. 2008; Harris *et al*., 2010; Kuhlicke, 2013). The article attempts to explain resilience as a resilience thinking paradigm with a development perspective. It seeks to explain this core debate supported by the new developmental perspective and criticisms.

**Resilience Thinking: A Review**

Resilience is a recent topic in policy and environmental planning and management research. There appear to be many aspects that explain why planners seem to be failing to put the concept into practice. The article adopts the definition of resilience by Folke *et al*. (2010: 1) that is "…the capacity of a [socio-ecological system] SES to continually change and adapt yet remain within critical thresholds". Resilience thinking thus has three pillars - resilience, adaptability and transformability. The forthcoming paragraphs intend to provide evolutionary insights to the subject.

Resilience has gained current in central organising metaphor for the policy-making process, including aspects of national security and emergency preparedness (Cutter *et al*. 2008; Thiruchelvam *et al*. 2018). Political prioritisation of the safety and security of communities against an array of perceived hazards and threats, including terrorism, disease pandemic and global warming-related flooding underpin resilience thinking (Coaffee 2013). Overall, resilience has its roots in the study of adversity and people's adjustment to it (Wiig and Fahlbruch 2019). Complex adaptive systems and resilience show how organisations adapt to the challenges they face, particularly in relation to social and technological complexity.

Some have considered the diversity of conceptualisations on resilience a weakness of the traditional approach giving rise to growing calls for a coherent integrative theoretical framework of resilience (Hudson, 2003; Murray, 2018; Thibaud *et al*. 2018). No single theory on resilience can address all the relevant factors and concepts that fall into the picture (Macrae 2014; Torques *et al*. 2017). Mapping out the general contours of a broad and expansive framework may act as a useful coordinating platform of future work on resilience in the high-risk industries.

Building resilience involves the strengthening of three specific capacities, notably, the absorptive, adaptive and transformative capacities (OECD, 2014a). Absorptive capacity is the ability of people, assets and systems to prepare for, mitigate, or prevent negative impacts of hazards to preserve and restore essential basic structures and functions. The absorptive capacity can be achieved through considerations of, protection, robustness, preparedness and/or recovery in the designing and construction of resilient buildings. The adaptive capacity demands the ability of people and systems to adjust and adapt from the impacts caused by hazards (Smit and Wandel, 2006; Fazey *et al*. 2007; Woods, 2015). The considerations of the transformative capacity in the construction of resilient buildings involve the need to create a fundamentally new system that can avoid the negative impacts of hazards. These three capacities are associated with a number of resilient building concepts that can be realised through a variety of activities (Table P.6).

**Table P.6: Conceptual considerations in the construction of resilient buildings (World Bank, 2017)**

| **Concept** | **Activity** |
|---|---|
| Protection | Building/ Reinforcing protective infrastructure (e.g., seawalls) |
| | Improving tree canopy cover for environmental protection from excessive heat and gale wind |
| | Resettling communities outside risk-prone area |
| Robustness | Maintaining and upgrading roads and other critical road infrastructure |
| Preparedness | Developing contingency plans, including funding of relief and rescue efforts |
| | Developing early warning systems, emergency relief shelters and evacuation routes |
| | Providing disaster risk insurance packages for vulnerable populations |
| Recovery | Reconstructing damaged housing and ancillary infrastructure |
| | Rehabilitating damaged ecosystems (e.g., reforestation) |
| | Food warehousing and distribution to disaster affected households |
| Diversity | Providing less weather-sensitive income generating activities, (e.g., jobs in the tourism industry) |
| Redundancy | Establishing multiple power-generation back-up systems at relief stations |
| Flexibility | Setting up irrigation projects for farmers dependent on rain–fed agriculture |
| | Constructing Bus Rapid Transport to provide residents with access to the city centre within 60 minutes |
| | Budgeting and planning for contingencies to allow for swift action during disasters |

The practice of resilience encompasses three major phases, notably, assessment, planning and action (Enfors-Kautsky *et al*. 2018) albeit there are different approaches and guides pertinent to thinking on resilience building. However, recent surveys (Cosens and Fremier 2014, Nemec

*et al*. 2014, Huitric *et al*. 2016, Allen *et al*. 2018) have suggested three major approaches to resilience building that include:

- The assessment of theory-based resilience frameworks,
- Participatory resilience assessment and
- Resilience-based planning and operations that have focused on more rapid assessments of resilience principles or attributes.

These approaches use different sets of resilience strategies, principles or properties, to assess relative resilience across different places and cases (Cosens and Fremier 2014, Nemec *et al.* 2014). There are three paradigms of resilience, namely: engineering resilience, systems resilience and resilience in complex adaptive systems (Nuryanti *et al.* 2017). The engineering resilience paradigm uses metaphors of infrastructure, such as bridges and buildings (Davoudi 2013). The engineered systems view of resilience focuses on how a system withstand excessive pressures and returns to normal when the pressure is removed (Nuryanti *et al*. 2017).

*Resilience in Regional and Rural Planning for Human Settlements*

Although its conceptualisation and practice continue to vary, regional planning occupies an important place in the development of many countries across the globe. Regional planning is the efficient placement of land-use activities, infrastructure and settlement growth across a larger area of land than an individual city or town (Chen Lu *et al*. 2014). Regional planning covers wide areas where several cities and rural areas are organically combined. Regional planning needs to address the problems of regional disparities, overpopulation and regional economic stagnation (Hall 2010). To ascertain regional trends and decide on future directions and development strategies, it is important to not only focus on the current situation, but to accumulate basic data over a number of years.

Rural settlements are most closely and directly related to the local natural resources. The major function of the settlement and the occupation of majority of inhabitants are related to primary activities, such as agriculture, animal husbandry, fishing, mining and forestry. This important distinction makes it clear that settlements are not just roads, houses and other infrastructure: they are also a setting of social relationships. Development structures within the rural human settlement must be properly understood and the resolution of development issues must be addressed from a more macro perspective.

Most European countries, that include UK, Scotland, Wales and Northern Irish, have undergone a significant reassessment and rearrangement of the regulatory and spatial planning system. This has ushered in new institutions; processes and scale of development planning that have much focus on regions. Unlike rural planning policies that are increasingly concerned with controlling the amount of physical development taking place in the countryside, regional planning brought with it the need to coordinate and manage new scales through processes and institutions of governance and the idea of 'scalar complexity' through the proliferation of new scales and their interaction with existing scales, institutions and processes of coordination.

The Swedish rural policy came under scrutiny in the 2017 Organisation for Economic Cooperation and Development Swedish Territorial Review, that argues that current government policy fails to comprehend the particular challenges faced by outlying areas and a more coherent approach, focused on developing rural strengths and potentials is required. As a result, sectoral policies, such as education and health services, spatial planning and transport, do not have a clear and coherent 'rural articulation'. The 2017 Parliamentary Report outlined the need to develop a more integrated and holistic approach to national rural policy. The report highlights the importance of Swedish rural areas for the development of the green economy and tourism, but notes a failure to exploit business potential and discrepancies in access to public services compared to urban areas.

Most African countries face the dilemma of developing more functionally integrated, spatially coherent, economically competitive, environmentally sustainable and socially inclusive rural and urban environments. In theory, sustainable human settlements should lead to creation of much needed socioeconomic opportunities, both locally and nationally, while at the same time should provide a strong incentive to manage nature's strongholds in a way that would conserve them. But in reality, there are, as it is argued, limited signs of progress toward sustainable development in Africa's rural settlements (Cobbinah *et al*. 2015b). With specific reference to sustainability in rural areas, Lowe and Murdoch (2014) argue that the social viability of the conserved countryside should be regarded as a primary objective of rural planning, but that such a proposal is neglected in contemporary debates about sustainability and rural development.

*Resilience Practices and Rural Human Settlements*

In many countries, rural areas have shown new spatial-economic dynamics that have meant a contrast with the traditional urban-rural dichotomy (Akgün *et al*. 2015). The way resilience thinking is operationalized tends to differ from place to place. Thus, diverse practices are being used in different countries and the success of resilience thinking is being understood in the context of that particular country (LeCoze 2018). Over the past decade or so, resilience is gaining ever-greater prominence in the international development discourse, emerging as one of the core principles of sustainable urban development in the post-MDGs framework.

Resilience featured as an important theme in major global agendas since 2015, including the Sendai Framework for Disaster Risk Reduction 2015-2030, the Paris Agreement on Climate Change and the New Urban Agenda. The Sendai framework aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years (United Nations Office for Disaster Risk Reduction, 2015). The Paris Agreement on Climate Change requires all countries—developed and developing—to make significant commitments to address climate change. The agreement contains provisions to hold countries accountable to their commitments and mobilise greater investments to assist developing countries in building low-carbon, climate- resilient economies (Natural Resources Defense Council, 2012). The New Urban Agenda (NUA) was adopted in 2016 in Quito at Habitat 111. It focuses on what needs to be done to ensure cities and human settlements of all scale deliver sustainable development. The NUA has three aspirational commitments: social inclusion and ending poverty; sustainable and inclusive urban prosperity and opportunities for all; and environmentally sustainable and resilient urban development. These global frameworks have helped various countries in applying resilience thinking.

Countries, such as Sweden, Canada and Australia, have applied resilience thinking in the context of urban planning and local governments in Sweden and Canada among others (Liu 2014, Sellberg *et al*. 2015). Australia applied resilience practices in their planning and development of rural and urban settlements. Australia's land, estuarine and coastal areas are divided among 56 regional natural resource management organisations (NRM Region Australia, 2017). In the early 2000s, organisations were established in their current form to redistribute environmental management from the national and state governments to regional

communities - an arrangement referred to as “the regional model”. They are concerned with the sustainable management of land, vegetation and water and deal with multiple interconnected issues, such as climate change and extreme events, biodiversity loss, invasive species and sustainable agriculture. Resilience Planning in Australia grew out of a history of applied research on resilience thinking and was enabled by state and federal policies.

Resilience assessment uses a participatory process of defining a social- ecological system, assessing its resilience and identifying options for interventions. Rather than to measure resilience, it aims to create a shared understanding of the structures and processes that shape the resilience of a complex system (Quinlan *et al*. 2015). The first resilience assessment was carried out as a research project in Goulburn-Broken in the early 2000s and contributed to developing the Resilience Assessment Workbook. Since 2007, about 25 of the 56 regional natural resource management organisations in Australia have adopted resilience planning to some degree: ranging from using resilience as a goal, to using resilience thinking to inform the content, process and organisation of the strategic planning. All the plans included an adaptive management framework, intending to build systematic learning and flexibility into the planning and operations of the organisations. Previous cases in Australia demonstrated that resilience practice contributed to establishing an adaptive management program (Walker and Salt 2012), helped dairy industry actors coordinate their governance practices and come up with joint strategies (Ayre and Nettle 2017) and led to a transformation of the Murray catchment management authority by strengthening community engagement and adopting a culture of learning.

Sweden also embraced operationalisation of resilience from the UN’s campaign of “making cities resilient” (UNISDR 2012). Municipalities in Sweden developed a municipal plan for local food security and sustainable food systems that bridged longer-term sustainable development and shorter- term crisis management (Sellberg *et al*. 2015). Some of the strategies, that were implemented, include environmentally friendly production methods from industries. This necessitated a view of the municipality as an interconnected system across sectors and scales and it became significant for both crisis management and planning for sustainable development.

Rural settlements in Africa are affected by numerous disasters (Clover, 2003; Haile, 2005; Reid and Vogel, 2006; Zogning, Ngouanet and Tiafack, 2007; Asare-Kyei *et al*. 2017). These range from acute but infrequent events, such as major floods, droughts and epidemics that can kill or injure large numbers of people, through to chronic and recurrent events that may affect only a few households or individuals at a time, but cumulatively have the greatest impact on poor people (ActionAid, 2016; Osuteye, Johnson and Brown, 2017). In Africa, the poor marginalised populations are often excluded from decision-making processes and lack the assets and skills needed to reduce their risk and achieve change (Raleigh, 2010; Yakubu and Aderonmu, 2010; Braun and Gatzweiler, 2014; Taylor and Camaren 2014). Particularly, some complex emergencies in the Sahel and Horn of Africa, in particular, resulted in food insecurity stemming from a combination of drought and socio-political conditions, such as conflict and conflict-related displacements, economic conditions and rising food prices (Lautze and Raven-Roberts, 2006; Meier, Bond and Bond, 2007; Downie, 2014).

Population movement between rural and urban areas (and between towns and cities) means that rural events can quickly have an impact on urban environments. The Ebola outbreak of 2014-2015 originated in rural Guinea, but spread rapidly to urban areas – and across borders (Meltzer *et al*. 2014; Carroll *et al*. 2015; Yamanis, Nolan and Shepler, 2016). These constraints mean that most governments in Africa and developing countries and poor people in rural areas, have very little capacity to adapt to changes. The crucial question, however, is how can sustainable rural settlements societies that are risk resilient, be created? Strengthening rural human settlement planning and enforcement of appropriate building standards, could contribute significantly to resilience building. This will help to reduce exposure to hazards, by preventing settlement and development in hazardous areas. The role of policies can be placed on the basis of precautionary planning to shield the region against (externally or internally induced) shocks; tools and actions for stabilizing the region and mitigating the worst impacts of the crisis; and processes for transformation, reorientation and renewal that help the region recover from a crisis.

Various over cases would be looked at that are being shown in Figure P.4.

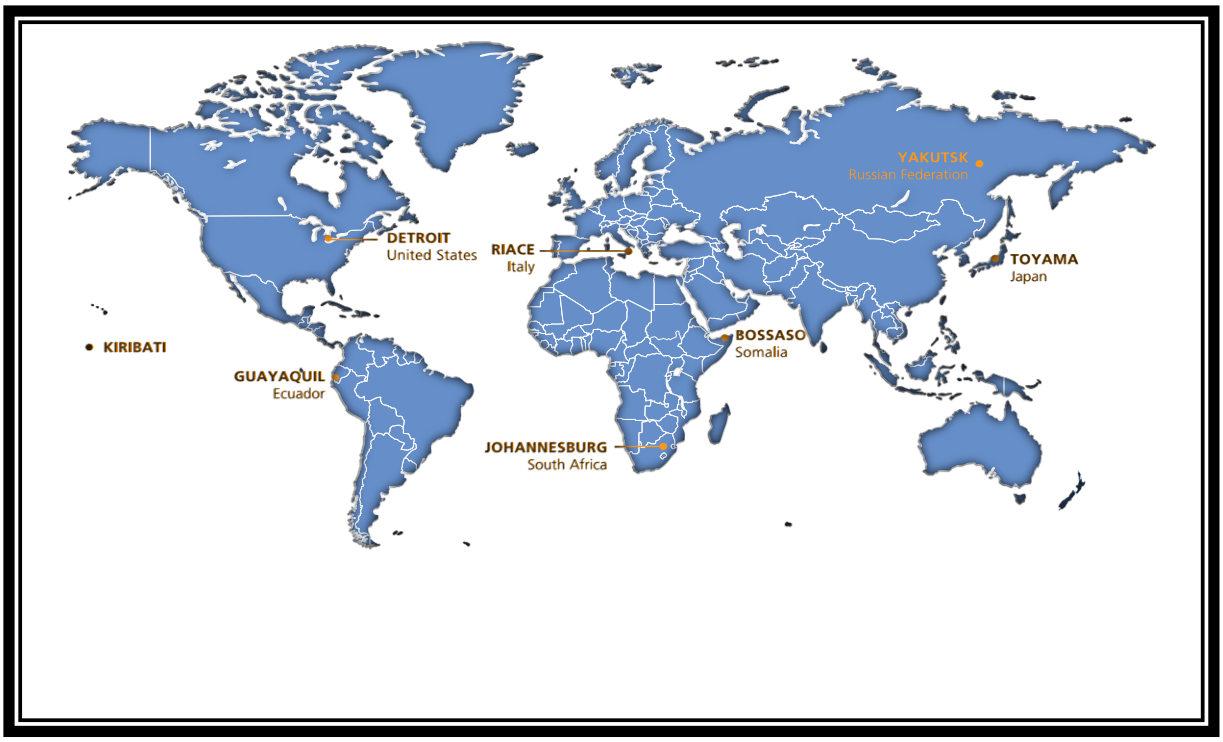


**Figure P.4: Some case studies where resilience thinking is applied (United Nations Human Settlements Programme, 2017**

### Akutsk, Russian Federation

Located just south of the Arctic Circle, the city of Yakutsk constitutes one of an average annual temperature of -8.8˚ Celsius (Kesserwan and Arteau 2017). Global warming is causing the 'active' layer of permafrost; usually between 30cm to 60cm thick, to expand beyond 1 meter. The once hard frozen ground underneath – or continuous permafrost – is turning soft, threatening infrastructure with distortion and shortening the lifecycle of buildings. Houses and apartment blocks in Yakutsk are cracking; some were even ruled uninhabitable due to the danger of collapse, furthering the housing shortage (Jaycen 2014). The region's agricultural land and its major industries of gas and diamond mining is at risk of ground settlement and thermokarst. Authorities in Yakutsk first recognised the need to adapt socioeconomic development to the reality of the harsh cold climate, while avoiding environmental degradation. The generated cold climate urban development plan retrofitted buildings to enhance energy efficiency, provided a new drainage system and constructed better roads and 5,000 new apartment units.

Yakutsk is grossly affected by climate change, causing the 'active' layer of permafrost to expand. This makes resilience a major concern in the region. Russia has attributes that provides

capacity for resilience as compared to other industrialized countries and most developing countries (Carino, 2009). Despite this capacity the impacts of climate change continue and intensify. Russia's capacity to adapt and protect its people will be severely tested. Peoples' livelihoods are increasingly challenged by environmental changes due to the persistent effects of global climate change (Galloway-McLean, 2017). Settlement patterns in Yakutsk that is uneven distribution patterns of settlement (Stepanova *et al*. 2020) have an impact on the effectiveness of resilience practices. Yakutsk acknowledged the necessity to adapt socioeconomic development to the reality of the harsh cold climate.

The city committed to climate change mitigation to halt and limit occurring shifts in vegetation and wildlife (Galloway-McLean, 2017). The sparsely populated territories' sustainability depends on implementing the policies of municipal, regional and national (federal) authorities and flexibility in natural resources management regimes (Zaivok *et al*. 2020; Gritsenko and Efimova, 2020). Russia is an example of a state-driven, top-down model that contrasts with the bottom-up and individual-driven sustainability model in other countries. Currently, the state remains strong and although it no longer plans communities, much of the impetus for achieving sustainability comes from government. Key factors likely to promote sustainability include health and treatment tourism in rural areas, excursion and ethnographical tourism, educational and recreational rural tourism and gastronomy tourism (Erokhin *et al*. 2018). Efforts to address the unique resilience challenges faced in Yakutsk are evidence to the commitment of local-level actors and one that stands to be shared during the Barcelona Resilience Days. Russia's sustainability question is centred on villages that provide labour to the industrial-agricultural complex.

**Resilience Practices and Rural Human Settlements in Zimbabwe**

Subsequently, in so far as it has existed as a development paradigm, the notion of rural settlement has come under criticism for several shortfalls. Issues of risk and resilience were not fully incorporated into rural human settlement in Zimbabwe (Green, 2014). Climate is exacerbated by the high levels of sensitivity of the social and ecological systems and the limited capacity of civil society, private sector and government actors to respond appropriately to these emerging threats. Table P.7 shows Post-2000 cyclones in Zimbabwe and their impacts.

**Table P.7: Post-2000 cyclones in Zimbabwe and impacts (Brown et al. 2012)**

| Cyclone | Dates | Extent of damage | Affected areas |
|---|---|---|---|
| Eline | Mid Feb 2000 | Widespread damage; 2.7 million people affected, 91 deaths, 357 injuries, 59,187 huts were destroyed | Manicaland, Matabeleland South, Midlands, Masvingo |
| Japhet | 3 March 2003 | 6 deaths | Masvingo, Midlands South, Manicaland South and parts of Mashonaland East. |
| Idai | March 2019 to the 17th of March 2019. | 181 deaths<br>347 people still missing.<br>183 injured<br>Properties, roads, livestock destroyed. | Chimanimani, Chipinge, Buhera, Nyanga, Makoni, Mutare Rural, Mutasa and parts of Mutare Urban and Masvingo Province |

Coupled with the slow settlement planning processes, poor living conditions in the rural areas are rampant. Rural settlements are usually built without giving adherence to building by-laws that are usually applied in most urban settlements (Njoh, 1992; Ogu, 1994). This has resulted in most rural settlement dwellings being constructed from pole and mud, that are not durable and some of the buildings are too small to be habitable. Disasters have kept on repeating in same districts and provinces causing damages. Enforcements and building inspectorate services are needed where a department of rural planning should not only create and approve plans at business centres and growth points, but to assess building plans for proposed housing developments in terms of locality and building materials (Chambers, 1982; Olorunfemi, 2011; Osuteye, Johnson and Brown, 2017). The interconnectedness of the human settlements is generating highly complex, challenges that require new design and engineering approaches (Allenby and Chester, 2018). The practitioners of the built environment should design, construct and operate rural human settlements that are compatible with the resilience dynamics of unpredictable environments (Hilson, 2016; Woods and Hollnagel, 2017). The recognition that human settlements function as complex, interdependent and integrated social-ecological systems is essential for understanding how resilience-based planning, development and management can protect life and assets sustainably. In Zimbabwe, resilience building is focused on the overlap between areas of chronic vulnerability and the occurrence of shocks and stressors (UNDP, 2015; Mavhura et al. 2017).

## Conclusion and Policy Options

The article sought to decipher how resilience thinking is integrated into human settlements as sphere and domain in which people live and engage in their day-to-activities. Emerging from the article is that resilience thinking has spanned decades of development debate and it transcend a number of sectors most of which are linked to the way people dwell in the places of their choice (Ayre and Nettle, 2017; Wig *et al*. 2018). The main trigger of resilience thinking is noted as the search, by humankind, of habitable areas with the least of risk and disaster occurrence. This means that whenever necessary, people will try by all means to avoid those places that increase their vulnerability to such natural events like flooding and earthquakes. However, risks and disasters are increasingly happening due to global warming and climate change. Theoretically speaking and with reference to the cases cited in the article, it is quite evident that resilience thinking has become resilience practice and there are various initiatives at policy and practical levels to make it a reality.

In the developed world, efforts are being advanced toward resilience building and construction in which Africa is also following the same script. The idea is to protect life and assets in case of emergencies. Countries are investing to reduce such mishaps as water stress and crop failure and the decimation of huge numbers of livestock in a given season. It has emerged in the foregoing analysis that rural areas have always been a neglected aspect of human development. With increasing extreme weather events like cyclones, hurricanes and heat, focus is beginning to be put on rural areas with respect to both infrastructure and superstructure investments. It is concluded that the conversion of 'thought to practice' in terms of resilience is a stride in the right direction. It is recommended that the countries, at central government level, put in place flexible policies in fast achieving resilience practice while at local government level, there is serious implementation of such policies. With concerted and appropriate policy and practice efforts at all geographic scale being applied, rural sustainability and enhancement are attainable as goals and outcomes.

## References

Action Aid, (2016). Strengthening Urban Resilience in African Cities: Understanding and Addressing Urban Risk. ActionAid International

Akgün, A. A, Baycan, T and Nijkamp, P. (2015). Rethinking on Sustainable Rural Development. European Planning Studies, 23(4), 678–692.

Aldunce P, Beilin R, Howden M, Handmer J. (2015). Resilience for Disaster Risk Management in a Changing Climate: Practitioners' Frames and Practices. Glob Environ Change-Hum Policy Dimens 30:1–11

Allenby, B and Chester, M. (2018). Reconceptualizing Infrastructure in the Anthropocene. Issues in Science and Technology, 34, 58–63.

Asare-Kyei, D, Renaud, F. G, Kloos, J, Walz, Y and Rhyner, J. (2017). Development and Validation of Risk Profiles of West African Rural Communities Facing Multiple Natural Hazards. *Plos One*, *12*(3), E0171921.

Baird, J, Plummer, R, Moore, M.L, Brandes, O, (2016). Introducing Resilience Practice to Watershed Groups: What are the Learning Effects? *Journal of Environmental Management* 217, 906-918

Barry, F, King, M and Matthews, A. (2010). Policy Coherence for Development: Five Challenges. *Irish Studies in International Affairs*, 207-223.

Bratton, M and Van De Walle, N. (1992). Popular Protest and Political Reform in Africa. *Comparative Politics*, 419-442.

Braun, J. V and Gatzweiler, F.W. (2014). *Marginality: Addressing the Nexus of Poverty, Exclusion and Ecology*. Springer-Verlag Gmbh.

Brenner, N and C. Schmid. (2014). "The 'Urban Age' in Question." International Journal of Urban and Regional Research 38 (3): 731–755

Carroll, M. W, Matthews, D. A, Hiscox, J. A, Elmore, M. J, Pollakis, G, Rambaut, A and Abdellati, S. (2015). Temporal and Spatial Analysis of the 2014–2015 Ebola Virus Outbreak in West Africa. *Nature*, *524*(7563), 97.

Chambers, R. (1982). Rural Refugees in Africa: Past Experience, Future Pointers. *Disasters*, *6*(1), 21-30.

Christensen, D. (2018). The Geography of Repression in Africa. *Journal of Conflict Resolution*, *62*(7), 1517-1543.

Clover, J. (2003). Food Security in Sub-Saharan Africa. *African Security Studies*, *12*(1), 5-15.

Coaffee, J. (2013). Towards Next-Generation Urban Resilience in Planning Practice: From Securitization to Integrated Place Making, Planning Practice and Research, 28:3, 323-339, DOI: 10.1080/02697459.2013.787693

Cobbinah, P. B, Erdiaw-Kwasie, M. O and Amoateng, P. (2015b). Africa's Urbanisation:

Implications for Sustainable Development. *Cities*, 47, 62–72. Doi: 10.1016/J.Cities.2015.03.013

Cutter, S. L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E and Webb, J. (2008). A Place-Based Model for Understanding Community Resilience to Natural Disasters. *Global Environmental Change*, 18(4), 598-606.

Cutter, S. L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E and Webb, J. (2008). A Place-Based Model for Understanding Community Resilience to Natural Disasters. *Global Environmental Change*, 18(4), 598-606.

Devoid, S. (2013). On Resilience, Disp - *The Planning Review*, 49:1, 4-5, DOI: 10.1080/02513625.2013.799852

Downie, R. (2014). EU And US Policies in The Sahel and the Horn of Africa. The Search for Sustainable Approaches. *Transatlantic Security from The Sahel to the Horn of Africa*, *12*, 43.

Dube, N, Sithole, M, Ngwenya, T, Muhwati, T, Moyo, E and Manyanga, K, 2018. Impact of climate change on sustainability in semi-arid, rural Africa: Lessons from rural Zimbabwe. *Cogent Social Sciences*, *4*(1), 1553327.

Dwyer, J, Ward, N, Lowe, P and Baldock, D. (2007). European Rural Development Under the Common Agricultural Policy's 'Second Pillar': Institutional Conservatism and Innovation. *Regional Studies*, *41*(7), 873-888.

Ernstson, H, Van Der Leeuw, S. E, Redman, C. L, Meffert, D. J, Davis, G, Alfsen, C and Elmqvist, T. (2010). Urban Transitions: On Urban Resilience and Human-Dominated Ecosystems. *Ambio*, *39*(8), 531-545

Erokhin, V, Gao, T and Zhang, X. eds, 2018. *Handbook of Research on International Collaboration, Economic Development and Sustainability in the Arctic*. IGI Global.

Fazey, I, Fazey, J. A, Fischer, J, Sherren, K, Warren, J, Noss, R. F and Dovers, S. R. (2007). Adaptive Capacity and Learning to Learn as Leverage for Social–Ecological Resilience. *Frontiers in Ecology and The Environment*, *5*(7), 375-380.

Folke, C, Carpenter, S, Walker, B, Scheffer, M, Chapin, T and Rockström, J. (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecology and society*, *15*(4), 1-9.

Fox, S and Bell, A. (2016). Urban Geography and Protest Mobilization in Africa. *Political Geography*, *53*, 54-64.

Galloway-McLean, K, 2017. *Advance guard: climate change impacts, adaptation, mitigation and indigenous peoples: a compendium of case studies.* Darwin, Australia, UNU-IAS Traditional Knowledge Initiative.

Gilbert, E. W and Steel, R. W. (1945). Social Geography and Its Place in Colonial Studies. *The Geographical Journal,* 106(3/4), 118-131.

Green, L. (2014). Resilience. *Resilience: A Journal of the Environmental Humanities*, *1*(1), 1-3.

Gritsenko, D and Efimova, E, 2020. Is there Arctic resource curse? Evidence from the Russian Arctic regions. *Resources Policy*, *65*, p.101547.

Gupta, H. (2015). *Home Sweet Home*. Oslo: Norwegian Refugee Council.

Haile, M. (2005). Weather Patterns, Food Security and Humanitarian Response in Sub-Saharan Africa. *Philosophical Transactions of The Royal Society B: Biological Sciences*, 360(1463), 2169-2182.

Harris, J. I, Thornton, S and Engdahl, B. (2010). The Psychospiritual Impact of Disaster an Overview. In *Creating Spiritual and Psychological Resilience* (Pp. 108-118). Routledge.

Harris, K. Keen, D and Mitchell, T. (2015). *When Disasters and Conflict Collide: Improving the Links Between Disaster Resilience and Conflict Prevention*. Overseas Development Institute (ODI): London.

Hassler, U and Kohler, N. (2014). Resilience in The Built Environment, *Building Research and Information*, 42:2, 119-129, DOI: 10.1080/09613218.2014.873593

Hilson, G, 2016. Farming, small-scale mining and rural livelihoods in Sub-Saharan Africa: A critical overview. *The Extractive Industries and Society*, *3*(2), 547-563.

Hudson, P. (2003). Applying the Lessons of High-Risk Industries to Health Care. *BMJ Quality and Safety*, *12*(Suppl 1), I7-I12.

Hutter, G, Kuhlicke, C, Glade, T and Felgentreff, C. (2013). Natural Hazards and Resilience: Exploring Institutional and Organisational Dimensions of Social Resilience. *Natural Hazards*, *67*(1), 1-6.

Jackson, S. (2007). A Multidisciplinary Framework for Resilience to Disasters and Disruptions. *Journal of Integrated Design and Process Science*, *11*(2), 91-108.

Jaycen, A. (2014). Permafrost Thaw Cracks Urban Infrastructure, Students Dig In. *Barents Observer*. Available at: http://barentsobserver.com/ en/society/2014/07/permafrost-thaw-cracks-urban- infrastructure-students-dig-15-07.

Jha, A. K, Miner, T. W and Stanton-Geddes, Z. (Eds.). (2013). *Building Urban Resilience:*

*Principles, Tools and Practice*. The World Bank.

Jiri, O, Mafongoya, P.L and Chivenge, P, 2017. Building climate change resilience through adaptation in smallholder farming systems in semi-arid Zimbabwe. *International Journal of Climate Change Strategies and Management*, 9(2), 1-33.

Kesserwan, K and Arteau, J.F. (2017). Daryana Maximova: Native Yakutian And Researcher. *World Policy Blog.* Available at: http://www. worldpolicy.org/blog/2017/01/25/daryana-maximova- native-yakutian-and-researcher.

Kuhlicke, C. (2013). Resilience: A Capacity and a Myth: Findings from an In-Depth Case Study in Disaster Management Research. *Natural Hazards*, *67*(1), 61-76.

Lautze, S and Raven-Roberts, A. (2006). Violence and Complex Humanitarian Emergencies: Implications for Livelihoods Models. *Disasters*, *30*(4), 383-401.

Lecoze, J.C. (2018). An Essay: Societal safety and the global1,2,3. Saf.Sci. (December2018, Volume 110, Part C), https://doi.org/10.1016/j.ssci.2017.09.008

Leichenko, R. (2011). Climate Change and Urban Resilience. *Current Opinion in Environmental Sustainability*, *3*(3), 164-168.

Luhn, A. (2016). Slow-Motion Wrecks: How Thawing Permafrost Is Destroying Arctic Cities. *The Guardian.* Available at: https://www. theguardian.com/cities/2016/oct/14/thawing-permafrost-destroying-arctic-cities-norilsk-russia.

Macrae, C. (2014). *Close Calls: Managing Risk and Resilience in Airline Flight Safety* (Palgrave Macmillan, New York.

Makate, C, 2019. Local institutions and indigenous knowledge in adoption and scaling of climate-smart agricultural innovations among sub-Saharan smallholder farmers. *International Journal of Climate Change Strategies and Management*, 12(2), 270-287.

Mariathasan, G.M, (2015). *The Butterfly Defect: How Globalization Creates Systemic Risks and What to Do About It* (Princeton University Press, Princeton, 2015)

Marsden, E. (2014). Risk Regulation, Liability and Insurance: Literature Review of their Influence on Safety Management. Cahier De La Sécurité Industrielle 2014-08. Foundation for An Industrial Safety Culture, Toulouse, France (2014)

Mavhura, E, Collins, A and Bongo, P.P, 2017. Flood vulnerability and relocation readiness in Zimbabwe. *Disaster Prevention and Management: An International Journal*, 26(1), 41-54.

Meier, P, Bond, D and Bond, J. (2007). Environmental Influences on Pastoral Conflict in The Horn of Africa. *Political Geography*, *26*(6), 716-735.

Meltzer, M. I, Atkins, C.Y, Santibanez, S, Knust, B, Petersen, B. W, Ervin, E. D and Washington, M.L. (2014). Estimating the Future Number of Cases in the Ebola Epidemic--Liberia and Sierra Leone, 2014–2015.

Mitchell, M, Griffith, R, Ryan, P, Walkerden, G, Walker, B, Brown, V.A, Robinson, S, (2014). Applying Resilience Thinking to Natural Resource Manage- Ment Through A "Planning-By-Doing" Framework. Soc. Nat. Resour. 27, 299e314. https://doi.org/10.1080/08941920.2013.861556.

Mthalane, D, Othman, A. A. E and Pearl, R. G. (2008, March). The Economic and Social Impacts of Site Accidents on The South African Society. In *Proceedings of the 5th Post Graduate Conference on Construction Industry Development* (Vol. 1). South Africa: Bloemfontein.

Murray, A. (2018, September). Are Pipelines Being Held to An Unreasonably High Standard of Performance? In *2018 12th International Pipeline Conference*. American Society of Mechanical Engineers Digital Collection.

Musvoto, G. (2014). The Historical Evolution of Settlement Patterns and Trends in South Africa: Unlocking the Log-Jam of the Unsustainable Settlements' Impasse. *International Journal of African Renaissance Studies* - Multi-, Inter- and Transdisciplinary, 9:2,154-172, DOI: 10.1080/18186874.2014.987961

Mutenje, M.J, Farnworth, C.R, Stirling, C, Thierfelder, C, Mupangwa, W and Nyagumbo, I, 2019. A cost-benefit analysis of climate-smart agriculture options in Southern Africa: Balancing gender and technology. *Ecological Economics*, *163*, 126-137.

Njoh, A. J. (1992). Institutional Impediments to Private Residential Development in Cameroon. *Third World Planning Review*, *14*(1), 21.

Njoh, A. J. (2002). Development Implications of Colonial Land and Human Settlement Schemes in Cameroon. *Habitat International*, *26*(3), 399-415.

NRM Regions Australia, (2017). NRM Regional Organisations. http:// nrmregionsaustralia.com.au/nrm-regions-map/. (accessed 21 December 2017).

Nuryanti, L, Sullivan, G, Wang, S, Branney, P. (2017). Resilience as Boundary Object in Disaster Policy, Research and Interventions: Border Thinking from The Indonesian "Supermarket of Disaster"

Ogu, V. I. (1994). Rural Housing Quality in Nigeria: A Case Study from Imo State. *Habitat International*, *18*(3), 53-65.

Olorunfemi, F. B. (2011, May). Managing Flood Disasters Under A Changing Climate: Lessons from Nigeria And South Africa. In *NISER Research Seminar Series, NISER, Ibadan* (Vol. 3, 1-44).

Osuteye, E, Johnson, C and Brown, D. (2017). The Data Gap: An Analysis of Data Availability on Disaster Losses in Sub-Saharan African Cities. *International Journal of Disaster Risk Reduction*, *26*, 24-33.

Osuteye, E, Johnson, C and Brown, D. (2017). The Data Gap: An Analysis of Data Availability on Disaster Losses in Sub-Saharan African Cities. *International Journal of Disaster Risk Reduction*, *26*, 24-33.

Patricia Romero-Lankao, Daniel M. Gnatz, Olga Wilhelmi And Mary Hayden (2016). Urban Sustainability and Resilience: From Theory to Practice *Sustainability* 2016, 8, 1224; Doi: 10.3390/Su8121224

Philip R. Crowe and Karen Foley (2017). Exploring Urban Resilience in Practice: A Century of Vacant Sites Mapping in Dublin, Edinburgh And Philadelphia, Journal of Urban Design, 22:2, 208-228.

Quinlan, A.E, Berbe_S-Bla_Zquez, M, Haider, L.J, Peterson, G.D, (2015). Measuring and Assessing Resilience: Broadening Understanding Through Multiple Disciplinary Perspectives. *J. Appl. Ecol.* 53, 677e687. https://doi.org/10.1111/1365-2664. 12550.

Raleigh, C. (2010). Political Marginalisation, Climate Change and Conflict in African Sahel States. *International Studies Review*, *12*(1), 69-86.

Reid, P and Vogel, C. (2006). Living and Responding to Multiple Stressors in South Africa—Glimpses from Kwazulu-Natal. *Global Environmental Change*, *16*(2), 195-206.

Salehyan, I, Hendrix, C. S, Hamner, J, Case, C, Linebarger, C, Stull, E and Williams, J. (2012). Social Conflict in Africa: A New Database. *International Interactions*, *38*(4), 503-511.

Salinas Rodriguez, C. N, Ashley, R, Gersonius, B, Rijke, J, Pathirana, A and Zevenbergen, C. (2014). Incorporation and Application of Resilience in the Context of Water-Sensitive Urban Design: Linking European And Australian Perspectives. *Wiley Interdisciplinary Reviews: Water*, *1*(2), 173-186.

Sánchez-Zamora, P, Gallardo-Cobos, R and Ceña-Delgado, F. (2014). Rural Areas Face the Economic Crisis: Analysing the Determinants of Successful Territorial Dynamics. *Journal of Rural Studies,* 35, 11–25.

Serre, D, Barroca, B and Laganier, R. (Eds.). (2012). *Resilience and Urban Risk Management*. CRC Press.

Sharifi, A. (2016). A Critical Review of Selected Tools for Assessing Community Resilience. *Ecological Indicators*, *69*, 629-647.

Smit, B and Wandel, J. (2006). Adaptation, Adaptive Capacity and Vulnerability. *Global Environmental Change*, *16*(3), 282-292.

Somers, S. (2009). Measuring Resilience Potential: An Adaptive Strategy for Organisational Crisis Planning. *Journal of Contingencies and Crisis Management*, *17*(1), 12-23.

Stepanova, N, Gritsenko, D, Gavrilyeva, T and Belokur, A, 2020. Sustainable development in sparsely populated territories: Case of the Russian Arctic and Far East. *Sustainability*, *12*(6), 2367-73.

Taylor A and Camaren, P. (2014). *Strengthening Climate Resilience in African Cities*. African Centre for Cities: Cape Town.

Thibaud, M, Chi, H, Zhou, W and Piramuthu, S. (2018). Internet of Things (Iot) In High-Risk Environment, Health and Safety (EHS) Industries: A Comprehensive Review. *Decision Support Systems*, *108*, 79-95.

Thiruchelvam, S, Chit, S. C, Norkhairi, F. F and Nabilah, N. (2018). Conceptual Approach of Developing a Courseware to Educate Schoolchildren in Raising Resilience Towards Flood Disaster. Paper Presented at The Knowledge Management International Conference (Kmice) 2018, 25 –27 July 2018, Miri Sarawak, Malaysia. Available Online: Http://Www.Kmice.Cms.Net.My

UN-Habitat (2016). *Bossaso Releases First Urban Development Plan for City Extension.* Available at: https://unhabitat.org/bossaso-releases-first-urban- development-plan-for-city-extension/.

Voigt-Graf, C. (2016). Kiribati's National Labour Migration Policy: A Climate Change Adaptation Strategy? *Devpolicy Blog*. Available At: http:// devpolicy.org/kiribatis-national-labour-migration- policy-a-climate-change-adaptation-strategy-20161109/.

Von Fintel, D. P. (2018). Long-Run Spatial Inequality in South Africa: Early Settlement Patterns and Separate Development. *Studies in Economics and Econometrics*, *42*(2), 81-102.

Wagenaar, H, Wilkinson, C, (2015). Enacting Resilience: A Performative Account of Governing for Urban Resilience. *Urban Stud*. 52, 1265-1284.

Watts, M. (1994). The Geography of Post-Colonial Africa: Space, Place and Development in Sub-Saharan Africa (1960–93) 1. *Singapore Journal of Tropical Geography*, *14*(2), 173-190.

Wiig, K. Aase, M. Bourrier, O. (2018). Rise, Transparency in Healthcare–Displaying Adverse Events to The Public, In *Risk Communication for the Future*, Ed. By M. Bourrier, C. Bieder (Springer, Berlin, 2018), 111–125

Wiig, S and B. Fahlbruch, B. (2019). *Exploring Resilience*, Springerbriefsin Safety Management, https://doi.org/10.1007/978-330-03189-3_1

Wisner, B and Pelling, M. (2012). African Cities of Hope and Risk. In *Disaster Risk Reduction* (Pp. 33-58). Routledge.

Woods, D. D. (2015). Four Concepts for Resilience and The Implications for The Future of Resilience Engineering. *Reliability Engineering and System Safety*, *141*, 5-9.

Woods, D. D and Hollnagel, E. (2017). *Prologue: Resilience Engineering Concepts.* Resilience Engineering. London: CRC Press.

World Bank. (2017). *Resilience MandE Good Practice Case Studies*. World Bank, Washington, DC, USA.

Yakubu, O. D and Aderonmu, J. A. (2010). Rural Poverty Alleviation and Democracy in Nigeria's Fourth Republic (1999-2009). *Current Research Journal of Social Sciences*, *2*(3), 191-195.

Yamanis, T, Nolan, E and Shepler, S. (2016). Fears and Misperceptions of the Ebola Response System During The 2014-2015 Outbreak in Sierra Leone. *Plos Neglected Tropical Diseases*, 10(10), E0005077.

Zogning, A, Ngouanet, C and Tiafack, O. (2007). The Catastrophic Geomorphological Processes in Humid Tropical Africa: A Case Study of The Recent Landslide Disasters in Cameroon. *Sedimentary Geology*, *199*(1-2), 13-27.

## C1: Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe[33]

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### Introduction

Disaster losses are increasing partly due to climate change – but also because development is often not carried out in a risk informed way (Clarke and Dercon 2016:99). Disasters are a reality claiming lives, property, disrupting economic systems, livelihoods and other development gains across the globe, including in Zimbabwe. Rural areas are generally more vulnerable to disaster as compared to their urban counterparts. The vulnerability of rural areasisbeing accelerated by higher rates of poverty and higher population densities relative to settlement capacity in rural areas. Non- observance of building standards regulations in developing human settlements in rural communities have contributed much destruction as a result of disasters. These disasters have a tendency of eroding hard earned rural development planning gains earned over long periods of time (Van Niekek, 2013; Clarke and Dercon, 2016).

In response to these risks, two broad paradigms stand for managing these disaster-relief attempts through contingency planning. Reactive measures in the formoffood relief are the traditional approaches to disaster management in Zimbabwe. However, the measures are often less effective in addressing the hazard mitigation demands of rural communities, rural economies and the resource endowments and protecting the development gains of communities on post- disaster recovery. The other new, alternative paradigm (pro-active) focuses on hazard mitigation through pre- disaster planning to enhance hazard resilience through the day-to-day development planning activities to reduce vulnerability of human settlements to potential hazards over the long-term (Moreno *et al.* 2017). It is in this new paradigm (proactive paradigm) that local development planning resides as a potential tool for building resilience of rural settlements (Burby *et al.*2000; Madu and Kuei, 2018). This article, therefore, explores the

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potential for proactive measures as a tool for building the resilience of rural settlement to potential hazards in rural areas of Zimbabwe.

This article was mainly exploratory in nature and was conducted through case study review and drawing lessons from case studies where disaster mitigation was successfully mainstreamed into development planning. In terms of data collection, the study used literature and documentary review of disaster management reports, hazard mitigation plans and development plans of rural governments and communities across the globe. Major themes and principles emerging were extracted as key learning points for exploring the potential for mainstreaming hazard mitigation in rural development plans in the context of Zimbabwe. Results are presented in form of text.

In exploring the potential for mainstreaming hazard mitigation in rural local development plans in Zimbabwe this falls into five sections. The first section provides a theoretical and conceptual framework explaining the major concepts forming the foundation of rural development planning, master planning for disaster mitigation or hazard resilience. The next section is literature review of the global and regional experiences in mainstreaming hazard mitigation into local development planning. After the literature review follows findings on rural master planning for disaster resilience in Zimbabwe. The fourth section provides a discussion of the major findings while the fifth part provides a conclusion and policy recommendations for improving the efficacy of rural development planning as a tool for fostering disaster resilience in rural communities of Zimbabwe.

**Theoretical Framework**

This section discusses concepts and theories forming the foundation for mainstreaming hazard mitigation into rural local development plans. The concepts include master planning, resilience and disaster. While the theories include systems theory for resilience and disaster management theories.

Master plans or local development plans can be defined as policies that contain the development vision of a community over a defined period of time usually over a long-term period 15-30 years (though the length may vary from one country to another). Local plans address issues, including land-use, the physical development, social development, economic

development and natural environmental management vison of a community and also define the allocation of resources to implement programmes aligned to achieve the broad community vision over the long-term. This implies local development plans are not limited to land-use but also address social, economic and environmental development issues. Furthermore, development planning is responsible for managing human settlement dynamics (growth or decline or new wave of strains (hazards and risks) to achieve a particular desired physical, economic or social outcome, one of the goals is to deliver liveable, safe and resilient human settlements. These three goals of development planning equate it to regulation and management of risks, under changes over a defined period of time (March *et al.* 2017).

Concerning the history of master planning, it owes to the early utopian visions of ideal cities and human settlements and masterplans becomes the way through which the early utopias expressed these visions and are used in guiding development through design, planning and architecture and other strategies shaping the built environment with the overall aim of betterment of human life and increasing health and safety since the industrial revolution (Firley and Groen, 2014; March and Kornakova, 2017). Thus, the scope of masterplans or local development planning goes beyond spatial planning matters though spatial development and development regulation is the main traditional orientation of local development planning (Gallent *et al.*2008). Therefore, mainstreaming disaster resilience in local development planning in the context of this article considers the incorporation of disaster risk management across the different components of local development plans- land-use, physical (infrastructure), economic, social and environment development facets. Hence, mainstreaming disaster risk management in local development considers hazard mitigation across all the facets of local development – physical, economic, social and environmental management. However, the components and scope of master plans vary form one area to another (Perera and Khailani 2017).

Local development planning employs a range of tools that can be used to mainstream disaster risk reduction in development. These tools include spatial planning tools, coordination tools, risk informed policy in guiding social economic development and through the resource allocations or the capital budgeting mechanisms (Schwab, 2010). In addition, disaster risk mitigation concerns can also be integrated at the development project appraisal stage, where using specific scores on disaster mitigation as basis for approving or declining development

permits (Benson, 2009). The spatial mechanisms include risk informed land-use planning, hazard zoning regulations (flood zoning, geological hazard zoning (earthquake zoning, landslides zoning), wildfire zoning), building design standards, effective physical placement of land-uses (agriculture, tourism, recreation, residential, forestry, natural water resource areas), development density control, risk informed infrastructure planning and risk informed development control zoning. Effective zoning of hazard-prone areas (buffer zoning of the hazard-prone areas (FEMA, 2013) allows for the mapping of the extent of disaster (geological faults, floods and other metrological hazards, earthquakes and wildfires) and, therefore, restricting human settlement or infrastructure development and using such areas as natural forest areas or conservation areas. Thus, land-use planning and development control is one facet of fostering hazard mitigation.

Beyond spatial development tools, local development planning can also use the capital budget and resource allocation function to screen pro- hazard development projects and those that are not across all the facets (economic development, social and environmental management. The funding component of local development plans works through funding development projects that reduce the vulnerability of rural areas to hazards (Schwab, 2010). Risk informed capital budgeting could help mitigate the impacts of hazards on rural settlements, economies and social life (Lindslay, 1993; March *et al*. 2017).

A disaster has no single definition. It can be defined as an event which results in serious disruption of community – natural environment, life, assets or economic losses where the losses are beyond the capacity of a community to cope or recover using own resources or capabilities (Simonovic, 2010; Najafi *et al.* 2017). Though the common definition relates to events disrupting the economic, social, cultural or environmental components of communities, some countries have developed measures to rate these events and only an event that results in a particular level of disruption economically, socially or environmentally qualifies to be declared a disaster. Disasters also vary in terms of geographical scale. While some disasters are local (affecting communities at the local scale) some are national while others are global.

Concerning the causes, disasters can be natural or human-induced. Natural disasters are a result of natural processes and include geological hazards (earthquakes, tsunamis, volcanic splashes), hydro-metrological or climate change induced hazards (cyclones, hurricanes, floods, droughts,

fires) and biological hazards (tsetse flies, wildlife). On the other hand, manmade hazards are those induced or a direct product of human activities, including environmental degradation, flooding (Sulphey, 2016). Though hazards can be natural or human related, the degree of destruction imposed on development in the event of a hazard largely owes to the level of pre-planning and preparedness of a community. Besides differing by causes, the conceptualisation of disasters tends to vary across disciplines. While geographers relate disasters to physical occurrences independent on human actions, sociologists regard disasters as social constructs (Quarantelli, 1998). Building from the various definitions of disasters, in this article the term disaster refers to events either natural or which has potential to disrupt the physical, social, economic or natural environemntal systems of rural settlements if not preplanned for. Closely related to the term disaster is the term hazard. Hazards are events likely to result in loss beyond the capacity of a community, natural systems or the economic systems to adapt or cope (Benson and Twig, 2007).

Disaster management entails any strategies meant to prevent the occurrence of disasters, divert the effects or reduce the destructive effects of disasters through individual or organised group efforts at community, district, national or global levels (Simonovic, 2010). Besides being a both a technical and social endeavour, disaster management is also a public good (Schwab, 2010). One of the disaster management theories is the disaster intervention theory. The theory compromises of four major points of intervention. These include prevention, mitigation, preparedness, response and recovery. Prevention involves taking attempts to prevent a disaster from occurring. Mitigation though incorporating aspects of prevention, it's concerned with reducing the impacts of disasters in the event that they occur (Charkrabarti, 2017). Both the prevention and mitigation phases are pre- disaster and form the preparedness component of disaster management (Benson and Twig, 2007). Other distinct features of both mitigation and preparedness are that they are continuous and benefits are long-term. As such, these interventions are often less prioritised in resource allocation and funding since the benefits are invisible in the short run and more so are not likely to be realized during the tenure of political officers (though this based on the political reasoning) (Charkrabarti, 2017). Once a disaster occurs, the point of intervention is disaster response.

Disaster responses include all the emergency activities taken to evacuate either people or property in the event of disasters disaster. This is the shortest phase and is given the highest

priority in terms of resources allocation. However, the specific disaster response activities are particular to the type of disaster. The other point of planning intervention is through disaster recovery. Disaster recovery focuses on returning a community back to its pre- disaster condition through attempts, such as reconstruction. Both response and recovery secure more resource priority as opposed to the pre-disaster interventions, including those focused on mitigation, prevention or preparedness (Charkrabarti, 2017). However, restoring a community to its pre-disaster condition has detrimental implications on the capacity to deal with future dynamics henceno longer does recovery focus on reproducing the pre- disaster condition but also redevelopment occurs in an alternative way responsive to new strains of hazards (Davoudi, 2012). This simple model is critical since it defines the scope of typical disaster management intervention points in rural development planning. However, since the focus of this article is on disaster resilience through preplanning, the prevention and mitigation phases of disaster management are more relevant.

The other theory of understanding disaster management is the disaster incubation theory. This theory explains how a disaster event accumulates over time until it occurs and attributes the occurrence of disasters, to lack of foresight by management (public managers) and, therefore, action to avoid or mitigate the disasters (Lauder, 2015). As such, an overall future foresight through risk assessment is critical in reducing crises. The incubation theory consists of six stages in the development of events or disaster.

The first stage is the normal stage where the beliefs about hazards and the precautions are considered. At this stage, the plans, policies and standards to mitigate hazards are in balance. These tools are congruent to the community perceived hazards and are able to mitigate the common disasters (Lauder, 2015). Therefore, at the normal stage, the community has capacity to manage risks and hazards. However, a set of events, contradictory to the existing beliefs, knowledge systems and hazard mitigation tools gradually develops. This is the incubation stage, the second stage. The events are either not known or known but not fully understood. Possible explanation of the rise of these events includes rigid beliefs, information deficiency, knowledge deficiency (Lauder, 2015). Information shortages does not necessarily imply absence of knowledge but the ignoring of alternative knowledge systems in favour of conventional and usually scientific knowledge systems as the most appropriate knowledge system (Spierkerman *et al.* 2015). The disaster incubation stage is reinforced by little

appreciation of potential, invisible hazards. This thwarts motivation to building system resilience to mitigate potential hazards whose impacts are less perceived. Thus, generally community beliefs about hazards limits potential to plan for possible new hazards leading to precipitation and occurrence of a hazard that could are mitigated (Najafi *et al.* 2017).

The third stage is precipitation and unanticipated occurrence where the event forces it to the attention of communities and managers and changes the general norms and belief about hazards. The fifth stage is the stage of rescue where institutions and communities initially adjust (crisis management). Crisis management is followedbyenquiry and assessment driven by the need to understand the event. This enquiry generates new beliefs and a different understanding of hazards (Lauder, 2015). This results in a new or adjusted definition of the hazards, the laws and policies for addressing such issues are also adjusted in line with the new perception of hazards - thus, disaster management is dynamic. Part of these belief systems and policies are local development plans (LDPs), contingency plans as strategies a community adopts as being adequate to address the perceived disaster vulnerabilities.

Though Turner's theory is mainly framed in the business management field, it is critical in framing disaster management in rural development. The theory reflects the importance of foresight (long-term planning of disaster risks) and generation of continuous knowledge (not fixed perceptions, policies and culture of disaster management. In addition, the theory also advocates for continuous adjustments of the community tools for disaster management among which include local development plans to continuously improve adaptiveness to potential whose effects may not yet surfaced. Furthermore, the disaster incubation theory is important in appreciating the response of communities to local development planning for mitigating future hazard where community respond more favourably to initiatives/ policies or ideas that align with traditional perception of hazards in immediate jurisdictions (Federal Emergence Management Agency (FEMA), 2013). This has to be appreciated in rural local development planning for effectiveness.

Resilience has become a fuzzy and ambiguous term in the regional development planning fraternity though it originally evolved in the ecological field. Likewise, in the context of planning theory and practice the term is contested and can be used as a radical process or resilience is conceived as an outcome or goal or resilience interpreted as a performance measure

for the achievements of planners (Davoudi, 2012). Resilience refers to the ability of a system to absorb shocks and stress without affecting the capacity of a system to provide services. Thus, resilience can be stationary where the aim is to retain societies to their original state or maintain the society its original state or evolutionary where the focus is on building the evolutionary capacity of a community- ability to change without disrupting service provision (Davoudi, 2012). The dimensions of resilience critical in rural development planning include physical development (land-use and infrastructure) resilience, economic resilience, social and environmental resilience (to mutilate against the impacts of climate change among other potential threats) (Earthquakes and MegaCities Initiatives (EMI), 2015; Perera and Khailani, 2017).

The complex adaptive theory is a theory explaining disaster resilience building on the systems approach to resilience (Coetzee *et al*.2016). This system includes not only human and natural environment systems but also the ecology, society and the built environment or infrastructure systems, including the economic sphere (Simonovic, 2015). These interactions and connections at one level stimulate change at higher levels since the components have interlinkages (Coatzee *et al.* 2016). Though the ability of each unit component to influence change in the overall system varies, each unit component of the system can still trigger dynamics in the overall system (Simonovic, 2015). Based on the complex adaptive theory, the overall resilience of rural communities is shaped by the resilience of the total components based on how they relate (Coatzee *et al.* 2016). This calls for comprehensive approach in reducing the vulnerability of rural settlements to hazards.

Building from the definition of resilience and the complex adaptive theory, disaster resilience-oriented rural master planning is characterised by on-going change, adaptation, uncertainty, creativity, foresight, innovation, complexity and comprehensiveness (Shariffi and Yamagata, 2018). The orientation is on developing the capacity of rural systems (economy, livelihoods and society, natural resources) to withstand the strain from hazards without compromising the capacity of these systems to support decent livelihoods and the economy and the environment. Therefore, the theory also serves, as basis for evaluating to what degree local development planning is disaster resilience-oriented.

A range of principles is pertinent for mainstreaming disaster resilience into local development planning. These include capacity development (institutional, financing and community capacity), development of a supportive legal framework, a match between the local pro-disaster local development plan and development concerns of communities, reflection of local knowledge systems, equity, inter-departmental coordination, research and innovation informed interventions, integrating uncertainty in rural resilience planning.

Capacity development is one of the key factors in mainstreaming hazard mitigation into rural local development planning. It includes building not only the human resources and funding for disaster resilience and budgetary capacity of local planning authorities but also the capacity of rural local communities (African Development Bank, 2004). Concerning the importance of resourcing and budgeting and a financial framework, this is a critical indicator for the long-term implementation of disaster resilience-oriented development projects (Pervin *et al.* 2013). Closely related to developing the institutional capacity is the need for supportive legal frameworks in support of disaster risk mainstreaming in rural development planning.Institutional capacity development and supportive legal framework form the disaster governance component, which is critical in fostering disaster resilience development planning initiatives (Forino *et al.* 2018).Both the institutional and the funding components can be addressed separately through institutional and financial mainstreaming of disaster risk management in the long-term rural development plans of a community (Moreno *et al.* 2017).

Adding to capacity development, risk informed rural development plans should be designed to match local hazard plans or concerns at the local level and also reflect disaster mitigation principles and values of communities at the local scale though public participation (Horney *et al.* 2017). This is not only important for public support and political buy-in for implementation of disaster risk-oriented development planning but also enhances the responsiveness of local development planning to place specific risks (Moreno *et al.* 2017). Disaster resilience strategies informed by local traditional knowledge systems and coping mechanisms are also critical in promoting local entrepreneurship and economic activity (Shariffi and Yamagata, 2018). The other principle is inter-sectoral or inter-departmental coordination or coordination across different planning levels to enhance comprehensiveness and also ensure that disaster risk management efforts are coordinated and harmonized across different sectors and planning levels. Thus, though rural development plans should be largely oriented towards addressing the

localised hazards, they should also not lose concern over disaster mitigation concerns at higher level (provincial, national or global levels) (Berke and Smith, 2009).

The other principle for incorporating disaster resilience is inter- departmental collaboration across all sectors or different levels. This fosters integration of effort and harmonise disaster resilience initiatives across all the components - physical system, social, economic and the environmental systems). Inter-departmental collaboration and will is critical since disaster risk reduction is not only a physical planning endeavour but it also incorporates the environmentalists and financial institutions (investment) among other disciplines (Ayers *et al.* 2014). Other principles for incorporating disaster resilience is adopting long-term planning based on the assumption that this will be in tandem with the pace of climate change. In this regard, long-term climate change effect matches with long-term, rather than short-term planning (slow and long-term) and vice versa (Sharifi and Yamagata, 2018). Complementary to consideration of the hazards a local area is vulnerable to should be shorter-term strategic goals focusing on disaster resilience over the shorter-term period (Pervin *et al.* 2013). As such, the temporal scale for planning is an important dimension for incorporating disaster mitigation planning into local development plans. Where resilient oriented development planning should be long-term while not losing foresight of the short-term risks (the forest and tree analogue).

Research and understanding place-based hazard vulnerability, the probability of hazards forms the basisof evidence based planningyet hazards may be certain or uncertain (Sharifi and Yamagata, 2018). Besides research to understand and build scenarios in the hazard frequencies, another possible principle in resilience-oriented rural development planning is to cooperate uncertainty in development planning which implies planning for different scenarios, plausible futures employing moving point targets, rather than fixed targets (Chaudhury, 2017). Thus, development plans should cooperate uncertainty since uncertainty in the nature of possible hazards and the associated destruction presents a major challenge at local district levels for budgeting and planning for events, they are not sure if they will happen or not. Even when such events happen, recourse to contingency planning (emergency planning for response in the event that those disasters occur, rather than building resilience of systems over the long-term), which may call for extensive research in understanding place- based climate change uncertainties and projecting climate change scenarioswill be employed.

A variety of principles and dimensions exist for incorporating disaster resilience in local development plans of rural areas among which include risk aware land-use planning and zoning, incorporation into resource allocation considerations, incorporation in development control and development policies and also into the temporal scale of planning. Principles advocated for, including local participation, reliance on local knowledge system, comprehensive approach and a synergy. However, these serve as general guides for mainstreaming disaster resilience in rural development plans.

**Literature Review**

This section draws case studies of rural development planning as a strategy to enhance disaster resilience (how disaster resilience is currently being mainstreamed into development plans of rural areas) in America, Asia and Africa exploring the scope and achievements as far as disaster resilience of rural settlements is concerned. The major focus is directed on the type of hazards a particular rural area is vulnerable to, how managing that hazard for hazard mitigation is mainstreamed into the area specific development plan and a discussion of the possible impacts, successes, or challenges.

Hazard mitigation planning in the United States is a common phenomenon and case studies of Florida, Ontario, Mississippi and Tennessee are used. The major focus is on the vulnerability, planning tools employed to mainstream disaster risk mitigation into the local development plans for these areas and a discussion of the success.

Rural counties in South East United States, including Florida, Mississippi and Tennessee, have unique challenges that increase vulnerability to hazards. Among these factors include higher relative poverty, aged populations and dispersed human settlements (Horney et al. 2017). The most common disasters are both natural (floods, tornadoes, droughts, wild fires temperature extremes and also human (dam level failure) though the specific hazards vary at the country level.

The most common strategy for mainstreaming hazard mitigation in development planning in rural America are country hazard mitigation plans- the formulation of which are stirred as a requisite for funding from the federal governments. The hazard mitigation plans guide not only physical development away from hazard-prone zones but also ensure economic and social

development projects meet the hazard mitigation criteria before implementation (Horney *et al.* 2017; TEMA, 2018). Typical examples of promoting hazard mitigation through spatial planning include flood and environmental zones mapped for conservation to preserve the natural farming environment from growing population pressure King Country in California. This is because the natural environment is important for agriculture, which is the main economic activity for the country (Federal Emergency Management Agency (FEMA), 2013). The other dimension of mainstreaming includes development of policy guides or review criteria for development proposals. In the Tennessee countries, hazard risk components in development planning projects are assessed through a composite resilience index measuring the extent to which a particular development project or proposal incorporate all risks susceptible within and the areas (floods, dam wall failures) (Tennessee Emergency Management Agency (TEMA, 2018).

The success of hazard mitigation plans in rural countries of Eastern United States include improving the identification of vulnerabilities, inter-organisational cooperation and educating the public on disaster management and providing data for future hazards (Horney *et al.* 2017). However, a range of challenges mutilate against integration of disaster risk reduction in development plans through the hazard mitigation plans. These include limitations of planners' knowledge of the extent of future hazard scenarios and a restriction based on the fixed role of planners (Horney *et al.* 2017). Poor inter- agency coordination further thwarts effective coordination of actors for hazard mitigation-oriented development planning in the countries in the United States (Bihari *et al.* 2012). Poor integration of professionals partially stems from perception that fire prevention, natural resources management or flood control in the United States is the responsibility of natural resource managers. This limits the engagement of development planners (Bihari *et al.* 2012). Thus, institutional challenges are one calibre of challenges in mainstreaming hazard resilience and adaptiveness in the rural countries of the United States. Adding to institutional challenges, socio- cultural approaches of the community are one of the confrontations in the HMP in rural countries of the United States. The cultural perceptions on disaster negative influenced communities' commitment to hazard management planning and their collaboration where they express little commitment for proactive planning for disasters, 'unless it affects them' (Horney *et al.* 2017).

Since the formulation of Disaster Management Act in the India, attempts are made to mainstream drought resilience into development planning through initiatives, including drought-prone areas zoning and zoning of natural watersheds (UNDP, 2011). However, a variety of shortfalls on the effectiveness of lack of harmony with the traditional knowledge systems. In the case of Bangladesh disaster resilience mainstream include the devotion of climate change dedicated funds.

In Africa, hazards with a potential to disrupt rural livelihoods, economic and environmental systems in Africa include climate change and metrological hazards- droughts, floods, temperature extremes, geological hazards (earthquakes, landslides, tsunamis – rift valleys in Kenya and also biological hazards – tsetse flies and wildlife) among other hazards.

The most common form of disaster management planning in Africa is contingency plans where the focus is much on disaster relief and response, rather than mitigation (thus reactionary planning approach) (Bhavnani *et al.* 2008). As such, these plans are often reactionary and focused on the time prior to a disaster and soon immediately soon after a disaster. The other limitation of contingency planning is the great potential for abuse as giving way for politicians to use is as a strategy to enhance their political visibility (Clarke and Dercon, 2016). This has an effect in diluting the disaster management motives negatively- where contingency plans do not convey the comprehensive risks and issues linked to a particular hazard but rather the, "plans *are simple enough for politicians to communicate to their constituencies* "(Clarke and Dercon, 2016:102). This applies to disaster planning in countries, like Namibia, Mozambique, Malawi (Lindsay, 1993; Mabaso and Manyena, 2013).

These contingency plans are done at national level and are rather reactionary, rather than proactive, in addressing the hazard concerns of rural communities at provincial or district levels (World Bank, 2018). These are alternative models to LDP, however various weaknesses are staged against their effectiveness for fostering long-term disaster adaptiveness not only for rural communities but also for urban areas where participation of rural district authorities and communities is minimal case of rural Mozambique (explained by capacity and institutional constrains) and Malawi, lack of knowledge of district planning authorities (Mabaso and Manyena, 2013). Some of the challenges to the contingency plans include resource shortages for implementation and the challenge by nature that such plans failed to address long-terms

recovery concerns and that efforts were often incremental and disjointed for harmonizing efforts in rural disaster management (*ibid*.). As such, these contingency plans in the case of Southern Africa are more of event plans without comprehensive analysis of the local districts' context and capacities.

In terms of capacity some of the capacity deficiencies of these contingency plans include lack of dedicated budgets (Bhavnani *et al.* 2008). The possible explanation with regard to the setting of budgets to complement contingency plans relates to the unpredictability of the natural hazards (setting aside funds for disasters that would not occur) (Mabaso and Manyena 2013).

Other than contingency plans some authorities in South Africa, Benin and Tanzania have taken initiatives to integrate disaster resilience into the spatial development challenges. The common hazards in the eThekweni, South Africa include flooding and other metrological hazards (Van Niekek, 2013). In rural Tanzania, mainstreaming disaster risk involves identifying the major land-uses likely to be affected by floods (and restricting infrastructure developments in such areas to reduce the risk of flooding. In Gambia, at the national planning level, other than spatial planning-oriented initiatives, the government has also integrated national climate change budget to suit the development plans (Pervin *et al.* 2013). However, disaster resilience-oriented development in Kenya is incorporated guided not by the mere drive to reduce disaster resilience but rural poverty (Pervin *et al.* 2013). This reflects how disaster risk resilience overlaps with broad objectives of rural development that is to reduce poverty. Other initiatives to build the capacity of planning municipalities to deal with disaster management into development planning include the development of an additional committee on climate change and disaster management. Not only did these initiatives improve the integration of disaster management in spatial planning policies but it also enhanced the incorporation of disaster risk in the corresponding investment budgets at local municipal level. However, most of these initiatives are done at project level and mainly guided by NGO oriented development philosophies and interest and are more experimental.

Concerning the potential for integration of flood management into local development planning in eThekwini, there are a number of challenges relating to the conventional planning culture in the country environmental management and disaster resilience are less prioritised comparative to other development issues (infrastructure, land-use, social and economic development). Thus,

the need for presentation of disaster resilience as a complimentary component in achieving the overall development of rural areas, which is the conventional, planning culture approach. This increases probability for its mainstreaming in the existing organisational structures and principles in the discharge of development mandates by rural local authorities (Van Niekek, 2013). This reflects a planning culture approach challenge.

Planning for everyday disaster resilience as a rare endeavour for most municipalities (van Niekek, 2013). However, the Durban Metropolitan, including eThekweni, successfully managed to integrate and mainstream disaster resilience successfully in its LDPs. To gain the planning support of urban planners, the environmentalists since 2008 promoted climate change adaptation as the avenue through which the urban development institutions could achieve their development (spatial, infrastructure, community safety and economic development) objectives (the costs of ignoring climate change in long-term spatial planning –sweeping of the development gains- infrastructure in the event of occurrence of the disasters and while diverging funds to contingency plans (van Niekek, 2013). This resulted in integration in not only the LDP and development budgets (business, land-use, economic planning and social planning). Thus, planners have since been able to realise their development priorities. Besides realization by planners that building climate change adaptation was pertinent for achieving their development priorities and, therefore, not alien to their day-to-day activities, the immediate visibility of the impacts on communities and, therefore, likely potential political implications was a contributory factor in streamlining climate resilience in land-use planning activities in eThekweni (van Niekek, 2013).

**Fostering Disaster Resilience in Rural Development Planning in Zimbabwe**

This section examines the attempts that are taken to mainstream hazard mitigation into rural development plans. The study explores the context of rural development planning in Zimbabwe, the history of disaster risk management and exploring the attempts at fostering disaster resilience in rural development planning in some rural areas of Zimbabwe.

Prior to 1980, rural development planning was generally neglected and it served for the commercial farming areas, which were catered for under economic development and import promotion (Plan Africa, 2000). Though there was some adjustment in the institutional framework for rural development planning through the creation of rural district council's (there

has remained marginal changes in the policy and procedure for rural development planning) (Davies, 2008). Rural development planning remained centralised and fragmented across sectors from pre-independence to date. The fragmented sectors include agricultural planning, environment, natural resources management, economic management and water resources planning (Plan Africa, 2000; Hahlani, 2012) This resulted in faltering away of the capacity for rural development planning in submitted areas (Dalal- Clayton *et al.* 2000).

In terms of the orientation, rural development planning in the post-independence era is shaped by political motives of the ruling ZANU-PF party and revolves around land, agriculture and natural resources management (Thebe, 2010). The current aims of rural development guided the provisions of the RTCP Act 29: 12 of 1976 and the Rural District Council's Act Chapter 29:13. These include responsibility for planning on physical human settlement and infrastructure, environment and natural resources management, water resources planning, forests and parks (Rural District Council Act: Chapter 29: 13 1976). The other motive is to provide for human livelihood betterment and improving safety. Rural development planning in Zimbabwe is mainly a responsibility of rural district councils in collaboration with the DPP, which has the responsibility for formulation land-use plans for most of these district authorities.

Rural areas of Zimbabwe are vulnerable to a host of hazards now and in future based on an increased prediction of metrological hazard events (floods, droughts and storms, cyclones (Government of Zimbabwe, 2012; UNDP, 2016). These potential metrological hazards include recurring floods in areas, like Tsholotsho, Chimanimani and the Zambezi Valley. In Nyaminyami and Kanyemba districts in the Zambezi Valley, flooding is not totally natural but is accelerated by settlement on river basins driven by river basin depended livelihoods (GFDRR, 2017). Adding to floods, climate change induced droughts are a common hazard threatening the livelihoods and economies of most rural districts across the country particularly those parts where the livelihoods and economies are depended on rain fed agriculture and livestock farming (UNDP, 2016). Typical rural districts severely affected by droughts include Muzarabani, South Eastern Zimbabwe (Chiredzi, Mwenezi), Chivi and rural parts of Masvingo (Ndiweni and Musarurwa, 2013; UNDP, 2016).

Other than metrological hazards, development-planning gains in rural areas of Zimbabwe are also vulnerable to biological risks, including wildlife and tsetse flies. This is typical of rural

communities in the Zambezi Valley where wildlife hazards to human settlements have accelerated owing to human settlement encroachments into park areas due to population pressure and unplanned settlement (Mabaso and Manyena, 2013; GFDRR, 2017). Like droughts, tsetse flies are a threat to the sustainability of livestock farming and agriculture activities in these areas, which form the traditional economic activities in this rural corridor (Barret, 1989). Not only does the tsetse infestations threaten livestock farming but also poses a threat to human health through, like sleeping sickness (Barret, 1989; Vale Columbia Centre on Sustainable International Investment, 2011). Besides these biological hazards rural areas are also prone to other disasters, like wildfire and earthquakes, though earthquakes are not occasional. The vulnerability of rural areas to disastersinZimbabwe is accelerated by a range of factors most of which are linked to the rural nature of the areas. These include poverty, poor economic development, the absence of or non- observance of construction and infrastructure development standards (Dube *et al*. 2018).

Disaster management practice in Zimbabwe has its birth in civil defence factor where after independence this concept evolved into civil protection under the Civil Protection Unit (Bongo *et al.*2013). This Civil Protection Unit under the Ministry of Local Government Planningis responsible for planning, coordination and implementation of disaster management in Zimbabwe. However, this body implements the plans through the different sectoral ministries and at different levels, including at the rural district levels (Government of Zimbabwe, 2012). Contingency planning for disaster management is the most dominant form of disaster planning in Zimbabwe. However, contingency planning is more of events planning (lacking long-term visions, under-resourced, lack of appreciation of district specific disasters or hazards and focusing on disaster relief) (Mabaso and Manyena, 2013). Regarding the coordination of the District Civil Protection Unit with communities for flood disaster management, rural communities in Tsholotsho are disgruntled since the DCPU often ignore traditional knowledge systems in the planning and prediction of floods (Dube *et al.* 2018). Other than District Civil Protection Unit, NGOsare influential in directing programmes to improve disaster resilience for effective rural development in Zimbabwe driven by the need to reduce poverty and improve livelihoods (Barret, 1989).

Land-use planning is used to direct the viable land-uses in line with anticipated changes in droughts and floods. Rezoning land-uses are attempted through agricultural development

related plans and the Sebungwe regional plan designating areas suitable for subsistence farming and those that had to be reserved for wildlife farming since they were tsetse infested (Barret, 1989). This dimension of improving resilience of livestock farming to tsetse hazards promoted alternative farming and livelihood support systems in the Zambezi Valley since the 1980s (by NGOs and Livelihood Associations) (Barret, 1989).

Land-use zoning has also been attempted as a strategy to mitigate the impacts of tsetse flies in the Zambezi Valley. In the Zambezi Valley tsetse infestation is a continuous threat since the 1980s. It threatens the traditional livestock farming activities in the area. Furthermore, overstocking is likely to accelerate land degradation and fragility in this area. Attempts that are taken to improve the resilience of rural economies against tsetse threats in the Zambezi Valley include, tsetse zoning and transferring these tsetse infested regions into wildlife areas (land-use planning for tsetse control and the economy of the Zambezi Valley region). As such, the communities would shift from livestock to a wildlife depended economy (Barret, 1989). Other than tsetse infestation overstocking within the region further compounded the fragility of the Zambezi Valley, limiting its prospects for productive agriculture (Barret, 1989). In response to this, livestock density controls for different areas are proposed. However, these densities being discordant to the acceptable levels accepted by farmers has limited adherence to these density-control recommendations resulting in increase in stocking levels and an increase in degradation of the environment (Barret, 1989). This reflects the importance of cultural acceptability of initiatives.

Other than tsetse zoning and as part of the strategy to mainstream climate change in local development planning in the Zambezi Valley Rural Districts, other initiatives include flood zoning and natural water conservation initiatives (Global Facility for Disaster Reduction and Recovery (GFDRR,2017). Forest planning and natural water resources management aim to improve water resource management to reduce the impacts of droughts while zoning of flood prone areas into conservation areas seeks to direct physical development away from hazard-prone areas. Furthermore, the other dimension of mainstreaming disaster management in Nyaminyami District is through enhancing the capacity of the local authority and communities in hazard mitigation through community participation. The intention is to formulate a community led disaster adaptation initiatives (GDFR, 2017). However, the issue of public

participation remains a challenge in effectively mapping the vulnerable developments within the Zambezi Valley (Speranza, 2011).

One of the challenges relates to the uncertainty of forecasting the possible future economic gains with tsetse eradication and without tsetse eradication over the long-term (Barret, 1989) which decision the introduction of tsetse mitigation planning and financing was anchored. Similarly, uncertainty in predicting the occurrence and extend of droughts in South East Zimbabwe is also a challenge in mainstreaming drought mitigation policy in development planning at district levels (Ndiweni and Musarurwa, 2013). This problem can be better addressed through the case of scenario building for plausible outcomes advocated informed by the resilience theory.

The other challenge relates to unacceptability of recommended strategies driven by technical reasoning of external agencies, like development planners and non-governmental organisations with little integration of local knowledge systems and values. This is evidenced in the resentment of farmers to the reduction of livestock densities in tradition agro-pastoral communities in the Zambezi Valley. Furthermore, despite the recommendations to reduce the impacts of tsetse flies on livelihoods by transforming from livestock rearing to wildlife-based activities, communities not seeing the rationale of the development proposal resented to its own continuous peril (Barret, 1989).

For districts, like Binga Rural, funding is the major challenge in the ability of council to foster drought risk resilience policy and reducing the impacts of droughts on rural development (Manyena, 2006; GFDR, 2017). Funding is often secured through NGOs as in the case of droughts, climate change adaptiveness targeted generally for the entire Zambezi Valley. Lack of funds dedicated to long-term disaster risk adaptiveness emanates from the legislative framework of Zimbabwe's Civil Protection Act (Chapter 10:06) enacted in 1989, that fails to provide funding mechanisms for reducing vulnerability and adaptation but for short-term relief and response (Mavhura, 2015).

In addition to institutional challenge, disharmony between the interests in disaster resilient development and interest of politicians is a reality in improving adaptiveness of rural development to hazards. Politics confronts development planning for disaster adaptation in a

number of ways in Zimbabwe. One way is through the prioritization of disaster adaptiveness development. In the Southern parts of Zimbabwe, drought mitigation comes as a least priority area for policymakers in development planning despite the huge impacts of droughts on the economies, environment and infrastructure in the region (Ndiweni and Musarurwa, 2013). The second dimension through which politics affect disaster adaptiveness planning is through the short-term political shift of office (that has implication in the setting of disaster resilience priorities and political support) since political leaders keep changing in the short run disrupting political support for long-term disaster resilience development support. This is typical in Kariba rural district (GFDR, 2017).

The most dominant approaches to mainstreaming disaster resilience into rural development planning in Zimbabwe focus on social resilience, livelihood security, food security against climate change and droughts rather than the resilience of the building systems or physical infrastructure component. In addition, these initiatives are mainly led and financed by non-governmental organisations with most of these in experimental stages.

**Discussion**

Although resilience-oriented rural development planning being at an advanced stage in the United States countries, the concept is still at infancy and experimental stages in most African countries, including Zimbabwe, where practice remains in favour of contingency planning, rather than day-to-day planning for long-term disaster adaptiveness. For those rural planning authorities managing to mainstream hazard mitigation into development planning major gains are realised, including protection of development gains and increasing community participation and support in fostering disaster adaptiveness across all aspects of rural development.

However common challenges emerge in mainstreaming disaster adaptiveness in local development planning policies and programmes among that include lack of support by local communities, conflict of interest of the disaster resilience school with views and interest of politicians (policymakers), uncertainty on probability of occurrence of hazard events, capacity deficiency and limited integration of traditional knowledge systems. One of the major challenges is that local communities tend to show little interest in collaborating for long-term adaptiveness where the disasters are not visible. This observation goes well with the disaster prevention motivation theory. This is a problem not only in Africa and Zimbabwe but also in

the in the United States countries. Likewise, due to the invisibility of the gains of long-term adaptiveness or the invisibility of potential development losses, should disasters occur, development planning for disaster adaptiveness appears to be an unpalatable strategy to politicians.

Uncertainty of hazard events is another challenge for effective integration of hazard mitigation into rural development plans in the Zambezi Valley where lack of effective weather or any hazard related information limits the effectiveness for integration into development planning. This is contrary to the principles of the resilience theory where development planning to foster resilience should incorporate uncertainties. Capacity development is one of the key factors in mainstreaming hazard mitigation into rural local development planning (African Development Bank in 2004). However, in most rural development initiatives across Zimbabwe and Africa, institutional capacity deficiency is a major challenge (BINGA, Bhavnani *et al.* 2008). Part of the problem emanating from poor legislation and lack of national budgets dedicated for long-term hazard mitigation programmes serve for contingency funds. Contrary to this rural government development planning initiatives in the United States are effectively funded by a dedicated hazard mitigation fund from the federal government (FEMA, 2013; Horney *et al.* 2017; TEMA, 2018).

Furthermore, though the systems approach to fostering resilient development calls for interdisciplinary collaboration when planning for disaster risk adaptation, in Durban challenges remain in integrating the different profession and changing the culture where disaster risk mitigation is perceived as a role of environmentalists with planners having a passive role (Van Niekek, 2013). This is similar to the case of Zimbabwe where disaster management under the current contingency plans is implemented separately based on separate sectors – health, spatial planning, environmental planning and economic planning. As such, the danger remains of failure to coordinate these attempts for effective disaster resilience within the overall rural development planning system.

The importance of integrating traditional knowledge for success of fostering adaptiveness of agricultural practices to climate change is evidenced in the case of planning proposals to mitigate the impact of tsetse flies in the Zambezi Valley. Despite the genuine arguments for altering livelihoods from livestock and crop farming to wildlife conservation, subsistence

farmer communities have resented this. The results are perpetual livestock losses, increasing declines on crop yields with negative implications on economic development within the Zambezi Basin. This is in sync with one of the principles for disaster adaptiveness where strategies have to be in sync with local cultural practices. It also attests to Turner's disaster incubation theory where plans or policies in conflict of a community's culture and known practices for hazard mitigation are likely to be resented (Lauder, 2015).

**Conclusion and Recommendations**

This article sought to explore the potential for mainstreaming disaster management in rural local development plans to improve rural settlements' disaster resilience in Zimbabwe. The results of disaster-oriented rural development plans in the United States countries and in South Africa indicate that development plans have great potential to be used as tools to improve disaster adaptiveness of rural settlements, rural infrastructure, rural economies and the society or livelihoods. Considering the huge costs of contingency planning and predictions of increasing vulnerability to hazards (particularly climate change induced hazards there is need to mainstream disaster management plans in rural settlements. This can be achieved through hazard informed land-use zoning, building and infrastructure design standards, local development budgeting for disaster adaptation where only programmes and projects that increase hazard mitigation are financed or through development approval mechanisms where economic or social development-oriented projects are only approved subject to the condition they positively contribute to disaster risk reduction. However, based on the case study of attempts to mitigate the impacts of disasters (metrological, geological and biological) across the globe and in Zimbabwe, a number of measures have to be observed if disaster mitigation is to be effectively integrated into development planning to improve disaster resilience in rural areas. Among that include integration of traditional knowledge systems for acceptability, political will to get politicians to see the rationale for investing in long-term disaster adaptiveness where the disasters are uncertain and the impacts of the disasters not yet visible, rather than invest in disaster relief (that increase the visibility of politicians within their immediate constituencies).

Institutional capacity development is also critical where funding is dedicated to long-term hazard mitigation. In addition, professional integration and synergy between development

planners, agricultural sector and the environmental management professions among other professions need to be improved. This can be achieved through a cultural change on the traditional role of planners where planners have long perceived disaster management as a special area for environmentalists and the district civil protection units with no relation to the day-to-day activities of a development planner. As such, development planners should envisage disaster resilience as the cornerstone to realizing the broader rural development priorities. Furthermore, the integration of disaster management into rural development planning in Zimbabwe also entails an alteration of the technical component of development plans do not have to be implemented based on fixed targets but moving targets and standards informed by detailed and solid research. In addition, the plans have to incorporate elements of uncertainty, creativity, foresight and innovativeness.

**References**


Government of Zimbabwe, 2012. *Zimbabwe National Contingency Plan: November 2012 – December 2013.* Harare: Government of Zimbabwe.

Ayers, J, Huq, S, Wright, H, Faisal, A.M and Hussain, S.T, 2014. Mainstreaming Climate Change Adaptation into Development in Bangladesh. *Climate and Development,* 6(2014), 293-305.

Barret, J, 1989. *Tsetse Control, Landuse and Livestock in the Development of the Zambezi Valley.* Harare: Alpan.

Benson, C, 2009. *Mainstreaming Disaster Risk Reduction into Development; Challenges and Experiences in the Philippines,* Geneva: ProVention Consortium

Benson, C and Twig, J,2007 .*Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations,* Geneva: ProVentioN Consortium .

Berke, P and Smith, G, 2009. Hazard Mitigation and Disaster Resilience: Challenges and Strategic Choices for the 21st Century . In: U. Paleo, ed. *Building Safer Communities: Risk Governance, Spatial Planning and Responses to Natural Hazards.* Amsterdam: IOS Press.

Bhavnani, R, Owor, M, Vordzorgbe, S and Bousquet, F, 2008. *Report on the Status of Disaster Risk Reduction in the Sub- Saharan Africa Region,* Washington DC : World Bank.

Bihari, M, Hamin, E and Ryan, R, 2012. Understanding the Role of Planners in Wildlife Preparedness and Mitigation. *International Scholarly Research Network*, 2012(2), 191-196.

Bongo, P, Chipangura, P, Sithole, M and Moyo, F,2013 . A Rights Based Analysis of Disaster Risk Reduction Framework in Zimbabwe and Its Implications for Policy and Practice. *Journal of Disaster Risk Studies,* 5 (2), 1-11.

Burby, R, Deyle, R, Godschalk, D and Olshansky, R, 2000. Creating Hazard Resilient Communities Through Land-use Planning. *Natural Hazards Review,* 1(2), 99-106.

Charkrabarti, P,2017 .*Mainstreaming Disaster Risk Reduction for Sustainable Development: A Guidebook for the Asian Pacific,* s.l.: United Nations.

Chaudhury, M, 2017. *Strategies for Reducing Vulnerability and Building Resilience to Environmental and Natural Disasters in Developing Countries.* New York, s.n.

Clarke, D and Dercon, S, 2016. *Dull Disasters: How Planning Ahead Will Make a Difference.* Oxford: Oxford University Press.

Coetzee, C, van Niekerk, D and Raju, E,2016 . Disaster Resilience and Complex Adaptive Systems Theory: Finding Common Grounds for Risk Reduction. *Disaster Prevention and Management* ,25(2), 196-211.

Dalal- Clayton, B, Dent, D and Dubois, O, 2000. *Rural Planning in the Developing World with a Special Focus on Natural Resources: Lessons Learnt and Potential Contributions to Sustainable Livihoods-An Overview*. London: IIED.

Davies, D, 2008. Zimbabwe's Experience in Rural Development. *Development Southern Africa*, 7(1990), 467-482.

Davoudi, S,2012. Resilience: A Bridging Concept or A Dead End?*Planning Theory and Practice*, 13(2), 299-307.

Dube, E, Mtapuri, O and Matunhu, J, 2018. Managing Flood Disasters on the Built Environment in the Rural Communities of Zimbabwe: Lessons. *Journal of Disaster Risk Management*,10, 1-11.

Earthquakes and MegaCities Initiatives (EMI), 2015. *Urban Resilience and Master Planning: A Guidebook for Practioners and Policymakers.* Quezon City ed. s.l.:Earthquakes and MegaCities Initiatives (EMI).

Federal Emergence Management Agency (FEMA), 2013. *Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials FEMA,* s.l.: FEMA.

Firley, E and Groen, K,2014 .*The Urban Masterplanning Handbook.* s.l.: Wiley.

Forino, G, Bonati, S and Calandra, L, 2018. *Governance of Risks, Hazards and Disaster: Trends in Theory and Practice.* s.l.: Taylor and Francis.

Gallent, N, Juntii, M, Kidd, S and Shaw, D,2008.*Introduction to Rural Development Planning.* London: Routledge.

Global Facility for Disaster Reduction and Recovery (GFDRR),2017.*Output 2: Mainstreaming DRR/CCA In Local Development Planning: Mainstreaming Disaster Risk Reduction and climate Change into Local Development Planning in Zimbabwe Project,* s.l.: Global Facility for Disaster Reduction and Recovery.

Hahlani, D, 2012. Bottlenecks to Integrated Rural Development Planning in Zimbabwe. 6(2), 136-158.

Horney, J, Nguyen, M and Salvensen, D, 2017. Assessing the Quality of Rural Hazard Mitigation Plans in the South Eastern United States. *Journal of Planning Education and Research,* 377(1), 56-65.

Lauder, M,2015.*Disaster Incubation Theory Re- Imagined.* Surrey: Gower Publishing.

Lindsay, J,1993.*Exploring the Interface of Urban Planning and Disaster Management: Establishing the Connection Between the Field,* Manitoba: Department of City Planning.

Mabaso, E and Manyena, S, 2013. Contingency Planning in Southern Africa: Events rather than Proccess. *Journal of Disaster Risk Studies,* 5(1), 1-8.

Madu, C and Kuei, C,2018.*Handbook of Disaster Risk Reduction and Management.* London: World Scientific.

Manyena, B, 2006. Rural Local Authorities and Resilience in Zimbabwe. *Disaster Prevention Management,* 15(5), 810-820.

March, A and Kornakova, M,2017.*Urban Planning for Disaster Recovery.* s.l.: Elsevier Science.

March, A, Kornakova, M and Handmer, 2017. Urban Planning and Recovery Governnance. In: A. March and M. Kornakova, eds. *Urban Planning for Disaster Recovery.* Cambridge: Elsevier Science, 13-30.

Mavhura, E, 2015. Disater Legislation: A Critical Review of the Civil Protection Act of Zimbabwe. *Natural Hazards,* 80(1), 605-621.

Moreno, J, Ponte, E, Emberador, S and Noriega, M. C. 1, 2017. An Effective Approach to Mainstreaming DRR and Resilience in LaPaz, Mexico. In: M. Tiepelo, A. Pezzoli and V. Tarchiani, eds. *Renewing Local Planning to Face Climate Change in the Tropics.*Switzerland: Springer, 285-310.

Najafi, M, Ardalan, A, Akbarisari, A, Noorbala, A.A and Elmi, H, 2017. The Theory of Planned Behavior and Disaster Preparedness. *PLoS Current,*Volume 9.

Ndiweni, N and Musarurwa, C,2013 . Natural Hazards as Disasters: Mitigation and Challenges in Southern Zimbabwe. *Journal of Emerging Trends in Educational Research and Policy Studies,* 5(1), 14-19.

Perera, R and Khailan, K,2017 . Development Plan as a Tool to Improve the Disaster Resilience of Urban Areas. In: W. Yan and W. Galoway, eds. *Rethinking Resilience, Adaptation and Transformation in a Time of Change.* s.l.: SpringerInternational, 199-221 .

Pervin, M, Sultana, S, Phirum, A and Camara, I, 2013. *A Framework for Mainstreaming Climate Resilience into Development Planning.* London: IIED.

PlanAfrica, 2000. *Local Strategic Planning and Sustainable Rural Livilihoods: Rural District Planning in Zimbabwe- A Case Study,* Bulawayo: Plan Africa.

Quarantelli, E, 1998. *What is a Disaster? A Dozen Perspectives on the Question.* London: Routledge.

Schwab, J, 2010. *Hazard Mitigation: Integrating Best Practice into Planning.* Chicago: American Planning Association.

Sharifi, A and Yamagata, Y,2018.*Resilience Oriented Urban Planning: Theoretical and Empirical Insights.* Switzerland: Springer International.

Simonovic, S, 2010. *Systems Approach to Management of Disasters: Methods and Applications.* Hoboken: Wiley and Sons.

Simonovic, S,2015 . Systems Approach to Management of Disasters: A Missed Opportunity. *Journal of Integrated Risk Management,* 5(2), 70-83.

Speranza, C. 1, 2011. Flood Disaster Manage,ment and Humanitarian Interventions in the Zambezi River Basin: Implications for Adaptation to Climate Change. *Climate and Development* ,2(2), 176-190.

Spierkerman, R, Kienberger, S, Norton, J, Briones, F and Weichselgartner, J, 2015. The Disaster Knowledge Matrix- Reframing and Evaluating Knowledge Challenges in Disaster Risk Reduction. *International Journal of Risk Reduction,* Volume 13, 96-108.

Sulphey, M, 2016. *Disaster Management book.* Dehli: PHI Learning .

Tennessee Emergency Management Agency (TEMA), 2018. *State of Tennessee Hazard Mitigation Plan 2018,* Nashville: TEMA.

Thebe, V,2010 . Rural Development Policy Cross Roads in a Post ZANU- PF Era. *Journal of Sustainable Development in Africa,* 12(3), 87-105.

UNDP , 2016 . *Mapping of Selected Hazards Affecting Rural Livelihoods in Zimbabwe: A District and Ward Analysis*, UNDP: Harare.

UNDP, 2011 .*Mainstreaming Drought Risk Management: A Premier*, Nairobi: UNDP.

Vale Columbia Centre on Sustainable International Investment, 2011. *Resource Based Sustainable Development in the Lower Zambezi Basin: A Draft for Consultation*, s.l.: Vale Columbia Centre on Sustainable International Investment.

Van Niekek, W,2013 . Translating Disaster Resilience into Spatial Planning Practice in South Africa: Challenges and Champions. *Journal of Disaster Risk Studies* ,5 (1), 1-6.

World Bank, 2018 .*Mozambique Disaster Risk Management and Resilience Program Report*, s.l.: World Bank.

## C2: The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe[34]

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### Introduction

The adoption of by-laws when building and developing settlements have become the 'golden standard' for the establishment of new settlements globally. This is because of their ability to encourage the construction of standardised buildings and their ability to produce buildings of high quality and durability that, in turn, promote resilience to changes in climatic conditions. Due to their ability to regulate building heights, direct the architectural design aspects of buildings and resist against harsh weather conditions. such as earthquakes (GoI, 2016), model building by-lawshave become the yardstick for which most of the infrastructural development practices must take place, in both the most developed and the least developed countries. In the case of the African rural areas, particularly Zimbabwe, the adoption of the by-laws by the rural people are slow, leaving by-laws to be well articulated on paper and less applicable in practice. This may be attributable to the fact that most of the people in the rural areas still rely on the old traditional ways of building and, as such, heavily depend on the maximum utilisation of the readily available local materials that are at times cheap (FAO, 2011; Ndlovu and Umenne, 2008). This article engages a building-standards debate, to see the model building by-laws' rate of applicability and feasibility as regards to rural building and development in rural Zimbabwe.

### Conceptual Framework

The establishment of the 1977 Model Building By-laws was a way to control the nature in that infrastructural developments would take place in Zimbabwe's (GoZ, 2002). The Ministry of Rural Housing and Social Amenities, a government arm was established in 2005 to deal with rural housing (Ndlovu and Umenne, 2005). Putting these measures in place would have control over how rural developments would take place and, in turn, promote the general health and safety of the rural populace.

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Studies have, however, shown that most of the rural settlements, particularly those of Zimbabwe, still utilise traditional materials, such as pole and dagga/mud (FAO, 2011; Saidi, 2018) that do not match up to the standards of the model building by-laws. Such practices are heavily influenced by the fact that most rural people are poor and may not afford to build with the model building by-laws as basic standards. Rural local authorities have also been noted to fall short of funds to effectively monitor the implementation of these by-laws in a rural building. This has resulted in the sweeping away of settlements by the cyclone as witnessed by the Cyclone Idai of 2019 that left many Chimanimani residents homeless (Chatiza, 2019) and the cyclone Eline event that affected the Gwayi area (Ndlovu and Umenne, 2008). It becomes critical for governments and other non-governmental organisations to put measures in place, to ensure that support is offered to effectively develop settlements in some of the rural precincts of the country.

**Literature Review – Global and Regional Perspectives**

The use of by-laws has gained much depth in building and construction globally. In India, by-laws are used to regulate the building height, coverage, the architectural design and construction aspects of buildings (GoI, 2016). This does not only ascertain the orderly development of the area but also helps the developed settlements to be more functional. India's model building by-laws are deemed mandatory as they help protect structures from noise, earthquakes, structural failures and other hazards and, the enforcement of building by-laws helps in regulating developments and, in a way, stop haphazard developments from forming (GoI, 2016). Building by-laws are, therefore, a way for local authorities to control developments in their respective areas, urban or rural. By-laws were developed as early as 1877 in England and these were adopted by many urban and rural local authorities, by so doing, builders were required to submit building plans to local authorities. Before the commencement of the building process, a surveyor would inspect the building at various stages (Booth, 1999). The process helped to regulate the nature of construction developments in the yesteryears.

Criticism, however, arose in light of the 1877 by-laws as it was argued that, they did not focus much on issues of density and by so doing, resulted in the creation of slums. Additionally, the by-laws also prohibited the use of cul-de-sacs and are said to create aesthetically unpleasant housing (Booth, 1999). The strict standardisation of building designs resulted in limited

diversity in settlement designs and, thus, promoted monotone. By the early 1900s, many bodies opposed the 1877 by-laws as they required one to be more flexible and allow for densification and allow builders to have a broad choice regarding the choice of building material, without necessarily lowering standards (Booth, 1999). Increased variety regarding the choice of building material would help people especially in rural areas to choose readily available and affordable building materials that also comply with building standards when building.

India has also altered its building by-laws to suit the ever-changing climatic trends. In light of the Bhuj earthquake that occurred in 2001 in India, the Ministry of Urban Development in 2003 tuned its 2004 building by-laws to focus more on the structural safety of buildings, fire-safety and made other provisions for rainwater harvesting, solar-assisted heating and wastewater recycling (DEOC, 2016). This shows positive developments regarding the continued alteration of building standards to suit the ever-changing environment and the demands of the people. In this case, buildings that are more resilient to changes in weather are created and people's lives and property are saved in the process. Energy is also served in the long run due to improvements in technologies, such as the use of solar energy as a substitute for electricity. India's building by-laws has also allowed for the increased saving of the water resource by enabling rainwater harvesting and wastewater recycling. As a result of the increased awareness to conserve the environment, some of the Asia-Pacific Economic Cooperation (APEC) countries, such as Canada, Australia, Japan and New Zealand, have adopted green building codes in their construction practices. These include embracing aspects of energy and water efficiency, indoor air quality, storm water management and issues of environmental protection (APEC, 2013). In this regard, more environmentally friendly buildings are created.

The African rural environment is a unique one, as it heavily relies on the use of natural resources in constructing various infrastructures. To promote the sustainable development of settlements, it is critical to involve the people or make provisions for public participation regarding the management and use of natural resources. . In Tanzania and Uganda, the formulation of by-laws is more participatory and villagers are involved in decisions on the management of natural resources (Mowo *et al*. 2016). It is noted that, in Tanzania, the process of by-law formulation starts at the hamlet level and these are then passed to the village level (Mowo *et al*. 2016). Evidence has shown that most rural villages use natural resources in

construction (FAO, 2011) and these come in the form of wood, mud and thatch /grass as some of the major roofing materials.

As a result of improved education, increased global interaction, the mixing of cultures and technologies, the African rural communities have undergone many changes (FAO, 2011) and hence, the increased appreciation of building technologies. However, it is argued that the planning and design of rural dwellings are heavily reliant on the target population's tastes and preferences, financial situation, family size and location, among others (FAO, 2011). These specifications usually determine the differences in rural built-up structures and they make building by-laws difficult to effectively implement in the African landscape. Some of the by-lawsand standards to be followed may be too rigid and expensive for the ordinary rural people to afford and hence, the resultant effect of the increased building of poor rural structures in some rural areas.

**Research Methodology**

The study utilised the desktop approach to gathering data and this was done through internet search engines, such as Google Scholar and EBSCO. The study examines the global and regional examples as regards to the effective adoption of by-laws in rural areas when building. The study then took a closer examine the Zimbabwean scenario to understand if by-laws are still being applied in planning in rural areas.

**Results**

The use of building by-laws has gained global acknowledgement as they are associated with improved order and functionality of new and existing developments. The adoption of building by-laws has helped countries to guard against structural failures and the massive destruction of infrastructure and people's lives as a result of natural disasters, such as earthquakes and cyclones. The Bhuj earthquake of 2001 motivated India's Ministry of Urban Development in 2003 to shift its focus on the structural safety and fire-safety of buildings (DEOC, 2016) that is an indication that, at times, building by-laws are, at times, constantly being changed to suit the ever-changing environmental demands and this would, in turn, guarantee the building of quality resilient buildings. In England, many rural authorities adopted the use of building by-laws and by so doing, building plans had to be approved by the responsible local authority first before the actual building process and this would be followed by the continuous inspection of

the building process by the surveyor (Booth, 1999). In this regard, it becomes the local authority's responsibility to enforce building standards and builders must comply. Such strictness on by-laws would help prevent construction mistakes and prevent structural building failures in the short and long run periods.

By-laws are also used by Local Authorities (both rural and urban) as a way to save energy and water. India's 2004 by-laws encouraged the use of solar heating, rain water harvesting and, waste water recycling (DEOC, 2016). Countries, such as Canada, Japan and Australia, have, therefore, adopted green-building codes when constructing and these have helped in protecting the environment and at the same time, save on energy and water (APEC, 2013). Through building designing and the effective use of by-laws, energy and water can be saved and this could help prevent future water and energy crises that local authorities could face as population increases.

However, these by-laws are regarded as rigid in many instances and are associated with monotonous building (Booth, 1999) and hence, the need for rural local authorities to consider the local culture and the possibility or using the locally available materials without compromising on quality. An example is that of the African rural areas that have traditionally relied on the use of the locally available materials, such as grass for thatch and roofing. Rural local authorities must come in to make sure that, these materials are used according to standards to build structures that are strong. In Tanzania and Uganda, the local people's input is regarded as important in the formulation of by-laws and this have helped in the management of the locally available natural resources (Mowo *et al*. 2016). Involving people in the management of their own resources would help prevent the over exploitation of resources in these rural areas. The involvement of the local people would also help to make known some of the challenges that these rural people could be facing in building and the following of building standards and by-laws, such as those related to financial difficulties and the inability of the rural people to afford some of the basic standard construction materials. Such information may help rural local authorities to seek for outside funding to help with rural construction processes.

***Evidence from Zimbabwe***

Environmental and economic shocks have characterised the Zimbabwean landscape for at least a decade now and this has posed environmental challenges, particularly in Zimbabwe's rural

setups (UNDP, 2015) and as a result, people in the rural areas have at times, witnessed massive infrastructural damages in the hands of the unprecedented weather conditions. Some of the negative effects of bad weather conditions have come in the form of floods and cyclones for example Cyclone Japhet, Cyclone Eline and one of the deadliest cyclones to hit Zimbabwe's Eastern highlands, Cyclone Idai. Events of the Cyclone Idai left many people homeless, infrastructure and people's homes were destroyed (Chatiza, 2019). That, in a way, indicates the need to follow standards and by-laws when building and the need to adopt resilience building to adapt to changes in climate over time.

### *Brief History of Construction in Zimbabwe's Rural Precincts*

Construction in Zimbabwe dates back to the pre-colonial times (Chirisa, 2014) when the early settlements, such as Great Zimbabwe and the Khami, were established. It is argued that early settlers designed their buildings in response to the local culture, climate, topography and the geographic conditions of the (Puspitasari *et al*. 2018), hence, the uniqueness buildings all around the country. Those in high-risk areas that are sometimes characterised by floods and wild animals, such as the Binga area dominated by the BaTonga tribe, were built on stilted 3-meter poles made of strong wood, such as *mukwa* or mahogany (Siamonga, 2018), to areas with favourable rainfall patterns in Zimbabwe's agro-ecological Region IIa, such as Mt Darwin, Chiota and Rusape that are mostly characterised by the traditional round hut on a cylinder (Steyn, 2006). This shows the differences in building structures according to place and need and most of these buildings were built based on indigenous knowledge and not well laid written down procedures. The traditional round hut forms a dominant feature in most of Zimbabwe's rural areas.

### *Interrogating the Contents of the 1977 Model Building By-laws Rural Construction in Zimbabwe*

The Ministry of Local Government and Housing published Zimbabwe's Model Building By-Laws in 1977 and this was done under the Urban Councils Act chapter 214 and section 83A of the Rural District Councils Act (Chirisa, 2014). The Rural District Council Act (RDCA), regulates the number of buildings that can be constructed in a particular area and prohibits the construction of buildings on unstable sites (GoZ, 2002).

Building standards are finely detailed regulations, with specific technical requirements as regards to the design and construction of buildings and related services. They cover a range of issues, such as foundation, masonry, walling and miscellaneous construction **(**Zami and Lee, 2007) and water supply, constructions, lighting, drainage and sewerage, public safety and fire protection (Musandu-Nyamayaro, 1993). By-laws provide a high level of structural safety and operational efficiency (Zami and Lee, 2007). Building by-laws are further supported by the RDCA that stresses the need to make sure that buildings are constructed after plan approval by the Council (GoZ, 2002; Zami and Lee, 2007). RDCA also regulates the design, nature, appearance, height and the ventilation area of buildings and forbids the construction of buildings that may be dangerous or unhealthy for the public (GoZ, 2002). It is, therefore, the mandate of rural authorities to promote the overall development of the area (de Visser *et al*. 2010).

During the construction process, inspectors are obliged to inspect the building under construction at different construction phases to ensure compliance of the building with the by-laws (Zami and Lee, 2007). Under these by-laws, high-density housing in Zimbabwe now allows the use of 115mm walls as load-bearing walls and this reduces the costs of construction by a quarter and it observes that the minimum room size of a habitable room should be seven square meters for it to comfortably accommodate occupants with less or no difficulty (Zami and Lee, 2007). The by-laws also deal with issues related to building construction and alterations, subdivisions, conversions and reconstruction (Chirisa, 2014). This shows that the model building by-laws hints on many aspects that range from the general building structure to support uses, such as sewerage, lighting and areas to deal with public safety and subdivisions and reconstruction practices.

Temporary structures that are constructed without approval by the local authority may be removed under the RDCA regulations. The statute also ensures the adequate and suitable provision of toilet facilities, sewerage and drainage and sanitation facilities for any settlement and these may entail the regulation and construction of septic tanks, the regulation of private sewers and the adequate provision of water supplies (GoZ, 2002). These are then supported by circular 70 of 2004 that have reduced the size of stand sizes and regularised the use of gravel roads (Government of Zimbabwe, 2004; Herald, 2013). Gravel can now be used in place of tar and stands for high-density areas are reduced to 150 square meter stands. However, one may

argue that these gravel roads may sometimes cause locations to be clouded by dust and this may, in turn, be linked to negative health implications.

The RDCA in conjunction with the model building by-laws, therefore, aims at promoting sustainable development in the rural areas. In this regard, the use of model building by-laws allows building strong and more resilient structures. Good construction practices also reduce or eliminate issues of health threats or hazards to the public. The use of by-laws and the strict application of the RDCA, would promote sustainable development through the maximum and efficient utilisation of resources in the construction process. The sustainable building aims to promote the effective conservation of resources that comes in the form of energy, material, water and land conservation and ensure that cost efficiency is attained and the design for human efficiency is attained. The design for human adaptation ensures that human health and comfort are protected and this helps to create sustainable liveable environments for the rural mass.

In ensuring that the rural areas are also developed while deeply rooted in building standards and by-laws, sustainable development is achieved and strong buildings of value and high performance are constructed. It is the government's responsibility to ensure that rural areas also have the same development opportunities, such as cities, to prevent rural-urban migration and seek better living conditions (Nyadombo, 2018). Building standards, therefore, help homeowners to appreciate the importance of standards as they help in maintaining a minimum quality of life and the environment as well (Zami and Lee, 2007). This article now examines cases where the application of model building by-laws is successful in a rural building in Zimbabwe.

***The extent to which Model Building By-laws is applied in Rural Zimbabwe***

Traces of Land-use planning (LUP) in rural Zimbabwe can be drawn back to the early 1980s and an example is of the Kanyati communal lands under the Nyaminyami Rural District Council (RDC) that benefited from LUP and infrastructural development practices of the area. In 1984, the land-use planning process was initiated by the District Administrator's office and Agritex was tasked to carry out a settlement plan to identify arable land for grazing sites and village sites for the settlement of villagers. Land-use study was also commissioned by the Agricultural and Rural Development Authority (ARDA) funded by the European Economic Commission / EEC (Bvuma and Matawu, 1997) and this was meant to sustainably develop the

area. In 1985, 870 arable plots of 5-6 hectares were demarcated by Agritex and these were completed by March 1987 and in 1992, ARDA re-planned the Kanyati communal lands intending to make provision for service centre uses, such as woodlot sites and feeder roads (Bvuma and Matawu, 1997). Table P.8 shows some of the developments made under the LUP exercise.

**Table P.8: Infrastructural Development as funded by the EEC and Government of Zimbabwe (Adapted from Bvuma and Matawu, 1997)**

| Type of Infrastructure | EEC funded | Other Government Sources |
|---|---|---|
| Feeder Roads | 40 km | 117 km |
| Boreholes | 37 | 25 |
| Deep wells | 9 | 10 |
| Piped Water scheme | 1 | 1 |
| Primary Schools | 1 | 3 |
| Secondary School | | 1 |
| Stock water dams | 8 | 1 |
| Houses | 6 | 6 |

The table reflects positive developments in Kanyati communal area. The article notes that by-laws must ensure that areas are sufficiently developed to cater for water supply and ensure that the area has an adequate sewerage and drainage system (Musandu-Nyamayaro, 1993). In the case of Kanyati communal area, a total of 62 boreholes, 19 deep wells and 2 piped water schemes were developed by the government and under the EEC funding scheme. The development of schools would serve the educational interests of the population and the development of feeder roads would help to improve the areas' accessibility and connectivity with the surrounding areas.

The establishment of the Ministry of Rural Housing and Social Amenities in 2005 concretised the existence of a government arm that deals with rural housing (Ndlovu and Umenne, 2008). It can also be argued that some of the rural growth points are planned by following standards and by-laws. Rusape for example, gained her town status in 1992 and falls under region two, with an estimated population of 34 000 (Rusape Town Council, 2020). The Town Council managed to develop 30 kilometres of tarred roads, 2 036 low-density housing units, 2 101 medium density and 5 304 high-density housing units, 7 secondary and 10 primary schools, 2 vocational centres, 1 hospital and 3 clinics (Rusape Town Council, 2020). This shows that the

area has made positive improvements in terms of infrastructural improvements. A road was developed and people were allocated stands ranging from high to low residential stands in Rusape. The area has a vocational centre which caters for adult learners. Some of the development opportunities in Rusape includes the construction of a golf course in Rusape's Mabvazuva area and the development of mixed-use commercial high-rise shopping malls in Rusape Central Business District (Rusape Town Council, 2019). This marks a positive step towards bringing development in areas that are miles away from the country's capital, Harare.

Gokwe Town Council was proclaimed a growth point under the country's growth point's policy in 1982. Gokwe gained town status in July 2006 and managed to develop into two low-density areas (Green Valley and Sasame), four medium-density stands and two high density stands (Gokwe Town Council, 2019). Gokwe has 4 primary schools and 4 secondary schools, a well-developed communication system with the establishment of telephone network providers, such as Econet and NetOne and an aerodrome for the landing of private jets, popularly known as Gokwe airport (Gokwe Town Council, 2019). This shows that, through the effecting of standards in developing the Gokwe area, the area has gained town status. The availability of a small airport reflects much potential in terms of development and investment opportunities. It is, however, important to note that, some of these rural areas are placed in remote, hard to reach areas and the people in those areas still rely on earthen construction and do not necessarily follow standards when building. Earthen construction in the rural areas is still not regulated by any codes, standards and by-laws and this has resulted in differing building heights and wall thickness (Ndlovu and Umenne, 2008).

Studies have also shown that the walls rest directly on the ground with the majority of building superstructure being made of pole and dagga and the lifespan of the walls is usually prolonged as a result of the high-quality thatch that is usually put as part of the roof (Ndlovu and Umenne, 2008). This signifies absence of formal and standard, well laid out foundations in some of the structures found in rural districts that puts the lives of the ordinary rural people at risk when faced with natural hazards, such as strong winds and floods.

The round huts lack most of the required standards, such as the use of hard burnt clay or cement; they sometimes face more destruction in the wake of harsh weather conditions. An example is of the Cyclone Idai of 2019 that left many Zimbabweans in the Chimanimani area homeless

(Chatiza, 2019). The cyclone Eline induced floods of 2000 and the 2005 floods destroyed homes and livestock in the Gwayi River flood plain (Ndlovu and Umenne, 2008). These scenarios are an indication that the lack of enforcement of model building by-laws in some of the country's rural remote areas, sometimes poses a threat to the lives of rural residents as they sometimes lose their most valued household property, houses and livestock.

Positive gains have, however, been realised from the regional migratory trends in the region. Due to increased regional migratory trends of people into the neighbouring countries of South Africa and Botswana, the construction of better infrastructural developments in Tsholotsho's ward 18 are witnessed (Ndlovu and Umenne, 2008). This forms a positive step towards the construction of more resilient structures in the Tsholotsho region. This does not only produce more sustainable rural habitable structures but also plays a positive role in boosting the property values of the area. It is also argued that earthen construction encourages creativity and diversity in earthen construction (Ndlovu and Umenne, 2008) and this may also blend well with the local area's aesthetics.

However, by-laws are sometimes difficult to implement in rural areas due to many reasons. Other scholars have argued that model building by-laws are outdated, rigid and inhibitive to allow the smooth implementation of infrastructure development work in local authorities (Chirisa, 2014). Zimbabwe's housing standards were adopted in 1977. It is critical to revise thestandards to suit the changes in economic, technological and cultural domains (Zami and Lee, 2007). Toriro (2007) further stresses that the by-laws are not responsive to physical and climatic conditions and the needs of the end-users (Toriro 2007). In this regard, by-laws may fail to accommodate the needs of the poor and this may make model building by-laws difficult to implement in the rural areas and the revision of these standards would help create buildings that would suit the needs of people.

Studies have also shown that most of the skilled builders in rural areas have left in search for greener pastures in neighbouring South Africa and Botswana.This has left most rural areas without skilled manpower. The skilled manpower at times leaves family members to work as builders and the shortage of water in most rural areas, such as Tsholotsho results in poor quality earthen products resulting in cracks on the dried earth bricks (Ndlovu and Umenne, 2008).

**Discussion**

Many countries across the globe have adopted the use of building by-laws in their urban and rural zones. The adoption of by-laws is done with the aim to promote uniformity with regards to the nature of buildings in cities and rural areas. By-laws have, therefore, been used by many countries as a shield against bad weather conditions, such as earthquakes (GoI, 2016). This is also a way to monitor buildings at each stage of development (Booth, 1999). By-laws have, therefore, been used as standard operating procedures upon which builders and local authorities can monitor rural developments. Following these by-laws can help build structures that are more resilient and stronger. In other regions, as evidenced by the APEC countries, such as Canada and Australia, the increased importance of the environment is appreciated. This is evidenced by the adoption of the green building codes (APEC, 2013). Therefore, sustainable development is achieved through the harmonisation of the built and the soft landscapes.

The use of natural resources as a major form of building material is more pronounced in the African landscape (FAO, 2011). This has prompted other African countries, such as Tanzania and Uganda to engage in massive public consultation practices at local levels regarding the management of natural resources (Mowo *et al*. 2016). Involving the local people in the management of their resources helps to promote good rapport and dialogue between local authorities and the locals and this would help preserve some of the natural resources and prevent the depletion of forests through deforestation. Globalisation has also had positive impacts on how the buildings in rural communities have evolved (FAO, 2011). This is motivated by the mixing of cultures and the appreciation of new building technologies by the locals and hence, the improvement in building technologies.

It is clear that, on paper, model building by-laws are well laid down, as articulated by the 1977 model building by-laws and the RDCA. Through the model building by-laws, buildings must be constructed in such a way that upholds building standards to ensure that a high level of structural safety and operational efficiency is ensured (Zami and Lee, 2007). By-laws must also ensure that issues of drainage, public safety and water supply are addressed in building and when forming new settlements (Musandu-Nyamayaro, 1993). It is, therefore, illegal to construct buildings without the approval and inspection by the Local Council (GoZ, 2002; Zami and Lee, 2007). These by-laws aim at producing structures that are stronger and more resilient to the changing weather conditions and they also aim to promote uniformity in

development and prevent haphazard developments from occurring. The following of by-laws in building and settlement formation also helps to create more sustainable settlements that are of good quality.

To sustainably develop settlements and promote the increased cropping up of good buildings, rural local authorities must ensure that these standards are followed. This has seen the development of the Kanyati communal lands that were developed with supporting facilities, such as water and the establishment of a better road system to connect with other areas (Bvuma and Matawu, 1997). The ability to develop an area with own supporting facilities does not only improve the people's livelihoods and social statuses but also helps in attracting investors. This reduces the increased migratory trends of people into the neighbouring regions in search of better employment opportunities. Also due to an appreciation of better building structures by the people who migrate to neighbouring countries, such as Botswana and South Africa, people in Tsholotsho Ward 18 have adopted the building of better and improved buildings in their areas (Ndlovu and Umenne, 2008). This may be partly due to the fact that these people would be in a better condition to afford the hard burnt or cement bricks that may be expensive for the local people to afford. By engaging better building practices and constructing with better and stronger building materials, than the traditional pole and dagga, more resilient structures of high quality and high value are created.

It can also be noted that some of the growth points that were established after independence, such as Gokwe Centre, have managed to gain town status, after some time. This is because of the continued improvements and the following of standards by the rural local authorities as they develop their areas. Rusape and Gokwe Town Councils (GTC) have managed to develop high, medium and low-density areas (Gokwe Town Council, 2019; Rusape Town Council, 2020) with Gokwe having a small airport for private jets and Rusape having investment opportunities, such as the development of a golf course and the proposed establishment of mixed-use high-rise buildings for commercial use in Rusape's Central Business District. Due to continuous investments and the spread of investment opportunities, these areas continue to attract many people and economic activities in their respective local authorities.

Despite the good intentions of by-laws to rural development, most RDCs have not been able to effectively implement these by-laws due to several factors. People in the rural areas are still

accustomed to their old ways of building and are heavily reliant on locally available materials, such as pole and dagga for the conical huts and grass for thatch as a roofing material. Traditionally, people in rural areas are in the habit of using pole and dagga to build conical huts (Saidi, 2008) that are sometimes constructed without the required footing and as a consequence, walls may end up resting directly on the ground (Ndlovu and Umenne, 2008). Such practices may weaken the building structure as time goes by and the building may not stand firm against harsh weather conditions and this may further put the lives of people at risk of property loses or at times deaths in the event of bad weather events. Examples of Chimanimani, Chipinge and Gwai reveal that the houses in these areas due to poor building standards were easily destroyed by bad weather conditions. This shows the importance of following standards and by-laws when building as they help in improving on safety issues and this helps in reducing the amount and level of damage that may occur in any cases of natural disasters.

By-laws are regarded as rigid and outdated (Chirisa, 2014), as they have failed to accommodate the changing culture and socio-economic environments over time (Zami and Lee, 2007). They have also failed to accommodate changes in climate over time (Toriro, 2007). Model building by-laws were established in 1977, under the white colonial rule, before the country's independence in 1980. Therefore, one may argue that, the by-laws were made in the best interests of the whites and that, they did not fully address the needs of the black majority. Rural local authorities must ensure the adequate and effective provision of a sewerage and drainage system (Musandu-Nyamayaro, 1993), whereas most of the remote rural areas heavily rely on the use of the Blair toilet system. Also, due to the availability of more land in rural areas and the development of sparsely distanced rural huts, some of these by-laws, such as the development of high-density stands of 150 square meters, may face resistance in some more remote areas. This shows that some of the model building by-laws were more biased towards urban development as compared to rural development that, in turn, justifies the need to continuously adjust these by-laws to suit the unique needs of the black people in the rural areas of Zimbabwe.

The study notes that, at different stages of the construction process, an inspector must come to inspect the building under construction to ensure that they comply with building by-laws (Zami and Lee, 2007). This is not usually a reality in the rural areas, in some instances, the area might be remote and it may be difficult to reach some areas due to poor road network and this may

compromise on the type of work done. It is also noted that at times rural local authorities may not have enough funds to carry out their work, hence, the need for increased government funding and also innovativeness on the part of rural local authorities. Innovative income-generating projects would boost rural local authorities' money reserves and this enables them to effectively carry out their duties.

In search of greener pastures, it might now be difficult to find skilled builders, as the majority have fled to the neighbouring regions of South Africa and Botswana. Some families in Tsholotsho have built their own homes (Ndlovu and Umenne, 2008). The failure to have the skilled manpower in place makes it difficult for rural areas to have nicely built structures in place. The use of gravel road is now acceptable in developing residential suburbs (GoZ, 2004). This is sometimes not the case for rural residential suburbs as some of the rural local authorities may not have adequate funds to develop the road network. There is also a need for local authorities to be funded for them to effectively carry out their duties when it comes to enforcement of building by-laws in building and development of settlements in rural Zimbabwe.

**Conclusion and Recommendations**

This article sought to discuss the scope and limitations in embracing model building by-laws in rural construction in Zimbabwe. The article notes that, some areas (especially rural growth points) have managed to positively develop from the use of standards and have gained town statuses in the process. The applicability of these standards and building codes remains limited as regards to their effective applicability especially in the remote rural parts of the country. Therefore, in some cases, these by-laws and standards have merely existed on paper as they have faced resistance as opposed by the people's way of living and the over-reliance of the local people on locally available building material. This has continuously promoted the practice of earthen building in most rural areas. This has seen the destruction of rural settlements in the wake of harsh weather conditions, such as the Cyclone Eline and the Cyclone Idai that, in turn, reflects the importance of following standards in rural building, regardless of the area's location.

To increase awareness and increase the use of by-laws in rural areas, there is need for increased funding from Central Government and Donors. This enables rural local authorities to

effectively carry out the enforcement of building standards and the need to involve the local people to come up with more flexible standards that suit the local needs of the people. Involving the people's input in decision-making would also increase awareness and this would help the local people to appreciate the importance of following standards when building. There is also need for rural local authorities to become more innovative in developing vocational training centres and attracting more investment opportunities in their areas to allow for rural areas to retain their locally skilled personnel as a way of guarding against the brain drain. The ability to retain local skills would help in ensuring that skilled builder remains available and it then becomes possible to build structures of better quality in these rural areas.

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The authors have no conflicts of interest to declare that are relevant to the content of this article.

**References**

Akadiri P.O, Chinyio E.A and Olomolaiye P.O, 2012. Design of a Sustainable Building: A Conceptual Framework for Implementing Sustainability in the Building Sector. *Buildings*, 2, 126-152.

Asia-Pacific Economic Cooperation, 2013. APEC Building Codes, Regulations and Standards: Minimum, Mandatory and Green. APEC Secretariat.

Booth, P 1999. From regulation to discretion: the evolution of development control in the British planning system 1909-1947, Planning Perspectives. https://doi.org/10.1080/026654399364238.

Bvuma, J and Matawu, A, 1997. Land-use planning and implementation in Kanyati communal lands, Kariba District: the process and impact: The Zambezi valley experience. Available online: https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/12025

Chatiza, K, 2019. Cyclone Idai in Zimbabwe: An analysis of policy implications for post-disaster institutional development to strengthen disaster risk management. Available online: http://repo.floodalliance.net/jspui/handle/44111/3259

Chirisa, I, 2014. Building and urban planning in Zimbabwe with special reference to Harare: Putting needs, costs and sustainability in focus. *Consilience,* (11),1-26.

de Visser, J, Steytler, N and Machingauta, N, 2010. *Local government reform in Zimbabwe: A policy dialogue*. Community Law Centre, University Western Cape.

Government of India (GoI), 2016. Model Building By-Laws, 2016. Ministry of Urban Development, Government of India. Available online: http://mohua.gov.in/upload/uploadfiles/files/MBBL.pdf

Government of Zimbabwe (GoZ), 2002. Rural District Councils Act, Chapter, 29:13.

Harper, R.H, 1978. The Evolution of the English Building Regulations 1840-1914. The Faculty of Architectural Studies, The University of Sheffield.

Mowo, J, Masuki, K, Lyamchai, C, Tanui, J, Adimassu Z and Kamugisha, R, 2016. By-laws formulation and enforcement in natural resource management: lessons from the highlands of eastern Africa, Forests. *Trees and Livelihoods, 25(2),*120-131, available at https://doi.org/10.1080/14728028.2016.1159998.

FAO, 2011. Rural structures in the tropics. Design and development. Rome: FAO

Musandu-Nyamayaro, O. 1993. Housing design standards for urban low-income people in Zimbabwe. *Third World Planning Review, 15(4)),* 67-86.

Ndlovu, L. B and Umenne, S. I, 2008. Trends in Earthen Construction for Rural Shelter in Zimbabwe: the case of Tsholotsho in Matebeleland North Province. Available online: https://www.semanticscholar.org/paper/Trends-in-Earthen-Construction-for-Rural-Shelter-in-Ndlovu-Umenne/f39ef74c70c36d048eacfee5fb7d9ba893dae2b9?p2df

Nyadombo, V.V, 2018. Effectiveness of development control mechanisms used by local authorities to control illegal settlements: a case study of Harare city Crowborough Farm Paddock 27 invasion.

Puspitasari, P, Kadri, T, Indartoyo, I and Kusumawati, L, 2018. Microclimate and architectural tectonic: vernacular floating house resilience in Seberang Ulu 1, Palembang. *Earth and Environmental Science, 106,*1-7.

Toriro, P (2007). "Town Planning in Zimbabwe: History, Challenges and the Urban Renewal Operation Murambatsvina. Maphosa, F, Kujinga, K and Chingarande, S. (Eds.). (2007).

Zimbabwe's Development Experiences Since 1980: Challenges and Prospects for the Future. Organisation for Social Science Research in Eastern and Southern Africa.

Saidi, U, 2018. Repackaging “traditional” architecture of the African Village in Zimbabwe. In *Urban and Architectural Heritage Conservation within Sustainability*. IntechOpen.

Steyn, G, 2006. The indigenous rondavel – a case for conservation. *South African Journal of Art History, 2(1),*21-38.

UNDP, 2015. Building Resilience in Zimbabwe: Towards a Resilience Strategic Framework.

Zami, M.S and Lee, A, 2007, March. The influence of housing standards in the development of low-cost sustainable housing in Zimbabwe. In: *The 7th International Postgraduate Research Conference*.

**Reports, Newspapers and Websites**

Gokwe Town Council, 2019. About Us. https://gokwetowncouncil.co.zw/about-us/

Herald, 2013. Harare relaxes Building By-laws, 27 May 2013. https://www.herald.co.zw/harare-relaxes-building-by-laws/.

Rusape Town Council, 2020. Summary Information About Rusape Town Council. https://ucaz.org.zw/members/rusape-town-council/.

Siamonga, E, 2018. Binga: Architectural melting pot. The Patriot. file:///C:/Users/JOIHN/Desktop/Binga_%20Architectural%20melting%20pot%20_%20Celebrating%20Being%20Zimbabwean.html [accessed on 02/08/2020]

## C3: The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: Challenges and Prospects for Doing It Right[35]

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### Introduction

The frequency of wildfires has increased in many forest ecosystems. Corona *et al*. (2015) alludes that wildfires globally affect ecosystems in the Mediterranean as natural resources and biodiversity are facing rapid deterioration. Despite the increasing frequency in wildfires, Dube (2013) denotes that fires will intensify as a result of climate changes and natural disasters that makes it important to review fire suppression strategies and find sustainable means of fire management. Together with climate change impact, the spreading frequency and conflagrations of wildfires have increased recently due to the increases in population growth among many other causes (IBR and World Bank, 2018). Kaesin *et al*. (2012) aver that in the previous decades, climate change, coupled with soil degradation, desertification and the loss of biodiversity has become a great threat globally with its impact affecting ecosystems.

Recent prognosis has it that climate change, together with wildfires will be top leads in the extinction of biodiversity with an estimated 20% to 30% of the natural species risking extinction as of 2050 (Kaesin *et al*., 2012). SCBD (2001) also highlights that forest fire conflagrations have increased in the previous decades globally. The trends on wildland fires require a revision of the management practices and approaches in fire management to minimise disastrous effects amidst a changing climate. Mutimukuru-Maravanyika (2010) states that the centralised approaches to natural resources management have failed dismally and so is the participatory approach that has, instead of enhancing the management of resources, given

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disappointing and unexpected results towards the sustainable management of natural resources. Thus, this chapter seeks to explore the fire suppression approaches that were practiced in the ancient era and how relevant they are in managing wildfires presently. The chapter uses a desktop approach to explore literature relevant to the debates presented in the chapter and to concretise the arguments. A look into the ancient practices of environmental and wildlife fire management is relevant towards sustainable development.

**Theoretical Framework**

The success of the efforts to manage and control fires in the presence of a changing climatic environment requires the integration of various concepts, such as institutionalism that helps regulate and formulate policies against fires. Some concepts, such as the prisoner's dilemma, common-pool resources, the tragedy of the commons and zoning of wildlife areas are critical in effecting the implementation of wildfire control measures. Chief of all being institutionalism, without institutionalism, it is difficult to coordinate human behaviour and manage the challenges that come on shared resources' management.

Institutionalism is explained by Schmidt (2014) as an embodiment of rules, structures and regularities within a political science structure or setup that influences the behaviour of humans and the management of common goods. According to Amenta and Ramsey (2009), institutionalists influence policies and decisions. This concept is important in the management of natural resources. Without an institutional setup, it may be difficult to manage the usage of natural resources and prevent the further deterioration of the environment for a common good.

Common pool resources as a theory or concept focuses mainly on natural resources that is a result of human participation and lobbying to produce shared resources (Requier, 2004). Commons are all the natural resources that include forests and water bodies that are shared by the community (Choe and Yun, 2017). However, there is no extensive free usage of these commons due to the birth of capitalism. Many of these common resources being privatized lead to the exclusion of other users despite the nature of the commons as non-excludable (Choe and Yun, 2017).

The zoning concept brings in solutions to reduce conservation and development conflicts while maintaining culture (Rotich, 2012). Zoning is defined by Harris and Hazen (2006) as an action

that fosters the protection of the natural environment by setting aside sensitive areas and protecting their habitats. Such protection lessens conflicts of use by different people. It promotes sustainable utilisation of natural resources through discouraging some uses and developments that harm the environment (Eagles *et al*. 2002). Zoning is a very important tool that can be utilised to successfully monitor, control and manage wildlife zones (Rotich, 2012). FAO (2011) denotes that the most destructive impact on biodiversity and wildfires, apart from climate change, are as a result of human activities.

**Literature Review**

Wildfires have become a cause for concern in the management of natural resources and wildlife. Dube (2015) displays some of the damaging effects of wildfires to compose vegetation destruction, air pollution and wildlife destruction. In recent years, human activities and fuel consumption requirements have contributed to the conflagration of forest fires across the globe. Mkhwananzi (2007) asserts that an estimate of 95% of forest fires is as a result of human activities. This means that the successful management, control and monitoring of wildfires has to be a comprehensive and integrative approach that places the key players, such as the community affront as a few cases result from natural causes (Nkomo and Sassi, 2009). In Zimbabwe alone, wildfires destroyed approximately 950 905 hectares of land in 2009, about 1 152 413ha in 2010 and at least 1 320 325 in the year (EMA, 2011a). This is a real issue that needs proper strategic frameworks to deal with the enormous impact of wildfires both globally, regionally and locally if sustainability is to be achieved.

**Monitoring, Control and Management of Wildlife Fires under a Changing Climate**

Wildfires, exacerbated by climate change conditions have become a global challenge that requires immediate action in terms of policing, management and monitoring (Flannigan *et al*. 2009). The constantly changing climatic conditions have made wildfires settle inconveniently as drought effects tend to enhance fires. Global, regional and local efforts are imperative to the common problem of wildfires if biodiversity is to be protected. According to FAO (2011), a comprehensive approach to successfully fight the problem of veld fires should include, research (in-depth analysis of fire issues and exploration of possible options for positive change), risk reduction (preventative measures and channelling resources to the core causes), readiness (preparedness), response (giving proper responses against damaging fires) and recovery of what is lost if the fire had affected livelihoods. FAO (2011) states that it is a blinded view that

damaging fires are the danger that needs to be phased off but rather it is imperative to understand that the outbursts of fires are symptomatic and a signal to the underlying problems regarding management.

For the successful fight against fires, it is important to have supporting legislation, policy and enhanced community and institutional capacity. Fire is in existence since time immemorial and their frequency is a cause for action. There is  need to move from technical management of fire and address the underlying causes (FAO, 2011). The use of the community-based natural resource management (CBNRM) concept has become popular in recent years as this method brings together the states, communities and other stakeholders to a common goal to fight against the destruction of natural environments (Treue and Nathan, 2007). FAO (2006) reiterates strategies that are required to enhance a collaborative approach to firefighting to include the development of common standards and international systems, such as early warning mechanisms, the training and capacity building of important stakeholders and the formulation of policies and frameworks for institutional capacity building and support. The common pool resources require common effort by every stakeholder to avoid the prisoner's dilemma and the careless neglect of wildfire management. Also, technology transfer and the use of satellites in the monitoring of wildfires are of great use in most countries, such as Australia. Luce *et al*. (2012) denote that the effort to control and manage fires are made complex and complicated by the rising populations, particularly in the United States. The collaborative management of fires is successfully implemented in some parts of India with the government committed to greening and improving biodiversity. According to IBR and The World Bank (2018), the government of India policed, through its 'National Action Plan on Climate Change', to ensure an increase in forest cover on an estimated land size of 5 million hectares.

Climate change together with the natural fires has a bearing upon the livelihoods of people as they destroy the land to that many countries in the southern African region rely on for their living (Clover and Eriksen, 2009). Dube (2015) highlights that fires lower vegetal cover and cause air pollution that is detrimental to the health of people. One of the most common measures put in place by most African countries is the use of fireguards as a preventative means against wildfires. The management of wildfires in most African countries is bottom-up, with the community playing a major role in suppressing the fires (Nyongesa and Vacik, 2018). This is a relevant aspect of institutionalism that upgrades local people who experience the impacts

on ground, rather than have impositions through top-down approaches. Kenya as an example mostly makes use of traditional expertise on ecological management together with the Grass Fire Act (Chapter 327). However, Nyongesa (2015) highlights that there is a neglect of following the regulations regarding the management of grass and bushfires.

Behaviour change in humanity is the immediate need to fight and channel all resources towards mitigating climate change, rather than accommodating environment insensitive human activities that contribute to wildfires (Dube, 2015). Kenya has embodied cultural beliefs that discourage forest destruction as they fight to preserve their sacred tree of Mukuyu (sycamore tree), Mukurwe and Mugumo trees. With no community member allowed to destroy the sacred trees, it also saves on the protection of other natural resources from destruction (Nyongesa and Vacik, 2018). One of the effective approaches that can be applied in the management and control of wildfires is ecotourism that enhances the conservation and preservation of biodiversity (Acquah, 2017). This has multiple benefits as it does not only protect the environment but improves the economic livelihoods of the communities that benefit from the income generated (Ogato, 2014). Poachers have become an issue in the management of wildfires as they carry out their hunting, with fire as a hunting tool and this has cost many tourist sites, such as resorts through fire destruction (Government of Kenya, 2018). FAO (2012) highlights that about 350 million hectares of land is affected yearly by wildfires and of this approximately 250 million hectares consist of tropical rain forests.

**Environmental education and the stewardship ethic**

Environmental stewardship has gained popularity in recent years, people have realised the need for environmental responsibility and protection (Arakawa, Sachdeva and Shandas, 2018). The application of environmental stewardship in the cultural norms of communities has proven to be one of the effective means to achieve environmental justice as argued by Worrell and Appleby (2000). Berry (2006) argues that, when environmental stewardship and education are embedded in the culture of communities, they empower and capacitate communities. It becomes easy for a bottom-up approach to environmental management. Stewardship practices that include greening mechanisms by combined community-based efforts have become more common and relied upon by most governments globally (Baker, 2014). Successful environmental management is upon the realisation that institutions cannot work in isolation from the community especially with regards to the common or shared resources and thus the

top-down approach is rendered futile. According to Ramolini *et al*. (2012), stewardship practices to environmental management enhance the resilience of communities. Communites find it easy to work in unison with the government authorities to fight for a common cause.

Communities and individuals need to have a sense of ownership and responsibility. This would make even the enacted statutes easier followed as both the government and local people work towards achieving a common goal. For most of the developing countries in Africa, the reliance on stewardship is important as it covers government resource gaps through community participation (Arakawa, Sachdeva and Shandas, 2018). Most of the efforts that are put in place in many countries are anchored on environmental education to enhance community awareness to the dangers of not maintaining natural resources (Omoogun, Onnoghen and Egbonyi, 2016). The attainment of sustainable environment comes effectively in play when communities are well informed and practice environmental ethics that enable them to appreciate the sacredness of nature (Karatas, 2014). Despite the various efforts that are being done to foster good environmental management and conservation practices, Omoogun, Onnogheu and Egbonyi (2016) argue that many countries are still very far from attaining environmental justice.

A realisation of the need for common responsive action against wildfires enlarges the knowledge of communities and enables them to effectively fight wildfires. With the growing evidence of wildfire intensity amidst climate change impact, there is need for technology and information transfer. The information derived from the use of statistical models for projections and establishing the relationship between forest fires and the changing climate enables the projection of the likelihood of future wildfires (Mouillot and Field, 2005). This enables the pro-active management, monitoring and control of wildfires before they even come to life. Krawchuk *et al*. (2009) support the notion highlighting the common use of such models globally and how effective they have aided in preparing and equipping against fires in the United States according to Westerling and Bryant (2008) and Canada's Boreal forest as highlighted by (Flannigan *et al*. 2005). The failure to act upon the damaging impact of wildfires can overwhelm natural resources and environmental managers as they intensify due to the exacerbating climate change (Halofsky, Peterson and Harvey, 2020). Luce *et al*. (2012) denotes that the efforts to design landscapes that are fire-smart are socially and technically challenging and, as such, there is a need for capacitating and increasing community awareness in managing fires.

It is indicated that regional efforts to manage fires tend to crumble due to insufficient training and the failure to prioritise wildfires as a critical issue in policy-making (Chinamatira, Mtetwa and Nyamadzawo, 2016). Globally, various departments exist that deal with other areas deemed important but no specific departments with a sole focus on fire management exist. However, with the engagement and practising of environmental stewardship, the management, control and monitoring of wildfires and environmental problems become an easy battle. Grassroots' efforts are what defines the stewardship ethic and ought to be initiated (Worrell and Appleby, 2000).

**Research Methodology**

To support the research and arguments presented in the chapter, the chapter used a desktop approach and literature review to concretise the arguments put forward for environmental management and wildfire monitoring. The chapter made use of global, regional and local scholarship and reports that are rich in wildland-fire-information. These are visited to gain an appreciation of the nature of the problem of wildfires and how the efforts by other countries can be of use when applied in Zimbabwe. The chapter analyses the current efforts that are put in place towards the management of wildfires and how, with the moving of time, the old, culturally imbedded efficient practices are lost along the way. The analysis is made from the pre-colonial, colonial and post-independence eras. Since most literature and efforts towards controlling wildfires are biased towards its suppression alone, this chapter focuses on the monitoring, control and management of wildfires in Zimbabwe under a changing climate. It tries to provide an indepth analysis of the extent to which the modern efforts are efficient and gives a comparison with the ancient fire management efforts. The evidence are presented in text, tables and schematic diagrams to fully provide a picture of the extent of the situation and how imperative is urgent action needed.

**Analysis and Results**

Climate change and wildfires seem to be interconnected and have simultaneous effects. Climate change and the degradation of biodiversity have become frequent and more rampant from the turn of the 21$^{st}$ century (UNISDIR, 2012). Humanity and nature have not been spared of the effects of climate change, with humans becoming major contributors to bio-destruction (EEA, 2012). Flannigan *et al*. (2009) reveal the efforts being put in place by fire agencies and

managers to rectify and prevent frequent recurrences, severity and intensity of the fires. However, there is huge neglect by many nations of properly managing fires as in Canada, Australia and Russia, most of the wildfires conflagrate into unmanageable blazes as they are freely left to burn. This has indicated the existing battle against climate change and increasing frequency of wildfires. Many nations are embarking on mitigation approaches globally.

Climate change has become critical agenda in many conferences globally as with its intensity and destruction, many facets, such as bio-diversity, are affected. The recent projection has it that climate change, together with wildfires will be top leads in the extinction of biodiversity with an estimated 20% to 30% of the natural species risking extinction as of 2050 (Kaesin *et al*., 2012). SCBD (2001) also highlights that forest fire conflagrations have, in the previous decades, increased globally. Despite the immediate need to strategise on the best policies against wildfires in a changing climate, Flannigan *et al*. (2009) highlight the lack of an integrative approach to fire fighting and management as one of the contributing factors to the continued challenges of wildland fires. There is poor coordination and poor mobilisation of human and technical resources with the common goal of managing wildfires. There is a lack globally, of cooperation between international countries and this has led to poor or low capacity to fight wildfires.

## Monitoring, Control and Management of Wildlife Fires under a Changing Climate in Zimbabwe

The challenges of wildlife fires are slowly frequenting in Zimbabwe particularly as it is a Savannah climate. Nyamadzawo *et al*. (2013) argue that little efforts towards research on the major causes of wildfires in Zimbabwe are done and this has affected proper planning for management and control of wildfires.

### *Colonial Institutions for Environmental Management*

The issue of climate change and environmental protection goes long back and the efforts towards mitigating wildfires can be traced back to the colonial period where institutions and regulations for natural resource protection were put in place. The protection of natural resources in then Rhodesia, was enhanced by the natural resources board whose powers were postulated in the Natural Resources Act of 1975. According to Nickerson (1994), the natural resources board was mandated to monitor the utilisation of natural resources, recommend

necessary legislative tools for resources management and also educate the public through awareness campaigns. The relevance of the protection of natural resources in Rhodesia is weighed according to the protection, conservation and improvement of the natural resources as laid out in the natural resources Act. The natural resources board was also responsible for monitoring the efforts by landholder committees on the preservation of natural resources. This enhanced a bottom-up approach to the management of resources as landowners and communities at a local level were engaged in the management of natural resources (Nickerson, 1994).

Nyamadzawo *et al*. (2013) highlights the efforts towards fire management that were functional in the colonial era that can be traced back to 1890. The regulations that were functioning to preserve natural resources are the Native Land Husbandry Act of 1951 and the Natural Resources Act (No. 9) of 1941 (Stocking, 1978). Local farmers were given the responsibility to protect their farmlands from fires through the use of fire-guards and fencing off their farms as a way of restricting the movements of people and at the same time preventing outbursts of fires (Nyamadzawo, 2013). According to Mudekwe (2007), the systems regarding fire management in Zimbabwe were borrowed from the colonial regime that ensured the suppression, detection and quick responses to fires. However, with the onset of the LRP of 2000, the system was done away with due to the realisation that it was not easy to prevent fires but rather it was efficient to formulate mitigating measures that are more sustainable to fire management (Nyamadzawo, 2013).

***Post-colonial Institutions for Environmental Management: Change with Continuity?***

The transition from the colonial to the post-colonial period brought with it some changes in the management of natural resources. Mapedza (2007) highlights that the colonial regulations and policies regarding environmental protection were harsh, inhuman and exclusionary to the indigenous people. The attainment of independence would have brought in some changes that would enable community participation in decision-making. However, Mapedza (2007) denotes that the institutions have remained insensitive and rather a continuity of the colonial regime as local people are regarded as exploiters. Of some important regulation, The Parks and Wildlife Act of 1996 embodies some regulations regarding fire management before the beginning of its season that includes the placement of boundaries or fireguards. Mudekwe (2007) also highlights the contribution of the Forestry Act (1996) that shunned smoking in any forestry.

Some of the statutes that regulate wildfires, as highlighted earlier, include the Environmental Management Act (Chapter 20:27) together with theThe rural district councils through the Rural District Councils Act (Chapter 29:13) are also empowered to enact regulations that control fires and bylaws that enable the management of natural resources (Dube, 2015).

Amongst the provisions for environmental management, the environmental management agency (EMA) stands constitutionally (Mangena, 2014). The EMA is a board created by the government to facilitate the implementation of the environmental act (Environmental Management Act of 2000). The efforts by EMA to manage the environment are backed by the Act. The agency plays a crucial role in controlling human behaviour in the management of the environment through penalties for failure to comply and educational campaigns for human cooperation in management. The EMA was known as 'the Department of Natural Resources' (Mangena, 2014). The agency plays various roles, such as taking audits on the environment, carrying out environmental impact assessments and approving when carried out by third parties (Mukwindidza, 2008). This is crucial in protecting environmentally sensitive areas especially from destructive human developments on ecology. However, Mangena (2014) argues that most of the measures by the agency and the government to protect the environment are not considerate of non-human species and thus making it difficult to achieve a comprehensive and sustainable environment.

Richardson, Mgheoji and Botchway (2006) refer to the dearth of environmental law in most of the developing countries, Zimbabwe included. For Zimbabwe, it was a continuity of laws that were already in existence before independence. Various statutes were already in existence to fight against veld fires in the country. Nyamadzawo (2007) highlights that statutes, such as the Parks and Wildlife Act (Chapter 19:05) of 1996 and the Forest Act (Chapter 19:05) of 1996 were enacted to wedge against unprecedented fires. EMA (2007) highlights that various legislative and statutory mechanisms are put in place by the government of Zimbabwe to hedge against wildfires. The SI 7 0f 2007 requires that all landowners should ensure that they have preventative mechanisms of fire and to act in the suppression of fire in case of conflagrations. The instrument further apprehends that no one is permitted to set fire between July and October every year as it is the country's fire season.

Another important institution is Agritex that is a board focusing on agricultural practices that are climate-smart agriculture that do not worsen environmental degradation (Marambanyika, Mutsiwegota and Muringaneze, 2012). The department was officially initiated in 1980 as the Agricultural, Technical and Extension Services department (Hagmann, Murwira and Connolly, 2000). The department also offers training to farmers together with research on effective agricultural practices (Agritex (1994). However, Hagmann, Murwira and Connolly, (2000) argues that the board is not fully capacitated to assist all farmers as most farmers rely mainly on non-governmental organisations. The department's role in environmental protection through farm work is relevant but is affected dearly by financial challenges and the lack of full governmental support. Apart from influencing technology to farmers (Hagmann, Murwira and Connolly, 2000), there is not much that the department has done towards environmental protection and particularly the management of wildfires.

Also, the Zimbabwe Parks and Wildlife Management Authority (Zimparks), is a board that focuses on the management of wildlife in national parks. It was in existence even before the attainment of independence by the country with its controlling powers driven by the Parks and Wildlife Act of 1975. The agency has made efforts to engage with the communities in the management of wildlife resources. One of the most popular programmes that the agency uses is the CAMPFIRE that has proven to be a relevant conservation means. The success of such a program is due to the acknowledgement of the community efforts in environmental preservation by giving them access to incentives and community benefits (Zimparks, 2020). According to Frost and Bond (2007), the use of incentives in the management and protection of natural resources is proven to be a successful measure that brings cooperation with the local communities. With the continued deterioration of the environment and natural resources through human activities, Zimparks becomes a relevant department that should play a crucial role in enabling resources management.

***Wildlife Zoning in Zimbabwe***

The zoning concept brings in solutions to reduce conservation and development conflicts while maintaining culture (Rotich, 2012). Zoning protects vulnerable areas that need to be protected and the concept is advocated for by many organisations. It promotes sustainable utilisation of natural resources through discouraging some uses and developments that harm the environment (Eagles *et al*. 2002). Zoning is a very important tool that can be utilised to successfully monitor,

control and manage wildlife zones as highlighted by Rotich (2012). Zoning in Zimbabwe has yielded positive results towards both the protection of the natural resources and community benefits. Mashuku and Ngwenya (2014) denote that as part of zoning practices in the country, people were relocated from sensitive areas to more humane conditions that were conducive for human habitation. The communities that were resettled in a bid to protect wildlife became the custodians of conservation benefits that today is termed, CAMPFIRE.

The redistribution of land from white commercial farmers has had an impact on the management of wildlife in Zimbabwe. According to Mashuku and Ngwenya (2014), the fast-track land resettlement programme did not only focus on the farming areas but also included the resettlement of people from wildlife dominated areas. The motive that was behind the resettlement program was to enhance the food security of communities initially. Positively, this also contributed to the protection of wildlife and natural resources. The move towards land resettlement also resulted in CAMPFIRE villages that were capacitated with ownership and conservation of wildlife zones as highlighted by Bong (1999). According Murphree (2011), this promoted good conservation practices as the CAMPFIRE beneficiaries benefited from accessing grazing land and wildlife as a community resource. The fast-track land resettlement program contributed to wildlife conservation through resettling some locals from environmentally sensitive areas, such as regions 4 and 5 as there were conflicts from human and wildlife interaction.

The most urgent development need in Zimbabwe is the inclusion of climate change in zoning, planning and decision-making to create climate-resilient developments. Jiang *et al*. (2017) assert that sustainable development measures that promote the protection of biodiversity and natural resources are of urgent need. A delay in meeting these challenges will lead to a complex scenario where it is going to be difficult for policy-makers to overhaul both climate change, wildfires and the ever-increasing population that is already becoming a developmental issue (Abunnarsr, 2013). UNHABITAT (2016) emphasises on making climate a developmental issue as with its neglect, humanity is affected. Therefore, it is important for humanity to work towards resilient management and protection of wildlife. Zimbabwe makes use of the "National Climate Policy of 2017' that promotes evidenced-based methods and strategies for climate change mitigation (Government of Zimbabwe, 2020). Climate change is a policy issue that

needs a collaborative and integrative approach that involves all stakeholders in management and this requires good governance (Milan, 2016).

***Case Study:*** **Monitoring, Control and Management of Wildlife Fires under a Changing Climate in Zimbabwe**

The successful management of wildlife in communal areas depends highly upon the cooperation of the farmers with the policy-makers. Mhuriro, Mashapa and Mwakiwa (2017) highlight the existing conflicts between the communal farmers and the adjacent wildlife zones. According to Gandiwa *et al*. (2013), such conflicts have made it difficult to enhance the success of the CAMPFIRE programmes. Therefore, to maintain what already existed, there is need to ensure that the arising conflicts are addressed. Kahuni *et al*. (2014) highlight that most of the protected wild animals have become a danger to adjacent communities as they sometimes kill people and domesticated animals which affects the livelihoods of people. Gandiwa *et al*. (2013) provide workable examples of making habitat conservation successful through community engagement to include the exploration of other revenue generation and remuneration methods. This is because the revenue generated from the ordinary methods is not enough to be distributed to all community individuals. Therefore, to progress in wildlife management in most communal areas, it is important to ensure adequate community benefits and safety as a way of motivation.

Resettlement farms were a result of the government's efforts to achieve equity in the distribution of land to local people (Njaya and Mazuru, 2014). The redistribution of land was in such a way that local people would get about three lots (one for residential, one for grazing and the other for farm activities). The environment was impacted negatively as the vegetal cover was lowered as people cleared land for settlement and farming. Njaya and Mazuru (2014) postulate that the effects on the environment were also felt even in commercial farmlands as woodlands reduced. UNDP (2002) states that approximately woody vegetal cover lowered by 1.4% with cultivation land expanding by approximately 2%. Capacity utilisation for the management of natural resources for local farmers both in commercial and resettlement areas needs to be enhanced to successfully achieve environmental justice and protect natural resources. The white settlers, although they alienated black people, protected jealously their farmlands, natural resources and wildlife that the indigenous farmers today are very far from achieving. The present efforts are biased towards the suppression of fires and not more on the effective monitoring, management and control that saves to fight against even future

conflagratons. It is imperative therefore that comprehensive approaches be adopted to effectively fight wildfires and minimise impacts in the prevailing climate change.

## Discussion

Generally, and progressively from the colonial to the present day, there is a deterioration in the application of local environmental management systems and a lack of better alternative methods to cover up (Njaya and Mazuru, 2014). The progression from the old times has seen the loss of many vital practices and systems that are of more help today as climate change is worsening environmental deterioration. Table P.9 summarises the NRM from the pre-colonial to the present day in Zimbabwe and the continuity and changes in NRM.

**Table P.9: NRM Comparison in Phases (Chigwenya and Manatsa, 2007)**

| Pre-Colonial NRM | Colonial NRM | Post-Colonial NRM |
|---|---|---|
| • Institutions consisted of the Traditional Chiefs<br>• Environmental Stewardship ethic was well imbedded (sacred reverence and holistic NRM)<br>• Taboos and beliefs formed the customary laws<br>• Informal, traditional institutions and religious societies ensured full compliance<br>• Cutting down of trees was prohibited with only dry wood allowed for collection<br>• Strict protection of socially and religiously sacred areas eg forests,<br>• However: There was no<br>• Exclusive communal use of resources | • The Natural Resources Commission of 1938 controlled NRM<br>• The Natural Resources Act of 1941 (coercive NRM with strict monitoring of natural resources)<br>• The Land Husbandry Act of 1951 (arresting ecological deterioration, use of fireguards and fencing for fire protection)<br>• 1896 Game Law promulgation (wildlife utilisation regulation)<br>• 1929 Game and fish Act promulgation (led to the formation of the Matopo Reserve). However, it was top down-command-control NRM system,<br>• No commonly shared, no participation.<br>• Government local conflicts | • Inheritance of former instutions with no significant changes.<br>• The land reform program led to the loss of many practices<br>• SI 7 0f 2007 (all landowners to have fire preventative and suppression mechanisms of conflagrations.<br>• EMA Board, penalties for failureto comply and educational campaigns for human cooperation in management.<br>• Agritex (climate-smart agricultural practices)<br>• The Zimbabwe Parks and Wildlife Management Authority (Zimparks), |

| | | |
|---|---|---|
| • Environmental challenges were not rampant that era. | | (management of wildlife in national parks).<br>• National Climate Policy of 2017 that promotes evidenced-based methods and strategies for climate change mitigation.<br>• CAMPFIRE community-based management of natural resources).<br>• However: Land resettlement worsened environmental degradation and natural resources depletion. |

Chigwenya and Manatsa (2007) highlights that in all phases, there is a failure to create institutions with a specific mandate to fight aginst wildfires and climate change. Government and NRM systems have changed from one to another, but little has changed regarding the management of natural resources but rather a downward spiral. There is a relaxation in the management of natural resources in the modern times as compared to the colonial times and this has cost the nation of vital natural resources thus placing it on a more vulnerable state against the continual climate change impact. It is as though the coming in of any government system brings its own NRM methods that are divergent of those that are used from the past. This disintegration and lack of continuity has led to environmental degradation. The modern regime has to appreciate the indigenous efforts that were used in climate change and NRM. In as much as the colonial regime may be 'hated' by state to some extent, it is still mandatory that such differences be put aside and borrow the efficient practices that kept the natural resources intact. This has become a crucial matter in the modern times where climate change has taken its toll. Change with continuity is imminent for sustainability.

The transition from the colonial to the post-colonial period brought with it some changes in the management of natural resources. Despite the harsh and exclusionary colonial rules on

environmental management the white settlers appreciated well the importance of protecting natural resources and wildlife (Mapedza, 2007). However, the exclusionary policies that did not promote community participation in decision-making were carried on after independence and this left behind the sense of responsibility towards the environment that the settlers had (Njaya and Mazuru, 2014). Mapedza (2007) contends that the institutions have remained insensitive and rather a continuity of the colonial regime as local people are regarded as exploiters. Literature has it that most culprits in destroying the environment (Mkwananzi, 2007), apart from the climate change impact, are human beings. Without much education and emphasized responsibility, sooner than later, the planet would have lost its life.

Therefore, to successfully manage, control and monitor wildfires, there has to be a comprehensive and integrative approach that places the key players, such as the community as a few cases result from natural causes (Nkomo and Sassi, 2009). This is a real issue that needs proper strategic frameworks to deal with the enormous impact of wildfires both globally, regionally and locally if sustainability is to be achieved. The experience of destructive wildfires is a global issue that has affected many countries be it the developing or the developed countries with anthropogenic land-use activities and "natural disturbances" being at the forefront of the causes (Nyongesa and Vacik, 2018). According to Dube (2015), the involvement of all stakeholders is relevant in fighting against the destructive nature of fires.

**Conclusion**

The battle against climate change and wildlife fires does exist and needs immediate attention. The pre-colonial and the colonial regime had the environment at heart with strongly embedded culture sensitive environmental efforts to protect the natural environment. Even though pre-colonial policies were exclusionary, they managed to protect the natural resources that most indigenous people have failed to carry on even after being granted the power, independence and land. The government that took place after independence took a biased stance that was leaning on equity in the distribution of resources and neglecting the importance of environmental protection. With the passing of generations and with those who used to hold the environmental protection principles passing away, most of the environmental principles were lost along the way. Indigenous principles need therefore to be traced back and combined together with the modern environmental management principles A reactive approach in mitigating wildfire is the commonly used way. However, with climate change in the picture,

more pro-active monitoring, management and control measures ought to be implemented. As most of the fire and environmental management practices were lost along the way from the pre-colonial era, much work is now necessary to re-invent the ethic towards sustainable environmental management. Of late, the modern communities have lost the practices and they are only aware of fire suppression without futuristic mitigating and monitoring plans. Climate change is there to stay and humanity needs not to worsen the challenges by failing to manage the environment and inadvertently; they participate to the destruction of natural resources.

**Recommendations**

- There is a need for community awareness to enforce environmental stewardship ethics for collaborative natural resources management.
- Community engagement and participation in wildlife and environmental management is imperative so that it becomes easier to even resuscitate the indigenous environmental management practices that were in place before.
- The chapter recommends the revisit of the former environmental management practices to appreciate how the environment was maintained, how fires were fought, monitored and controlled. This would inform the present and help in planning for the future.
- Conflict management between stakeholders is to be improved to enhance community participation in protecting common pool resources
- There is need to form solid institutions whose mandate is specifically to manage, control and monitor wildfires.
- The problem of wildfires is to be made a policy issue that has to be worked on in just the same urgent manner as with other policy issues, such as housing challenges that are given high priority
- A revisit of ancient environmental ethics and practices is relevant and their application in the modern era to overcome the intensifying wildfires and climate change impact.

**References**

Abunnasr, Y. F. (2013). Climate change adaptation: A green infrastructure planning framework for resilient urban regions. University of Massachusetts. Open access dissertations. 725. https://doi.org/10.7275/yg71-qy42,

Acquah, E. (2017). The Socio-Cultural Impact of Ecotourism on Park-Adjacent Communities in Ghana. Afr. J. Hosp. Tour. Leis, 6, 1–14.

Amenta, E and Ramsey, KM. (2009). Institutional Theory. Springer. California. In: Handbook of Politics: State And Society In Global Perspective.

Arakawa, S., Sachdeva, S and Sandas, V. (2018). Environmental Stewardship. In: The Handbook: The Engaged Sustainability: Pathways to Community Cohesion and Cultivating Meaningful Engagement. Springer.

Baker, D. (2014). Environmental Stewardship in New York City Parks and Natural Areas: Assessing Barriers, Creating Opportunities and Proposing A New Way Forward. Phd Dissertation, Yale School of Forestry and Environmental Studies.

Berry, R. J. (2006). Environmental Stewardship: Critical Perspectives, Past and Present. T&T Clark, London.

Bond, I. (1999). CAMPFIRE As a Vehiclw for Sustainable Rural Development in the Semi-Arid Communal Lands of Zimbabwe: Incentives for Instituional Change. DPhil Thesis, Department of Agricultural Economics and Extension. UZ Publishing, Harare.

Clover, J and Eriksen, S. (2009). 'The Effects of Land Tenure Change on Sustainability: Human Security and Environmental Change in Southern African Savannahs', Environmental Science and Policy 12, 53–70.

Chinamatira, L., Mtetwa, S and Nyamadzawo, G. (2016). Causes of Wildland Fires, Associated Socio-Economic Impacts and Challenges with Policing, In Chakari Resettlement Are, Kadoma, Zimbabwe. Fire Science Review 5(1), 1-14.

Choe, H and Yun, S. (2017). Revisiting the Concept of Common-Pool Resources: Beyond Ostrom. Development and Society 46(1), P113-129.

Corona, P. et al. (2015). Integrated Forest management to Prevent Wildfire under Mediterranean Environments. Annals of Socio-Cultural Research. Review Paper 39 (1), 1-22.

Dube, E. (2015). Environmental Challenges Posed by Veld Fires in Fragile Regions: The Case of the Bulilima And Mangwe Districts in Southern Zimbabwe. MSU, Gweru.

Dube, O.P. (2009). Linking Fire and Climate: Interactions with Land Use, Vegetation and Soil. Curr. Opin. Environ. Sustain. 1, 161–169.

Dube, O.P. (2013). Challenges of Wildland Firre Management in Botswana: Towards a Community Inclusive Fire Management Approach. Journal of Weather and Climate Extremes 1, 26-41, Elsevier.

EEA, 2012. Urban adaptation to climate change in Europe: challenges and opportunities for cities together with supportive national and European policies (No.2). European Environment Agency.

Eagles, P.F.J. (2002). Sustainable Tourism in Protected Areas. Guidelines for Planning and Management. IUCN Gland.

Environmental Management Agency (EMA), (2011), Are Veld Fires A Threat to The Environment. Http://Www.Ema.Co.Zw/Index.Php/Ema-Newspaper-Articles/116-Veld-Fires.

FAO. (2006). Breed Diversity in Dryland Ecosystems. Information Document 9, Fourth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture. Rome, 13p.

FAO. (2011). Adapting to Climate Change: The Ecosystem Approach to Fisheries and Acquaculture in the Near East and North Africa Region. FAO Fisheries and Acquaculture Circular No. 1066, Rome. Available at (http://www.fao.org/docrep/014/i2146e00.html).

FAO. (2012). Forests, Trees and People Together in a Living Landscape: A Key Rural Development Committee on Forestry Paper COFO/2012/6.2. Available at (http://www.fao.org/docrep/meeting/026/me435e.pdf).

Flannigan MD. et al. (2005). Future Area Burned in Canada. Climatic Change 72, 1–16. Doi:10.1007/S10584-005-5935-Y.

Flannigan, MD. et al. (2009). The Implication of The Changing Climate for Global Wildland Fire. CSIRO Publishing. International Journal of Wildland Fire, 18, 483-507.

Frost, P and Bond, I. (2007). The CAMPFIRE Programme in Zimbabwe: Payments for Wildlife Services. Ecological Economics 65(4), 776-787.

Gandiwa, L. et al. (2013). CAMPFIRE and Human-Wildlife comflicts in Local Communities Bordering Northern Gonarezhou National Park, Zimbabwe. Ecology and Society, 18(4).

Government of Kenya. (2018). Mt Kenya Ecosystem Management Plan 2010–2020. Www.Kws.Go.Ke/Sites/Default/Files/Parksresorces%3A/Mt.%20Kenya%20Ecosystem%20Management%20Plan%20%282010-2020%29.Pdf

Government of Zimbabwe (2020). Background Report on National Policy Priorities, Initiatives and Institutions Relevant for Climate Change Capacity Development in Zimbabwe. Government of Zimbabwe, Harare.

Hagmann, J., Murwira, C and Connolly. (2000). Learning Together For Participatory Extension: A Grind Ytoo An Approach Developed In Zimbabwe. AGRITEX, Harare.

Halofsky, J. E., Peterson And Harvey, B. I. (2020). Changing Wildlife, Changing Forests: The Effects Of Climate Change On Fire Regimes And Vegetation In The Pacific Northwest, USA. Association Fire Ecology Review.

Harris, P and Hazen, HD. (2006). Power Of Maps: Centre Mapping For Conservation. ACME: E-Journal Of Critical Geographies 4(1), 99-130.

International Bank For Reconstruction (IBR)/The World Bank (2018). Strengthening Forest Fire Management In India. Joint Report By IBR and World Bank, Washington DC.

Jiang, Y. et.al. (2017). a Review of urban planning research for climate change. MDPI Article.

Kahuni, T., Zisadza-Gandiwa, P., Mhlanga, W., Libombo, E., Mashapa, C., Muboko, N. and Gandiwa, E. (2014). In: Mararike, C.G. (eds). Land: An Empowerment Asset for Africa: The Human Factor Perspective. UZ Publishing, pp278-287, Harare.

Kaesin, E., Redmond And Dudley, N. (2012). Wildlife in a Changing Climate. FAO Forestry Paper 16.

Karatas, A. (2014). Environmental Ethics Education as a Tool for the Prevention of Environmental Problems in the Community. European Journal of Sustainable Development 3(4). Research Gate Publication.

Krawchuk M.A. et al. (2009) Global Pyro Geography: Macro-Scaled Statistical Models for Understanding the Current And Future Distribution Of Fire. Plos ONE 4, E5102.

Luce, C. (2012). Climate Change, Forests, Fire, Water and Fish: Building Resilient Landscapes, Streams and Managers. Gen. Tech. Rep. RMRS-GTR-290. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 207 P.

Manatsa, D and Chigwenya, A. (2007). The History of Natural Resource Management in Zimbabwe: A Chronicle of How Sustainable Resource management has remained an Elusive Concept. Journal of Sustainable Development in Africa. 9( 2).

Mangena, F. (2014). Environmental Policy, management and Ethics in Zimbabwe, 2000-2008(1). The Journal of Pan-African Studies, 6(10).

Mapedza, E. (2007). Forestry Policy In Colonial And Post-Colonial Zimbabwe: Continuity With Change. Journal Of History Geography 33(4), 833-35.

Mushuku, A. and Ngwenya, T. A. (2014). Wildlife based Land Reform and its Impact on Household Food Security-A Case from Zimbabwe. *Journal of Rural Development*, *33*(4), 417-436.

Mkhwananzi, H. (2007). Veld Fire Campaign in Lupane. Environment Africa, Lupane.

Makwindidza, E. (2008). The Implementation of Environmental in Mutasa District of Zimbabwe. Unpublished MSc of Public Administration Degree. Pretoria: University of South Africa.

Marambanyika, T., Mutsiwegota, C and Maringawa, KCR. (2012). Importance of Community Participation in Sustainable Utilisation of Wetlands: Case of Chebvute In Zvishavane District, Zimbabwe. Journal of Environmental Science and Engineering 13(1), 832-844.

Mhuriro, P., Mashapa, C and Mwakiwa, E. (2017). Determinants of Communal Farmers' Willingness to Pay for Human-Wildlife Conflict Management in the Periphery of Save-Valley Conservancy, Southeastern Zimbabwe. Journal of Animal and Plant Sciences 27 (5), 1678-1688.

Milan, B.F. 2016. Water security in an urbanized world: an equity perspective. Habitat International, Technische Universität Berlin. http://dx.doi.org/10.14279/depositonce-5767.

Mouillot F and Field CB. (2005). Fire History and The Global Carbon Budget: A 1◦× 1◦ Fire History Reconstruction for the 20th Century. Global Change Biology 11, 398–420.Doi:10.1111/J.1365-2486.2005. 00920.X

Mudekwe, J. (2007), Management Practices For The Protection Of Forest Reserves: The Case Of Kalahari Sand Teak Forest Reserves In Western Zimbabwe. FAO, Rome.

Murphree, M. (2011). Environmental Management, African Centre for Disaster Studies, North-West University, Potchefstroom.

Mushuku, A and Ngwenya, TA. (2014). Wildlife Based Land Reform and Its Impact on Household Food Security. A Case from Zimbabwe.

Mutimukuru-Maravanyika, T. (2010). Can We Learn Our Way to Sustainable Management Adaptive Collaborative Management in Mafungautsi State Forest, Zimbabwe? Thesis Wageningen University, Wageningen.

Nickerson, B.J. (1994). The Environmental Laws of Zimbabwe: A Unique Approach to the Management of the Environment. B. C. 3rd World Law Journal, 14(2).

Njaya, T and Mazuru, N. (2014). Emerging New Farming Practices and Their Impact onThe Management of Woodlands in A1 Resettlement Areas of Mashonaland Central Province in Zimbabwe. *Asian Developing Policy Review*, 2(1), 1-19.

Nkomo, G.V and Sassi, M. (2009). 'Impact of Veld Fires on Land on Smallholder Farmers in Cashel Valley in Zimbabwe'. NAF International Working Paper Series No. 02/2009, International Research Network,

Nyamadzawo, G. (2013). “Understanding the Causes, Socioeconomic and Environmental Impact and Management of Veld Fires in Tropical Zimbabwe”. Fire Science Reviews 2, 1: 1-13

Nyongesa, K.W. (2015). Fire Management If Forests and National Parks of Kenya: Case Studies at Kakamega

Nyongesa, K. W and Vacik, H. (2018). Fire Management in Mt Kenya: A Case Study of Gathiuru Forest Station. MDPI Article.

Ogato, G.S. (2014). Planning for Sustainable Tourism: Challenges and Opportunities for Ecotourism Development in Addis Ababa, Ethiopia. Am. J. Hum. Ecol. 2014, 3, 20–26.

Omoogun, A., Onnoghen, UN and Egbonyi, EE. (2016). From Environmental Awareness to Environmental Responsibility” Towards A Stewardship Demarcation. Journal of Educational Issues Vol 2(2), 1-15.

Parks and Wildlife Act Chapter 20:14 (1996) The Parks and Wildlife Act Chapter 20:14. Government Printers, Harare, Available From: [Http://Www.Environmental-Auditing.Org/Portals/0/Auditfiles/Zweng02ar_Sm_Wildlife.Pdf].

Romolini, M., Brinkley, K and Wolf, L. W. (2012. What Is Urban Environmental Stewardship? Constructing a Practitioner-Derived Framework. USDA Forest Service Reserch note PNW-RN. Research Gate Publlication.

Requier-Desjardins, D. (2004). Produced Common Pool Resources, Collective Action and Sustainable Local Development: The Case of Food Processing Clusters. Research Gate

Richardson, BJ., Mgheoji, I and Botchway, F. (2006). Environmental Law in Post-Colonial Societies: Aspirations, Achievements and Limitations. Research Gate.

Rotich, D. (2002). Concept of Zoning Management in Protected Areas. Journal of Environmental and Earth Science, Vol 2(2).

Secretariat of the Convention on Biological Diversity (2001). Impacts of the Human-Caused Fires on Biodiversity and Ecosystem Functioning and Their Causes in Tropical Temperate and Boreal Forest Biomes, Montreal, SCBD, 42p, SCBD Technical Series No. 5.

Schimidt, V. (2014). Institutionalism. In Book: The Encyclopaedia of Political Thought.

Stocking, M. A. (1978). Relationship of Agricultural History and Settlement to Severe soil in Rhodesia. Zambezia 6(2), 129-145.

UNHABITAT (2016). Addressing climate change in National urban policy: A Policy guide for low carbon and climate resilient urban development. Cities and climate change initiative policy note, Nairobi.

United Nations Development Programme, UNDP (2002). Evolving Institutional Framework for Community-Based Natural Resource Management in Mozambique: A Case Study from Choa Highlands. African Studies Quarterly, 5(3). UNDP Interim Mission Report. UNDP, Harare.

UNISDR. (2012). How to make cities more resilient: A handbook for local government leaders. A contribution to the global campaign 2010-2015 "Making cities resilient – my city is getting ready!" United Nations, Geneva.

Westerling AL And Bryant BP. (2008). Climate Change and Wildfire in California. Climatic Change 87, 231–249. Doi:10.1007/S10584-007-9363-Z

Worrell, R and Appleby, M. C. (2000). Stewardship of Natural Resources: Definition, Ethical and Practical Aspects. Journal of Agricultural and Environmental Ethics 12(3), 263-277.

## C.2. Section Summary

The foregoing section is the collection of papers informing this 'thesis by publication. Its thrust has been to provide evidence for scholarship. The next section will provide the synthesis and conclusion reached. It also provides the contribution in terms of plugging the knowledge and practice gaps while suggesting further interventions.

# SECTION D: STUDY SYNTHESIS, CONCLUSION AND OPTIONS

# CHAPTER 4: CONCLUSION

## 4.1 Introduction

The study sought to explore the issue of resilience and experiences in some carefully selected rural case studies in Zimbabwe. It sought to map environmentally-induced disasters particularly, how they affect rural human habitats under the impact of climate change. Using global, regional case studies and Zimbabwe (and its selected rural districts as case studies), the specific objectives of the study were:

1) To map environmentally-induced disasters or simply disasters as they affect rural human settlements and habitats under the impact of climate change
2) To explore resilience as a theoretical and practical aspect for rural human settlements planning and management.
3) To examine the institutional, policy and statutory and infrastructure frameworks for rural settlement planning and maintenance across international and local regions
4) To suggest options for resilient and sustainable rural settlement's and habitat's production and management in Zimbabwe.

## 4.2 Study Summary, Sythesis and Focus Revisited

The subject of resilience is explored in its theoretical and practical sense as a means to establish a basis for the planning of human settlements and their management. Institutional, policy, statutory and infrastructure frameworks that guide rural settlement planning and management across the globe are explored in-depth. Lastly, the study sought to suggest practical and workable solutions that can enhance the resilience and sustainability of rural settlements and their management in Zimbabwe.

The writing of this thesis, and the research that informs it, was triggered largely by questions that I had about the impact being exerted by environmental disasters on rural settlements in Zimbabwe and that can also be easily inferred regionally and globally. The departure point was the seeming neglect of the rural narrative in seeking to hedge against the battering of rural dwellings and infrastructure in the wake of increased cyclones induced by global environmental changes.

As someone who grew up in a rural setting, I can speak comfortably on the dichotomous relationship of what can be called the 'rural advantage' and the 'rural disadvantage'. These issues evoke ideas of human rights and justice as equity becomes central in the discussion of both (Chimhowu and Woodhouse, 2008). Hodge *et al*. (2000: 1869) interrogate indicators as a reference point to the measure of the level of advantage or disadvantage of rurality, including such aspects as access "…to employment, service provision, and access to housing". In their study, Hodge *et al*. (2000) identify a mix of the qualitative and quantitative indicators of access to employment, quality of employment, level of income, housing accessibility, housing quality and access to services in defining the rural disadvantage. Tickamyer and Duncan (1990: 80) have observed how, like poor urban communities,

> "…poor rural areas lack stable employment, opportunities for mobility, diversity of social structure, and investment in community. Instead, these poor communities are becoming more isolated economically and socially."

In a neoliberal global context, Cervone (2017) observes how the rural continues to be a place of extraction of raw materials and of low wages, descriptors that leave the same place as a depressed region. However, the same space is becoming gendered, with countries, like Ethiopia having new laws that advance the rights of women (Tura, 2014). Chankseliani *et al*. (2020: 1006) have taken university admissions as a measure of rural disadvantage and they conclude that the relatively low-quality and under-resourced schools in the rural areas have limited the choice and availability of schools in the areas. The availability of private tutors is also limited, and this is one of the reasons why the quality of education in between rural and urban areas is different with the former having lower quality scores.

Most rural areas typify what Parr (1966) described as "depressed areas". To him, depressed areas typify the regions that have persistent unemployment and, in some cases, underemployment. This is typical of most rural areas. These are commonly characterised by dilapidated infrastructure, a limited variety of economic activities, unskilled labour and declining industrial activities. The description and cause of depressed regionalism is summed up by Maidanevych *et al*. (2018: 484) who argue that depressed regions tend to become problematic as they cannot, without external support, be able to stand and function independently. The driving external support includes state intervention especially in

development matters as leaving these regions to stand alone compromises their capacity to be resilient.

It was Henri Lefebvre who spoke of the 'right to the city', a concept popularised by David Harvey and others. In recent times, the 'right to the rural' is emerging as critical. Critics such as Fautras (2015) question whether it should be right to the rural or right for the rural. Cervone (2018) satirises the right to the rural as

> "a vague term based off of another vague term, Lefebvre's (1991) right to the city, which is not a particular way of being, but is a call to constantly define and redefine what rural is and what rural will be according to the terms of the people living there."

With respect to rural China, Sun and Wu (2012: 1) observes how "…the transfer system of use right to housing land are imperfect and impractical." Regarding tourism events in New South Wales, Australia, some urban dwellers are seen to be choosing to conduct such in the rural spaces. This is leading to high mobility and migration and thus influencing the change of lifestyles and amenities in many rural regions. This has brought forth diversity in their way of life (Mair and Duffy, 2021). The observations by Mair and Duffy (2021) converge to other rural landscapes in many other regions across the globe.

One major threat to rurality is "speculative urbanisation" that then deprive ruralites of their usual resource endowments. For Shin (2014: 511-12), speculative urbanisation in the context of China is about "[land] accumulation that is centred on the commingling of the labour-intensive industrial production with heavy investment in the built environment (e.g., high-speed rail networks, airports and metro construction and commercial real estate projects)." In the articles, I presented, on both Gokwe and Mbire, I note strongly of these tendencies that put the rural dweller to be, most of the times, on the edge. The bourgeois accumulation of rural land is speaking of a new form of land grabbing as rural business centres and growth points etch into rural land. The bulk of those pushed out from these areas have never known any other place as their home. Their ancestral graves are the 'title deeds' that make them lay claim to the ancestral land they are being pushed out of. Rural landscapes often are forest-dependent (Stedman *et al*. 2005). In the Mbire case, wildlife also seems to lay claim on the wildlife areas that humans are pushing into, to build their homes and engage in cultivation. In the process of the 'human push' forests are destroyed, riverine resources are compromised and biodiversity

that is be a major hedge against the vagaries of natural-induced disasters are disturbed. This corroborates with observations also made by Chapman and Reich (2007) with respect to bird community diversity in suburban, rural and reserve landscapes of Minnesota, USA.

Today's rural settlement patterns in Africa, have largely been influenced by colonial and post-colonial diktats (Moyo, 2011). Regarding Alvordism in Southern Rhodesia, Passmore (1971) explains that the system of centralisation was brought forth by Alvord together with his workers as a way to enhance productivity by preventing erosion and doing away with the tribesmens' shifting cultivation that did not bring stability. This was replaced with the introduction of clustered homesteads in village-lines. Grazing land was divided amongst the households and arable farm land. As of 1949, at least 9 million acres of land had gone through the centralisation process. This saw about 104 000 homes built of bricks that replaced the pole and dagga units. About 40% of the population in rural areas were affected with this process. It saw an improvement in cultivation standards and increasing yields.

Linear settlement patterns and nucleated patterns are common across Africa (Weigend, 1985). In Zimbabwe, rural nucleated settlement patterns were common in formally white farming and mining areas, where a farm or mine compound was a self-contained entity that allowed for residential, educational, commercial and recreational functions within a confined space (Zinyama, 1998; Goebel, 2003; Chimhowu and Woodhouse, 2008; Moyo, 2011). Production areas were located outwards. Moore (1999: 675) has concluded that, the spatial administrative system in Zimbabwe, of controlling local populations is key in maintaining the legacies and sedimented effects of colonial rule. All the existing struggles taking place regarding the spatial practices in regards to geographical location of reserves, agricultural practices, migration and the siting of fields is a glimpse of the colonial history.

Vulnerability and disaster resilience are closely linked. In most cases, the manner in which households and communities do access, control, utilise or own resources accentuates whether or not they are vulnerable. For Zimbabwe most of the rural challenges have been associated with land alienation. This put communities in tribal trust lands (now communal lands) into consistent marginality. Droughts, floods and related risks always put these communities to increased vulnerability. Efforts to reform land since 1980 are a clear testimony to the dire need to redress challenges entrenched by the colonial system. Indeed, Goebel (2003) submits a

description of the land organisation in rural Zimbabwe stating that, at the attainment of independence in 1980, the government of Zimbabwe began the resettlement programme that was targeted towards redressing the racial imbalances that existed in the distribution of land during the colonial era. The commercial farms were divided to accommodate small scale farming for household families. These family resettlement areas were organised in an orderly manner that included the nucleated villages with arable farmland located within. Grazing land and woodlands were considered as common property for the communities and were thus located within the bounds of each community. The ultimate ownership of land is held by the state. However, for resettlement farmers, usufruct rights were given and permits to arable farms and grazing land.

Land organisation at community level, in the rural areas, speaks to the manner in which land is used and the services (like security or environmental health) that come by it (Koczberski *et al*. 2009; Mutopo, 2014; Oberlack *et al*. 2016). For example, Lucas (1985: 359-360) observes that the majority of Botswana's population resides in nuclear villages. Some of the rural villages even exceed the ordinary town's population with the social structure, available facilities and economic activities being the only distinguishing factors. Large villages are normally the royal territories that belong to influential, royal tribal groups. These are surrounded by smaller villages to form a stylised spatial pattern around the royal village. From the nucleated village, there are scattered grazing and farming fields which are separated from the typical village by at least a day's walk away. Cattle posts that contain larger herds are located a distant from the villages in the sandveldt portion and these are referred to as the village catchment area.

Land organisation in rural communities is linked to the way livelihoods are organised. Some are derived from rivers (like fishing), others from mountains and forests (like hunting and gathering). Yet, others have become 'modernised'. Whether traditional or modern, access to and from the livelihoods sources is very important. As such, the subject of transport and mobility comes in handy and instrumental to the debate of why investment in transport (the way and terminals) infrastructure is critical. Linked to that becomes the concern of the rolling stock that must use these (Dawson and Barwell, 1993; Lebo and Schelling, 2001; Manyanhaire *et al*. 2011; Banjo *et al*. 2012). In most rural communities, intermediate transport systems play a very important role (Mutopo, 2014).

Investment in transport and built infrastructure in the rural environments leaves a lot to be desired in Zimbabwe and the major parts of the global South (Dawson and Barwell, 1993; Lebo and Schelling, 2001; Manyanhaire *et al*. 2011; Banjo *et al*. 2012). The vulnerability of populations in the rural environments in these landscapes has grown with the increase in extreme weather events like cyclones. After such extreme events, most areas are left impassable and difficult to access. The question then becomes: Who should invest what, where and when? The question of "who", in the case, is about the stakeholders. The question about investing in what, is about the substance of the investment. The question about where, is on the location aspect. The question about when speaks to the timing of investment with specific reference to time horizons – immediate, short-term, medium-term and long-term. In light of strategising to remove depressed regionalism, Maidanevych *et al*. (2018) speak of deliberate and targeted state intervention. Yet, observations indicate to state initiatives of rural development (like large dam constructions, rural electrification programmes and large roads constructions) offsetting the rural dwellers (Ledec and Quintero, 2003; Finley-Brook and Thomas, 2010; Scudder, 2012; Shi *et al*. 2012; Siciliano *et al*. 2019; Asher and Novosad, 2020).

### 4.3 Conclusions and Contribution to Knowledge

Resilience work is not a one-man band activity. Given that the work is revolves around issues of adaptation, absorption and transformation, that is a whole gamut and corpus of involvement needing different players other than government, in operation. Besides, this fact, rural processes revolve around human settlements and cover many sectors including extraction of earth materials, farming, animal raising, forestry resources' harvesting. These matters are intricately interwoven and involve complex systems. I must stress that disaster management and resilience thinking are a convergence of natural processes and the human processes defining localities and their inhabitants. Localities and their inhabitants sometimes emerge as 'powerless spaces' while hurricanes, cyclones and storms emerge as 'placeless powers' and spatial planning plays a 'connector' and remedy role to the ills induced (White and O'Hare, 2014). As summarised by White and O'Hare (2014: 934):

> "… resilience within spatial planning is characterised by a simple return to normality that is more analogous with planning norms, engineered responses, dominant interests, and techno-managerial trends."

My entry into sites of my case studies was through non-governmental organisations, all concerned with the local affairs in the two rural districts – Gokwe South and Mbire. The Gokwe South Land Conflict Management was spearheaded by the Centre for Conflict Management and Transformation (CCMT). In the district, we interfaced with resilience processes under Chief Mutendi and the developments at Defe Dopota where Zion Christian Church (ZCC) actively engaged with development work. Both state and non-state actors were heavily involved in their own way of doing resilience work. In Mbire, the Africa Wildlife Foundation (AWF) was the funder for the preparation of the Mbire Land-use Plan. Various government departments – Agritex, Forestry Commission, Zimparks and Environmental Management Agency were very active. Part of the stakeholders were non-state actors, like Plan International, World Vision, to name these few, who we in the process of resilience building with the local communities. It would be an understatement to simply think that resilience work is the ambit of government only; it is collaborative work.

In this thesis, I have contributed to the debate of rural settlement planning, development and management of disaster resilience thinking. These two major themes are treated in both academic discourse and practical implementation as disparate and incongruent. The disposition of Zimbabwe as landlocked seems to have blinded development actors that the country was safe from natural disasters. However, the damage evoked by the 2019 Cyclone Idai, extended immensely in especially Chimanimani, Chipinge, Buhera and Chikomba districts. The destruction on the hard infrastructure (houses, roads and bridges) indicated that the safety of rural dwellers was more compromised that ever thought. Previously, studies had focussed more on issues of drought, famines and livelihoods (Dube, 2008; Chitongo *et al*. 2019; Chirisa and Chivenge, 2019; Samu and Akıntuğ, 2020; Vambe *et al.* 2021).

In this thesis, I have retraced the origins of rural settlement patterns in Zimbabwe. I have noted that in pre-colonial times, the dominant settlement pattern was nuclear settlement whereby dwellers would live around a water source or around a hill that they deemed a security feature (Moore, 1995). Colonialism has altered the landscape dating back to the 1890s. Worse still, to consolidate it around the 1930s and 1940s, it became clear that Alvordism was introduced to entrench into communities the idea of linear resettlement patterns. For the colonialists, lines for Africans served to allow easy collection of taxes, easy conscription of labourers into the farms and mines, and ease of communication (Robins, 1994). However, for today and post-

colonial planning, these linear settlement patterning could have facilitated in rural electricity reticulation, collection of waste to dumping sites, as in urban settlements. Dispersion in settlements tends to cause higher costs of infrastructure installation (Gasper, 1988; Adeyeye *et al*. 2020; Fletcher, 2019). Overall, rural settlements, except for mine and farm compounds, that were labour-organised barracks, the generality of rural settlements were communal and low-density in nature. The low-density nature of the settlements allowed for the settlement dweller to do their activities on the 'farm' as pointed out in my preface where I speak of my grandfather's 'communal farm'. As described by Zvoleff *et al*. (2009: 4066), with reference to energy reticulation, "… access to grid electricity in Sub-Saharan Africa remains low; a problem generally ascribed to differences in settlement patterns."

The study has shown that the Fast-Track Land Reform Programme (FTLRP) of 2000 worked on the assumption of reducing poverty in the rural areas. It aimed at improving rural livelihoods and cushioning them to be resilient from natural disasters. However, despite the good intentions, the programme did not achieve its intended goals, rather it disrupted human livelihoods. The major hindrance was the lack of inputs to facilitate the program. The farmers had no access to credit facilities, even so, the hyperinflationary situation that existed in the country made it futile. Efforts were made by the state to ensure rural livelihoods improvement, such as the Command Agriculture that was under the Special Agriculture Programme enhanced through public-private partnerships.

The country is popularly known for devising quality blueprints intended for improving the livelihoods of the indigenous people. However, lack of assessment of the possible consequential results after implementation affect the implementation of the policies. One of the blueprints that was implemented is the Sustainable Socio-Economic Transformation (ZimAsset) which was facilitated in the period of 2013 to 2018. The program was divided into four clusters with agriculture being the key facet. This aimed at improving the living standards of vulnerable groups and contract farming initiatives were introduced in the process. Dam and road construction together with borehole drilling were part of the blueprint plan to improve the quality and safety of water in rural areas. However, climate change impacts and other interferences detrimentaly affected agricultural produce in the country.

In response to the effects brought forth on agriculture due to climate change, there was an introduction of the National Climate Change Response Strategy of 2014. Climate change has such severe impacts on agriculture that it led to the rising need for national climate mitigation and adaptation strategies. Of the hardest hit areas, Gokwe residents felt the effects severely, as their livelihoods are primarily maize and cotton based. Livelihood challenges were felt since the implementation of the Fast-Track Land Reform Program. Lack of finance and inputs, exacerbated with social differentiation impacted severely the Gokwe district.

In Nkayi, livelihoods are highly compromised due to frequent droughts that occur on a two to five-year basis. The people are highly dependent on the farming of cotton and groundnuts. However, more than 76% of the rural population still fall under the poverty datum line. Due to compromised livelihoods, they have resorted to selling off their assets to meet their daily needs and alleviate poverty when remittances are inadequate. For Chipinge, though there is more reliable precipitation, the rural livelihoods are affected by frequent flooding. Despite the favourable rainfall patterns, the farmers still encounter challenges in trying to take advantage of the rainfall to their benefit. This is highly due to lack of inputs and financial capability.

In some countries, governments have joined forces with the private sector as a way to create jobs for the people in rural areas. India's Ramanathapuram and Tuticorin rural districts that were affected by a destructive tsunami in 2004 led the state to take action to ensure reliable livelihoods for the people. There was intervention of non-governmental organisations in partnership with the People's Action for Development that worked on enabling the rural districts to recover from the disaster effects. However, many governments in Africa still lag behind in terms of equity in the distribution of resources. Therefore, those who are poor continue to suffer as the rich get richer. Corruption is one of the reasons for this.

The FTLRP in Zimbabwe has not achieved a 100% success as some areas were affected by frequest droughts. Agriculture is the economic basis of most African countries and its failure leads to economic decline. Therefore, the agrochemical sector should ensure that there is an introduction of drought resistant seed hybrids that can withstand harsh climatic conditions. This should be complemented by the use of pest and disease control chemicals to enhance productivity. Diversifying farming crops is another alternative to improving rural livelihoods. This ensures communities' advancements in resilient practices.

Wildfire outbreaks are worsening globally due to the climate change and natural disaster occurrences. This has led to the destruction of natural resources and wildlife. Various methods are practiced in order to ensure the protection of natural resources. Participatory measures are proven to be successful in curbing the challenges of natural fires. Enhancing institutional capacity and policy formulation enables human coordination for a common cause. This is enabled by supportive legislative framework that in a way facilitates the implementation of set policies. It is imperative to acknowledge that commonly shared natural resources do not require the use of top-down approaches in managing, insteadcommunity mobilisation works well.

Commonly shared resources comprise of water bodies and natural forests. However, capitalism has led to the privatisation of common resources thus depriving the community from non-exclusive use rights. The common effort in managing the common pool resources is relevant as it ensures equality in access and avoidance of the prisoner's dilemma in use. Zoning is introduced as one of the ways that can enhance the conservation of natural resources by way of settling aside these areas and protecting them independently. The prohibition of the use of these secluded areas is recommended for ensuring sustainability as there is enhanced management. This goes along with the regulation of human activities that destroy the ecosystem.

For developed countries, the monitoring of wildfires is enhanced by the use of satellites and other technology facilities. The cooperation and active engagement of governments and the public have made it possible to ensure environmental preservation. For most Southern African countries, firebreaks are the commonly used measure to protect natural resources. In areas where indigenous knowledge is highly esteemed, cultural (indigenous knowledge) measures in forest fire management are implemented. However, the lack of proper resource coordination and mobilization is a huge hindrance to successful control and management of wildfires.

Inadequate research on drivers of wildfires in Zimbabwe has deterred successful planning for wildfire management. Various policies on environmental protection are introduced since the attainment of independence in the country. The Environmental Management Act (2002) (Chapter 20:27) and the Forestry Act (Chapter 19:05) of 1949 (revised, 1996, 2002) amongst many other statutory instruments are part of the national efforts to fight poor management of

natural resources. However, the management of natural resources as it was in the colonial era, has continued to decline. One of the overlooked aspects is that of creating institutions that are solely meant to prevent wildfires.

The lack of continuity in the approaches targeted at managing wildfires has led to the loss of vast pieces of land to fires. As nations move towards finding better ways to achieve sustainability and resilience, it is imperative to look back and appreciate the traditional and colonial methods that were effective in protecting wildlife. The effects of climate change are becoming more severe and wildernes protection is becoming a need to stop continuous environmental disruption. Community participation and the involvement of all stakeholders is a necessary move to ensure behaviour change and common participation. However, decentralisation of power remains on paper.

It is clear that disaster resilience thinking is practiced in most rural settlement planning, development and management. However, the documentation and scholarly interrogation of the matter seems to have lacked rigour. This present thesis has attempted to plug that gap by investigating and discussing this matter. Each of the articles that I have authored brings in critical elements to the thrust of infusing resilience thinking in the practices.

Chapter 1, 2 and 3 set the tone by regarding issues in existing literature and how these relate to Zimbabwe, respectively. The publications made then map environmentally-induced disasters or simply disasters as they affect rural human settlements and habitats under the impact of climate change at various levels – global, regional and local. I also explored resilience as a theoretical and practical aspect for rural human settlements planning and management. Theoretically, disaster resilience is an emerging paradigm that it yet to be fully embraced by central goverments, local authorities and households, as units that can be change agents. I examined the institutional, policy and statutory and infrastructure frameworks for rural settlement planning and maintenance across international and local regions. I have also, in most of the papers suggested options for resilient and sustainable rural settlement's and habitat's production and management and tried to localise the debate to Zimbabwe. Table 4.1 provides the summary of the contribution I have made through the papers subsisting this thesis. I seek to answer the initial and main research question of this thesis:

**Table 4.10: Summary of the Contribution Made Through Publications**

| Category | Title of Paper/Publication | Contribution to the Debate |
|---|---|---|
| **A1:** | Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems | The principal contribution of the publication is of nuancing issues in climate change and resilience by superimposing them on settlement planning systems of which international, national and localised experience matter. |
| **A2:** | Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe | Missing in literature has been a kaledoiscopic presentation that links livelihoods in the post-fast-track resettlement programme of 2000 and how these have had an interplay with land use. In this paper, we stitch these together and the overall painted picture denotes rural vulnerability increased by government policy. The vulnerability situation and context has been compounded by frequent droughts and flooding across regions of Zimbabwe. |
| **A3:** | Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District? | The major contribution of this paper is how community conflicts are being perpetrated by first, business centres expanding into abutting communal lands, and, second how other resources including livestock and wildlife are made to suffer as human action increases on the ground. The study evokes the 'rights debate' as development demonstrates its paradoxes characterised by displacements and overriding of the 'weak' by the 'strong''. State decisions and private capital are the primary causes and pushers for rural landscape change in contemporary times. Unfortunately, most unbeknown by communal land dwellers, they land they sit own is vested with the President. Rural vulnerability is multidimentional and so should be disaster risk resilience. |
| **A4:** | Socio-ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe | In this paper, which is also a case study, socio-ecological challenges manifest heavily in a place once designated as a wildlife zone. The place is under intense pressure due to unreliable rainfall patterns that affect livelihood pursuits that largely are natural resource based. Interesting from this paper is the way traditional knowledge is part of the equation by the communities to endogenously build disaster risk resilience. |
| **B1:** | Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements | The contribution coming from this paper is the attempt by the author to try and distil global and regional practices and experience towards building a range of indicators that can be used to measure the impact of environmental disasters to inform the planning and management of human settlements, specifically human settlements. |
| **B2:** | Resilience and Climate Change in Rural Areas: A Review of Infrastructure | It is argued in literature that a well-infrastructured place could be well-placed in the ability and capacity to handle disasters. In this paper, we scan across the globe and region to construct a debate that captures experiences and realities in the different contexts towards |

| | | |
|---|---|---|
| | Policies Across Global Regions | informing rural resilience. It emerged that it is quite possible to formulate standards for infrastructure and even policies that are context-specific and could address the disaster risk resilience challenge. |
| **B3:** | Resilience Thinking in the Rural Human Settlements' Development and Management | This paper covers the conceptualisation of resilience as it affects rural human settlements. It acknowledges that settlements are a product of process that including decisions to plan, construct, maintain and sustain them. Resilince thinking, then, is that thread that must run through all these critical processes and ultimately shape the 'resilience recipe and menu' for settlement sustainability. |
| **C1:** | Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe | Local and master planning in literature has generally tended to focus on urban settlements, and specifically for Zimbabwe, that is a widely adopted position. The thrust and ultimate contribution of this paper is the advocacy for broadening local and master planning to embrace rural areas, taking them as vulnerable spaces inhabiting vulnerable communities. With infrastructure and physical master planning in place, it is possible to look into rural communities as rescuable in the event of disasters striking. That way, their resilience is a forgone conclusion. |
| **C2:** | The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe | The paper is an attempt to check on the structures built at rural homesteads. I argue that, the lens to view the matter is already in place because urban standards for construction have already been set up in the exisiting 1977 Model Building By-laws. Instead of re-inventing the wheel, one could study, learn and adapt to the exising standard for building structure construction and domesticate the principles and standards to rural landscapes. |
| **C3:** | The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: Challenges and Prospects for Doing It Right | In this paper, we observe how wildfires are increasingly becoming a major threat to human, livestock and wildlife every dry season in the country. We observe that partly, climate change could be one factor but largely also the human factor, including recklessness and negligence to established rules and norms to fire management some existing from as far back as the colonial days. The major contribution is an entreaty to stakeholders to get back to the set standards and put these to use for community and settlemements'resilience cause in the country. |

***In a world with a marked increase in disaster risk posed by climate-induced changes on the Earth's landscape, with special reference to the rural landscape (appearing more exposed and vulnerable, how does resilience-thinking manifest and work, for the sustainability of human settlements and their dwellers?***

## 4.4 The 8Ss Rural Settlement Resilience Process Model

In this model, I consider the process of resilience. The process of resilience and strategising for it is considered as centering 8Ss (Figure 4.1).

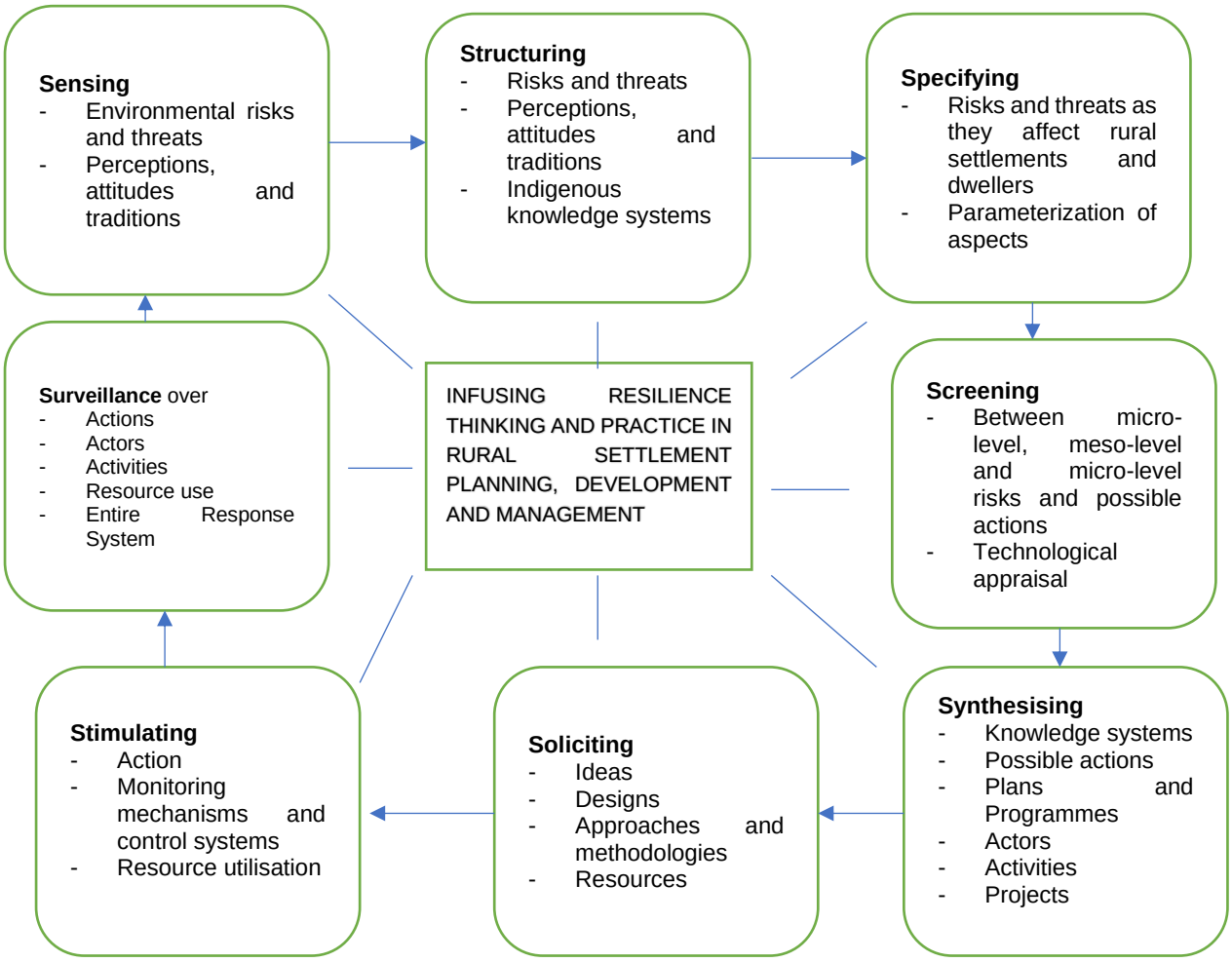


**Figure 4.1: The 8Ss Rural Settlement Resilience Process Model (Author, 2022)**

The 8Ss are describable in the following terms:

A. **Sensing**: This is a critical consciousness by society and communities that we are living in on a Planet threatened by increased environmental risks and threats. As such, perceptions and attitudes around the issue must be succinctly clear on this matter. A deliberate review on the tradition of settlement and living must be considered and captured so that good traditions are enhanced and bad ones thrown out.

B. **Structuring:** Having sensed and become aware of the risks and threats, households and communities must better structure these challenges. In this endeavour, indication and

parameters must be set. This includes tapping from the indigenous knowledge systems as the historical richness of survival in an area might be useful in achieving the resilience goal. Attitudes, perceptions and traditions indeed really matter. For example, why did the round huts survive more against the impacts of flooding induced by Cyclone Idai in 2019 than the squared and rectangular structured.

C. **Specification:** It is here taken for scientific parameterisation of aspects that can be achieved through tapping on built environmental sciences including geo-matric and surveying, urban and regional planning, engineering, architecture and quantity surveying. If one can model it, then it can be done better. The issue responds to the question of technology as it speaks to methods, techniques and equipment needed. In this technology mantra, low-impact development that mitigates against flood and green-house gases (GHG) is assumed.

D. **Screening:** Each environment with its communities has different needs and requirements for survival including what it can accommodate and afford. Usually, the scale of operation – micro, meso or micro-level-determines the resources and interventions required. It would be foolhardy for me to operate at a small site level as if they were a grand scale site like a region. For bigger regions, connectivity and linkages really mater. Technological appraisal is a key instrument for screening, so might be economic appraisal as costs must be outweighed by benefits.

E. **Synthesis:** The results of appraisal and screening, focusing on different sectors and aspects, analysed and modularized, must combine towards a functional system and we see this combination for functions as synthesis. Plans, possible actions, knowledge systems, efforts by different actors must constitute integration for functions. Rural communities and settlements must work to promote functionality.

F. **Soliciting:** This is here taken to mean the garnering of support to make sure that the desired path works. Even if a plan with its programmes and packed of projects has been so designed and packaged through synthesis, stakeholders must still be engaged. Their total commitment to it makes the difference. Implements, financiers, regulators, mentors, to mention these few must all be in consensus.

G. **Stimulation:** A shared vision must then be triggered to life. Breathing life to it comes with a whole gourmet of new challenges, lessons and feedback. That must push the system to move.

H. **Surveillance:** Everything will need strict monitoring once the system is bankrolled. This system is a rural settlement system superimposed in volatile environment system chose *natura* is traditionally unknown and unpredictable. Thanks to technology that can now assist in forecasting and predictions. This requires a cadre of expertise and specialists, placed even at local stations to help in environmental mentoring.

I strongly believe the 8Ss model as a process has also linked-in substance that suffice in building Global South rural landscapes that are amicable to resistance tasking and practice for sustainability.

### 4.5 Areas for Further Study

In so far as this thesis has been to map rural settlement thinking and practice with respect to planning, development and management, it has left many gaps that need plugging; it has largely been exploratory given the novelty of the disaster risk now becoming more pronounced in Zimbabwean (or even Southern African) rural landscapes. I would suggest multi-disciplinary studies that cover some of the following topics:

(a) The possibility of saving land for farming, forestry and extractions of natural resources through rural settlement densification. This may touch on heritage-based land management while effectively utilising land resources.

(b) Rural land titling that brings value to dwellers so that they are less of victims of especially state-engineered developments.

(c) Rural-urbanisation transitioning that does not allows rural dwellers falling into deep and entrenched poverty since we are living in a fast-urbanising environment.

(d) The development of relevant rural infrastructure that links rural communities to gainful markets so that predation of the 'gains of sweat' by rural communities is minimized. Most rural dwellers cannot improve their structures because they are less linked to proper and lucrative markets. Life remains at survivalist bench and less of entrepreneurial.

(e) Rural areas as self-contained hubs for development so that they are net exporters rather than importers of goods and devices produced elsewhere.

(f) The architectural design considerations of rural houses that accommodate the extended family under one roof and materially engages locally available materials.

## 4.6 Conclusion

While resilience discourse mostly focuses on urban area, the thesis provides sufficient justification on the need to understand resilience from a rural context. The thesis makes significant contribution in this regard. In this sense it makes both theoretical and empirical contributions to the discourse of resilience thinking and practice in rural settlement planning, development and management. It also contributes to resilience, vulnerability and rural planning discourse from a global, regional, national and community perspectives. The thesis also makes an important contribution on how to integrate disaster resilience thinking and practice in rural settlement planning in Zimbabwe.

The study has presented the need for ensuring resilience and sustainability in rural livelihoods management and the natural resources. Community participation, improvement in the institutional frameworks and public-private partnerships are hailed for improving sustainable development. The former policies on addressing inequalities, such as the FTLRP, have led to catastrophic effects that have affected most rural livelihoods. On the other hand, climate change is worsening the impacts. This calls for urgent action on the part of national governments to ensure livelihoods improvement in rural areas. Resilience thinking is to be a core theme in policy-making and implementation if ever human and natural life is to be enhanced. The study leaves room for further research especially in the practical ways that can be implemented to ensure improvement of institutional frameworks that target rural life improvement.

# REFERENCES


Abdallah, C, Lusiani, M. and Langley, A. (2019). Performing Process Research. In: *Standing on the Shoulders of Giants*. Bingley: Emerald Publishing Limited.

Adger, W.N. (2000). Social and Ecological Resilience: Are They Related? *Progress in Human Geography*, 24(3), 347-364.

African Development Group. (2021). Technical Assistance for the Development of a Climate Resilience Policy and Strategy and; Drought Insurance products for the Arid and Semi-Arid Zones of Southern and Central Parts of Mozambique: Climate Investment Funds-PPCR Business Development for Resilience Program. Mozambique. Available online: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=African+Development+Group.+%282021%29.+Technical+Assistance+for+the+Development+of+a+Climate+Resilience+Policy+and+Strategy+and%3B+Drought+Insurance+products+for+the+Arid+and+Semi-Arid+Zones+of+Southern+and+Central+Parts+of+Mozambique%3A+Climate+Investment+Funds-+PPCR+Business+Development+for+Resilience+Program.+Mozambique&btnG= Accessed on 15 October 2021.

Agwu, E and Speranza, C.I. (2018). Agricultural Resilience to Climate Change in Anambra State, South-eastern Nigeria: Beyond Agricultural Impacts. Available online: https://www.researchgate.net/publication/317741016_Agricultural_Resilience_to_Climate_Change_in_Anambra_State_Southeastern_Nigeria_Insights_From_Public_Policy_and_Practice. Accessed on 14 October 2021.

Ajani, A and van der Geest, K. (2021). Climate Change in Rural Pakistan: Evidence and Experiences from a People-centered Perspective. *Sustainability Science,* 16(6), 1-13.

Akyıldız, N.A and Olğun, T.N. (2020). Investigation for Energy Use and Conservation of Sustainable Traditional Architecture: Case of Malatya/Turkey Bahri Mosque. *Architecture Research*, 10(2), 60-67.

Al-Ababneh, M.M. (2020). Linking Ontology, Epistemology and Research Methodology. *Science & Philosophy*, 8(1), 75-91.

Alam, K and Rahman, M.H. (2018). The Role of Women in Disaster Resilience. In: *Handbook of Disaster Risk Reduction and Management* (pp. 697-719).

Aldunce, P, Beilin, R, Howden, M and Handmer, J. (2015). Resilience for Disaster Risk Management in a Changing Climate: Practitioners' Frames and Practices. *Global Environmental Change*, 30, 1-11.

Alexander, D. (1997). The Study of Natural Disasters, 1977–97: Some Reflections on a Changing Field of Knowledge. *Disasters*, 21(4), 284-304.

Allstadt, K. E, Jibson, R. W, Thompson, E. M, Massey, C. I, Wald, D. J, Godt, J. W and Rengers, F. K. (2018). Improving Near-Real-Time Coseismic Landslide Models: Lessons Learned from the 2016 Kaikōura, New Zealand, Earthquake. *Bulletin of the Seismological Society of America*, 108(3B), 1649-1664.

Amarasinghe, A. G. (2020). Concept of Disaster is in Disarray: Need a Consensus among Experts. *International Journal of Geography and Geology*, 9(2), 84-92.

and Chinese Dam-building in the Global South. *Current Opinion in environmental Sustainability*, 37, 20-27.

and Kashe, K. (2021). Flood-Recession Cropping in the Mid-Zambezi Valley: A Neglected Farming System with Potential to improve household food security and income. *The Geographical Journal*, 188(1), 57 - 75

Andharia, J. (Ed.). (2020). *Disaster Studies: Exploring Intersectionalities in Disaster Discourse*. Springer Nature.

Anríquez, G and Stamoulis, K. (2007). Rural development and poverty reduction: Is agriculture still the key? *eJADE (Electronic Journal of Agricultural and Development Economics)* 4(1), 5-46.

Arnold, J. L, Cangelosi, E, Beyea, W. R, Shaaban, A and Kim, S. K. (2021). Rural Climate Resilience through Built-Environment Interventions: Modified Deliberation with Analysis as a Tool to Address Barriers to Adaptive Capacity. *Regional Studies, Regional Science*, 8(1), 1-24.

Aruga, K. (2017). Consumer Reaction, Food Production and the Fukushima Disaster. *Springer Books*.

Asher, S and Novosad, P. (2020). Rural Roads and Local Economic Development. *American Economic Review*, 110(3), 797-823.

Bailey, R.C, Liew, T.S.B and Segovia, F.F. (Eds.). (2021). *They were All Together in One Place? Toward Minority Biblical Criticism*, 57. Leiden, Boston: Grill. SBL Press.

Balint, P.J and Mashinya, J (2008). CAMPFIRE through the Lens of the 'Commons' Literature: Nyaminyami Rural District in Post-2000 Zimbabwe. *Journal of Southern African Studies*, 34(1), 127-143.

Bănică, A, Kourtit, K and Nijkamp, P. (2020). Natural Disasters as a Development Opportunity: A Spatial Economic Resilience Interpretation. *Review of Regional Research*, 40(2), 223-249.

Banjo, G, Gordon, H and Riverson, J. (2012). Rural Transport: Improving its Contribution to Growth and Poverty Reduction in Sub-Saharan Africa. Available online: https://openknowledge.worldbank.org/bitstream/handle/10986/17807/786760SSATP0NW0t0Sub0Saharan0Africa.pdf%3Bjsessionid%3DA770C1174FC0A3AF53B3F0B9077FD04A?sequence%3D1 Accessed on 15 October 2021.

Bari, E, Enamul Haque, A.K and Khan, Z.H. (2022). Local Strategies to Build Climate Resilient Communities in Bangladesh. In: Haque, A. K.E, Mukhopadhyay, P, Nepal, M and Shammin, Md. R: *Climate Change and Community Resilience* (pp. 175-190). Springer, Singapore.

Barnes, D.L. (1978). Problems and Prospects of Increased Pastoral Production in the Tribal Trust Lands. *Zambezia*, 6(1), 49-59.

Barua, S. (2020). Financing Sustainable Development Goals: A Review of Challenges and Mitigation Strategies. *Business Strategy and Development*, 3(3), 277-293.

Béné, C, Mehta, L, McGranahan, G, Cannon, T, Gupte, J and Tanner, T. (2018). Resilience as a Policy Narrative: Potentials and Limits in the Context of Urban Planning. *Climate and Development*, 10(2), 116 -133.

Bennett, B. M and Van Sittert, L. (2019). Historicising Perceptions and the National Management Framework for Invasive Alien Plants in South Africa. *Journal of Environmental Management*, 229, 174-181.

Bennett, K. J, Borders, T. F, Holmes, G. M, Kozhimannil, K. B and Ziller, E. (2019). What is Rural? Challenges and Implications of Definitions that Inadequately Encompass Rural People and Places. *Health Affairs*, 38(12), 1985-1992.

Berends, H and Deken, F. (2021). Composing Qualitative Process Research. *Strategic Organization*, 19(1), 134-146.

Berhanu, M and Wolde, A.O. (2019). Review on Climate Change Impacts and Its Adaptation Strategies on Food Security in Sub-Saharan Africa. *Agricultural Socio-Economics Journal*, 19(3), 145-154.

Berisha, E, Cotella, G, Janin Rivolin, U and Solly, A. (2021). Spatial Governance and Planning Systems in the Public Control of Spatial Development: A European Typology. *European Planning Studies*, 29(1), 181-200.

Berryman, D.R. (2019). Ontology, Epistemology, Methodology, and Methods: Information for Librarian Researchers. *Medical Reference Services Quarterly*, 38(3), 271-279.

Blake, M. K. (2019). More than Just Food: Food Insecurity and Resilient Place Making through Community Self-Organising. *Sustainability*, 11(10), 2942.

Bosworth, G, Price, L, Collison, M and Fox, C. (2020). Unequal Futures of Rural Mobility: Challenges for a "Smart Countryside". *Local Economy*, 35(6), 586-608.

Boyle, E and Shneiderman, S. (2020). Redundancy, Resilience, Repair: Infrastructural Effects in Borderland Spaces. *Verge: Studies in Global Asias*, 6(2), 112-138.

Braun, Y. A. (2020). Environmental Change, Risk and Vulnerability: Poverty, Food Insecurity and HIV/AIDS Amid Infrastructural Development and Climate Change in Southern Africa. *Cambridge Journal of Regions, Economy and Society*, 13(2), 267-291.

Brodsky, A.E and Cattaneo, L.B. (2013). A Transconceptual Model of Empowerment and Resilience: Divergence, Convergence and Interactions in Kindred Community Concepts. *American Journal of Community Psychology*, 52(3-4), 333-346.

Brown, D.L and Schafft, K.A. (2011). *Rural People and Communities in the 21st Century: Resilience and Transformation*. Cambridge: Polity Press.

Brunetta, G, Ceravolo, R, Barbieri, C. A, Borghini, A, de Carlo, F, Mela, A and Voghera, A. (2019). Territorial Resilience: Toward a Proactive Meaning for Spatial Planning. *Sustainability*, 11(8), 2286-2303

Burger, M. J, Morrison, P. S, Hendriks, M and Hoogerbrugge, M. M. (2020). Urban–rural Happiness Differentials Across the World. *World Happiness Report*, *2020*, 66-93.

Burton, I. (1993). *The Environment as Hazard*. New York: Guilford Press.

Busby, J, Smith, T. G, Krishnan, N, Wight, C and Vallejo-Gutierrez, S. (2018). In Harm's Way: Climate Security Vulnerability in Asia. *World Development*, 112, 88-118.

Bush, R and Cliffe, L. (1984). Agrarian Policy in Migrant Labour Societies: Reform or Transformation in Zimbabwe? *Review of African Political Economy*, 11(29), 77-94.

Cervone, J.A. (2017). The Reproduction of Rural Spaces through Education: Abstraction of the Rural and the Creation of New Differential Spaces. *Policy Futures in Education*, 15(4), 427-440.

Cervone, J.A. (2018). Imagining the Rural Future: A Response to Howley, Clifton and Howley. *Journal of Research in Rural Education*, 33(7), 1-3.

Chakraborty, I and Maity, P. (2020). COVID-19 outbreak: Migration, Effects on Society, Global Environment and Prevention. *Science of the Total Environment*, 728, 138882.

Chambers, R. (1981). Rural Poverty Unperceived: Problems and Remedies. *World Development*, 9(1), 1-19.

Chambers, R. (1982). Health, Agriculture and Rural Poverty: Why Seasons Matter. *The Journal of Development Studies*, 18(2), 217-238.

Chambers, R. (1986). Hidden Losers? The Impact of Rural Refugees and Refugee Programs on Poorer Hosts. *International Migration Review*, 20(2), 245-263.

Chambers, R. (1995). Poverty and Livelihoods: Whose Reality Counts? *Environment and Urbanization*, 7(1), 173-204.

Chambers, R. (2010). Paradigms, Poverty and Adaptive Pluralism. *IDS Working Papers*, 2010(344), 01-57.

Chambers, R. (2013). Participation, Pluralism and Perceptions of Poverty. In: *The Many Dimensions of Poverty* (pp. 140-164). Palgrave Macmillan, London.

Chan, E.Y.Y, Man, A.Y.T and Lam, H.C.Y. (2019). Scientific Evidence on Natural Disasters and Health Emergency and Disaster Risk Management in Asian Rural-based Area. *British Medical Bulletin*, 129(1), 91-100.

Chanak, P, and Banerjee, I. (2020). Internet-of-Things-Enabled Smart Villages: An Overview. *IEEE Consumer Electronics Magazine*, 10(3), 12-18.

Chankseliani, M, Gorgodze, S, Janashia, S and Kurakbayev, K. (2020). Rural Disadvantage in the Context of Centralised University Admissions: A Multiple Case Study of Georgia and Kazakhstan. *Compare: A Journal of Comparative and International Education*, 50(7), 995-1013.

Chapman, K. A and Reich, P. B. (2007). Land Use and Habitat Gradients Determine Bird Community Diversity and Abundance in Suburban, Rural and Reserve Landscapes of Minnesota, USA. *Biological Conservation*, 135(4), 527-541.

Chatiza, K. (2019). An Analysis of Policy Implications for Post-Disaster Institutional Development to Strengthen Disaster Risk Management: Cyclone Idai in Zimbabwe. Oxfam, Zimbabwe. Available online: www.oxfam.org. Accessed on 15 October 2021.

Chatiza, K. (2019). Cyclone Idai in Zimbabwe: An Analysis of Policy Implications for Post-Disaster Institutional Development to Strengthen Disaster Risk Management. Available

online: https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620892/bp-impact-response-cyclone-idai-zimbabwe-071119-en.pdf. Accessed on 15 October 2021.

Cheater, A. (1990). The Ideology of 'Communal' Land Tenure in Zimbabwe: Mythogenesis Enacted? *Africa*, 60(2), 188-206.

Chenga, M. (1986). Rural Housing Programmes in Zimbabwe: A Contribution to Social Development. *Journal of Social Development in Africa*, 1(1), 43-47.

Chigavazira, T and Zandamela, H. L. (2021). Behaviour Change in Drought Response and Management: Case Study of Mudzi District, Zimbabwe. *Journal of Public Administration and Governance*, 11(2), 294316-294316.

Chigbu, U.E. (2013). "Rurality as a Choice: Towards Ruralising Rural Areas in Sub-Saharan African countries. Development Southern Africa. 30(6):812-825.

Chikodzi, D, Zinhiva, H, Simba, F. M and Murwendo, T. (2013). Reclassification of Agro-Ecological Zones in Zimbabwe-The Rationale, Methods and Expected Benefits: The Case of Masvingo Province. *Journal of Sustainable Development in Africa*, 15(1), 104-116.

Chimhowu, A and Woodhouse, P. (2008). Communal Tenure and Rural Poverty: Land Transactions in Svosve Communal Area, Zimbabwe. *Development and Change*, 39(2), 285-308.

Chimweta, M, Nyakudya, I. W, Jimu, L, Musemwa, L, Mashingaidze, A. B, Musara, J. P

Chingombe, W and Musarandega, H. (2021). Understanding the Logic of Climate Change Adaptation: Unpacking Barriers to Climate Change Adaptation by Smallholder Farmers in Chimanimani District, Zimbabwe. *Sustainability*, 13(7), 3773.

Chirau, T, Tirivanhu, P and Chabaya, O. (2020). Re-thinking the Value of Land-Based Livelihoods in Former Bantustans of Post-Apartheid South Africa. *Rural Ecologies of Teaching and Learning*, 27(2), 14-34.

Chirenda, T. G, Tandlich, R, Krele, V, Luyt, C. D, Srinivas, C. S and Iheanetu, O. U. (2018). Legislation, Vulnerability and Disaster Risk Management of Water Borne Diseases in Zimbabwe. Information and Security. *An International Journal*, 40(1), 61-91.

Chirisa, I and Bandauko, E. (2015). 13 Civil Society Advocacy and Environmental Migration in Zimbabwe. *Organisational Perspectives on Environmental Migration*, 179-195.

Chirisa, I and Dumba, S. (2012). Spatial Planning, Legislation and the Historical and Contemporary Challenges in Zimbabwe: A Conjectural Approach. *Journal of African Studies and Development*, 4(1),1-13.

Chirisa, I and Nel, V. (2021). Rural Land-Use Planning and Livelihood Dynamics in Post-2000 Zimbabwe. In *Sustainability in Natural Resources Management and Land Planning* (pp. 217-232). Springer, Cham.

Cloke, P and Little, J. (1997). *Contested Countryside Cultures: Otherness, Marginalisation and Rurality*. Psychology Press.

Cloke, P. (2006). Conceptualising Rurality. *Handbook of Rural Studies*, 18, 18-28

Conyers, D. (2003). Decentralisation in Zimbabwe: A Local Perspective. *Public Administration and Development: The International Journal of Management Research and Practice*, 23(1), 115-124.

Cook, A. D and Chen, C. (2020). Disaster Governance and Prospects of Inter-Regional Partnership in the Asia-Pacific. *The Pacific Review*, 1-31.

Corlett S and Mavin S. (2018). Reflexivity and Researcher Positionality. In: Cassell C; Cunliffe A; Grandy G, ed. *The Sage Handbook of Qualitative Business and Management Research Methods*. London: Sage, pp.377-389.

Cradock-Henry, N. A, Fountain, J and Buelow, F. (2018). Transformations for Resilient Rural Futures: The Case of Kaikōura, Aotearoa-New Zealand. *Sustainability*, 10, 1952.

CRED (Centre for Research on the Epidemiology of Disasters). (2018). EM-DAT (The Emergency Events Database). Country profile database—Zimbabwe. Available online: https://www.emdat.be/emdat_db/. Accessed 12 May 2018.

Cutter, S.L, Ahearn, J.A, Amadei, B, Crawford, P, Eide, E.A, Galloway, G.E, Goodchild, M.F, Kunreuther, H.C, Li-Vollmer, M, Schoch-Spana, M and Scrimshaw, S.C. (2013). Disaster Resilience: A National Imperative. *Environment: Science and Policy for Sustainable Development*, 55(2), 25-29.

Cutter, S.L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E and Webb, J. (2008). A Place-Based Model for Understanding Community Resilience to Natural Disasters. *Global Environmental Change*, 18(4), 598-606.

Cutter, S.L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E and Webb, J. (2008). A Place-Based Model for Understanding Community Resilience to Natural Disasters. *Global Environmental Change*, 18(4), 598-606.

Dalal-Clayton, B, Dent, D and Dubois, O. (2003). *Rural Planning in Developing Countries - Supporting Natural Resource Management and Sustainable Livelihoods*, London: Earthscan Publications Ltd.

Daly, P, Mahdi, S, McCaughey, J, Mundzir, I, Halim, A and Srimulyani, E. (2020). Rethinking Relief, Reconstruction and Development: Evaluating the Effectiveness and Sustainability of Post-Disaster Livelihood Aid. *International Journal of Disaster Risk Reduction*, 49, 101650.

Daniels, T. (1999). *When City and Country Collide: Managing Growth in the Metropolitan Fringe*. Island Press.

Davis, R and Hirji, R. (2014). Climate Change and Water Resources Planning, Development and Management in Zimbabwe: An Issues Paper. The World Bank/Government of Zimbabwe.

Davoudi, S, Shaw, K, Haider, L.J, Quinlan, A.E, Peterson, G.D, Wilkinson, C, Fünfgeld, H, McEvoy, D, Porter, L and Davoudi, S. (2012). Resilience: A Bridging Concept or a Dead End? 'Reframing' Resilience: Challenges for Planning Theory and Practice. Interacting Traps: Resilience Assessment of a Pasture Management System in Northern Afghanistan. Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning. *Planning Theory and Practice*, 13(2): 299-333.

Dawson, J and Barwell, I. (1993). Roads are Not Enough: New Perspectives on Rural Transport Planning in Developing Countries. London: Intermediate Technology Publications Ltd (ITP).

DCP (Department of Civil Protection). (2015). Topical Issues about Zimbabwe's Disaster Risk Profile. Harare. Available online: http://www.drmzim. org.zw. Accessed on 16 Jun 2018.

Démurger, S and Fournier, M. (2011). Poverty and Firewood Consumption: A Case Study of Rural Households in Northern China. *China Economic Review*, 22(4), 512-523.

Development Concept. In *EU Bioeconomy Economics and Policies,* II, 195-211. Palgrave Macmillan, Cham.

Devi, S. (2019). Cyclone Idai: 1 Month Later, Devastation Persists. *The Lancet*, 393(10181), 1585.

Dilley, M and Heyman, B.N. (1995). ENSO and Disaster: Droughts, Floods and El Niño/Southern Oscillation Warm Events. *Disasters*, 19(3), 181-193.

Dilley, M. (2000). Reducing Vulnerability to Climate Variability in Southern Africa: The Growing Role of Climate Information. In *Societal Adaptation to Climate Variability and Change* (pp. 63-73). Springer, Dordrecht.

Drinkwater, M. (1989). Technical Development and Peasant Impoverishment: Land-Use Policy in Zimbabwe's Midlands Province. *Journal of Southern African Studies*, 15(2), 287-305.

Dube, E, Mtapuri, O and Matunhu, J. (2018). Managing Flood Disasters on the Built Environment in the Rural Communities of Zimbabwe: Lessons Learnt. *Jàmbá: Journal of Disaster Risk Studies*, 10(1), 1-11.

Dube, K, Chapungu, L, and Fitchett, J. M. (2021). Meteorological and Climatic Aspects of Cyclone Idai and Kenneth. In *Cyclones in Southern Africa* (pp. 19-36). Springer, Cham.

Due, J.M. (1986). Update on Land Resettlement in Zimbabwe. *Journal of African Studies*, 13(2), 37-46.

Dunn, M, Rawson, M, and Rogers, A. (2021). *Rural Housing: Competition and Choice*. Routledge.

Egan, M. J. (2007). Anticipating Future Vulnerability: Defining Characteristics of

Eppler, U, Fritsche, U. R and Laaks, S. (2015). Urban-rural linkages and global sustainable land use. *GLOBALANDS Issue Paper, Berlin*.

European Commission. (2016). Science for Environment Policy. Future Brief: Not net land take by 2050? P4.

Eurostat. (2021). Making Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable: SDG 11-Sustainable Cities and Communities.

Fautras, M. (2015). Land Injustices, Contestations and Community Protest in the Rural Areas of Sidi Bouzid (Tunisia): The Roots of the "Revolution"? *Justice Spatiale-Spatial Justice, 7,* Available online: https://halshs.archives-ouvertes.fr/halshs-01512398/document. Accessed 15 October 2021.

Finley-Brook, M and Thomas, C. (2010). Treatment of Displaced Indigenous Populations in Two Large Hydro Projects in Panama. *Water Alternatives*, 3(2), 269-279.

Fisher, M.J, and Bloomfield, J. (2019). Understanding the research process. *Journal of the Australasian Rehabilitation Nurses Association, 22*(1), 22-27.

Food and Agriculture Organisation (FAO). What is transient poverty? Available online: http:// www.fao.org/docrep/007/ae0. Accessed on 19 July 2013.

for Rural Settlements in Post-independence Zambia. *The Journal of Architecture*, 23(3), 471-497.

Ford, J. D, King, N, Galappaththi, E. K, Pearce, T, McDowell, G and Harper, S. L. (2020). The Resilience of Indigenous Peoples to Environmental Change. *One Earth*, 2(6), 532-543.

Fothergill, A and Peek, L. (2021). Children, Youth and Disaster. In: *Children of Katrina* (pp. 15-36). University of Texas Press.

Fountain, J and Cradock-Henry, N. A. (2020). Recovery, Risk and Resilience: Post-disaster Tourism Experiences in Kaikōura, New Zealand. *Tourism Management Perspectives*, 35, 100695.

Fountain, J, Cradock-Henry, N, Buelow, F and Rennie, H. (2021). Agrifood Tourism, Rural Resilience and Recovery in a Postdisaster Context: Insights and Evidence from Kaikōura-Hurunui, New Zealand. *Tourism Analysis*, 26(2-3), 135-149.

Fox, S. (2014). The Political Economy of Slums: Theory and Evidence from Sub-Saharan Africa. *World Development*, 54, 191-203.

Francis, E. (2019). *Making a Living: Changing Livelihoods in Rural Africa*. London: Routledge.

Frey, W. H, and Zimmer, Z. (2001). Defining the City. *Handbook of Urban Studies*, 1, 14-35.

Fulkerson, G. M and Thomas, A. R. (2019). *Urbanormativity: Reality, Representation and Everyday Life*. Rowman and Littlefield.

Funk, C.C. (2021). *Drought, Flood, Fire: How Climate Change Contributes to Catastrophes*. Cambridge University Press.

Gasper, D. (1988). Rural Growth Points and Rural Industries in Zimbabwe: Ideologies and Policies. *Development and Change*, 19(3), 425-466.

Ghai, Y. (2000). Human Rights and Governance: The Asia Debate. *Asia Pasific Journal on Human Rights and the Law*, 1(1), 9-52.

Goebel, A. (2003). Gender and Entitlements in the Zimbabwean Woodlands: A Case Study of Resettlement. In: Howard, PL. (Ed.) *Women and Plants: Gender Relations in Biodiversity Management and Conservation*, 115-129. London, Zed Books.

Golding, S. A, and Winkler, R. L. (2020). Tracking Urbanization and Exurbs: Migration Across the Rural–Urban Continuum, 1990–2016. *Population Research and Policy Review*, 39(5), 835-859.

Gonese, F. T, Mangwe, N, Mukora, C and Kinsey, B. (2005). Land Reform and Resettlement Implementation in Zimbabwe: An Overview of the Programme against Selected International Experiences.

Government of Zimbabwe (GoZ). (2019). Draft Zimbabwe National Human Settlements Policy.

Gowan, M. E, Sloan, J. A, and Kirk, R. C. (2015). Prepared for What? Addressing the Disaster Readiness Gap Beyond Preparedness for Survival. *BMC Public Health*, 15(1), 1-5.

Grodach, C. (2002). Reconstituting Identity and History in Post-War Mostar, Bosnia-Herzegovina. *City*, 6(1), 61-82.

Gumbo, D. (2006). Zimbabwe: Country Case Study on Domestic Policy Frameworks for Adaptation in the Water Sector. WWF-Southern Africa, Harare.

Gumbo, D.J. (1992). Participatory Research for Rural communities in Zimbabwe: A Synopsis of the ENDA-Zimbabwe Community Management of Indigenous Woodlands Demonstration Project; Chivi and Zvishavane of Zimbabwe. In *Integrated Agricultural Research: proceedings of the SACCAR/Winrock Workshop held in Lilongwe, Malawi, 26 Nov.-1 Dec. 1989*. IDRC, Ottawa, ON, CA.

Gwimbi, P. (2007). The Effectiveness of Early Warning Systems for the Reduction of Flood Disasters: Some Experiences from Cyclone Induced Floods in Zimbabwe. *Journal of Sustainable Development in Africa*, 9(4), 152-169.

Gyawali, S, Tiwari, S. R, Bajracharya, S. B, and Skotte, H. N. (2020). Promoting Sustainable Livelihoods: An Approach to Postdisaster Reconstruction. *Sustainable Development*, 28(4), 626-633.

Hall, M.L, Lee, A.K and Cartwright, C. (2017). The 2015 Nepal Earthquake Disaster: Lessons Learned One Year On. *Public Health,* 145, 39–44.

Hallegatte, S, Vogt-Schilb, A, Rozenberg, J, Bangalore, M, and Beaudet, C. (2020). From Poverty to Disaster and Back: A Review of the Literature. *Economics of Disasters and Climate Change*, 4(1), 223-247.

Handmer, J, Ladds, M and Magee, L. (2018). Updating the Costs of Disasters in Australia. The *Australian Journal of Emergency Management,* 33(2), 40-46.

Harris, L. M, Chu, E. K and Ziervogel, G. (2018). Negotiated Resilience. *Resilience*, 6(3), 196-214.

Harrison, J, Galland, D, and Tewdwr-Jones, M. (2021). Regional Planning is Dead: Long Live Planning Regional Futures. *Regional Studies*, 55(1), 6-18.

Hawken, S and Fletcher, R. (2021). A Long-Term Archaeological Reappraisal of Low-Density Urbanism: Implications for Contemporary Cities. *Journal of Urban Archaeology*, 3, 29-50.

Heijman, W., Hagelaar, G and Heide, M. V. D. (2019). Rural Resilience as a New

Helen, A. S, Schneider, A, Kindness, P, Mellisha, C and Wilson, P. (2015). Using Technology to Enhance Rural Resilience in Pre-Hospital Emergencies. Department of Computing Science, University of Aberdeen, King's College, Aberdeen, UK; Centre for Rural Health, Inverness, UK; cdot. Rural the Digital Economy Hub at the University of Aberdeen, UK.

Helliker, K, Bhatasara, S and Chiweshe, M. K. (2021). Post-independence Land Reform, War Veterans and Sporadic Rural Struggles. In *Fast Track Land Occupations in Zimbabwe* (pp. 125-148). Springer, Cham.

help Projects. In *No Poverty* (pp. 120-128). Cham: Springer International Publishing.

Hoddinott, J. (2006). Shocks and their Consequences Across and Within Households in Rural Zimbabwe. *The Journal of Development Studies*, 42(2), 301-321.

Hodge, I, Dunn, J, Monk, S and Kiddle, C. (2000). An Exploration of 'Bundles' as Indicators of Rural Disadvantage. *Environment and Planning A*, 32(10), 1869-1887.

Holloway, A. (2003). Disaster Risk Reduction in Southern Africa: Hot Rhetoric—Cold Reality. *African Security Studies*, 12(1), 29-38.

Homewood, K. M, Trench, P. C and Brockington, D. (2012). Pastoralist Livelihoods and Wildlife Revenues in East Africa: a case for coexistence? *Pastoralism: Research, Policy and Practice*, 2(1), 1-23.

Hu, Q and Wang, C. (2020). Quality Evaluation and Division of Regional Types of Rural Human Settlements in China. *Habitat International*, *105*, 102278.

Huang, G. (2021). Investigation. In: *Theory of Mountainurbanology* (pp. 31-59). Springer, Singapore.

Huang, P and Zhan, S. (2005). Internal Migration in China: Linking it to Development. *Migration, Development and Poverty Reduction in Asia*, 65-84.

Huchzermeyer, M. (2009). The Struggle for In Situ Upgrading of Informal Settlements: A Reflection on Cases in Gauteng. *Development Southern Africa*, 26(1), 59-73.

Huggett, R and Perkins, C. (2018). Place as Landscape. In: *Companion Encyclopaedia Of Geography* (pp. 17-30). Routledge.

Hughes, D. (2001). Water as a Boundary: National Parks Rivers and the Politics of Demarcation in Chimanimani, Zimbabwe. Ingram, H. M and Blatter, J. eds. (2001). Reflections on water: New approaches to transboundary conflicts and cooperation. MIT Press.

Hull, R. W. (1976). Urban Design and Architecture in Precolonial Africa. *Journal of Urban History*, *2*(4), 387-414.

Huning, S, Naumann, M, Bens, O and Hüttl, R. F. (2011). Transformations of Modern Infrastructure Planning in Rural Regions: The Case of Water Infrastructures in Brandenburg, Germany. *European Planning Studies*, 19(8), 1499-1516.

Iglehart, J. K. (2018). The Challenging Quest to Improve Rural Health Care. *N engl J Med*, 378(5), 473-479.

Increasingly Critical Infrastructure-Like Systems. *Journal of Contingencies and Crisis Management*, 15(1), 4-17.

Isaac, R. (2021). Media Experiences of Asian Disasters—A Way Forward. *Media and Disaster Risk Reduction: Advances, Challenges and Potentials*, 13-29. Springer Singapore.

Ishimitsu, K and Goto, J. (1982). Changing Rural Areas as the Object of Rural Planning in Japan. *Journal of Irrigation Engineering and Rural Planning*, 1982(2), 28-42.

Jackson, S and Sleigh, A. (2000). Resettlement for China's Three Gorges Dam: Socio-Economic Impact and Institutional Tensions. *Communist and Post-Communist Studies*, 33(2), 223-241.

Jain, M and Korzhenevych, A. (2020). Urbanisation as the Rise of Census Towns in India: An Outcome of Traditional Master Planning? *Cities*, 99, 102627.

Jaka, H and Shava, E. (2018). Resilient Rural Women's Livelihoods for Poverty Alleviation and Economic Empowerment in Semi-Arid Regions of Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, 10(1), 1-11.

Jamshed, A, Birkmann, J, Feldmeyer, D, and Rana, I. A. (2020). A Conceptual Framework to Understand the Dynamics of Rural–Urban Linkages for Rural Flood Vulnerability. *Sustainability*, 12(7), 2894.

Johnson, D. (1992). Settler Farmers and Coerced African Labour in Southern Rhodesia, 1936–46. *The Journal of African History*, 33(1), 111-128.

Johnson, K.M and Lichter, D.T. (2019). Rural Depopulation: Growth and Decline Processes Over the Past Century. *Rural Sociology*, 84(1), 3-27.

Jones, B, Tebaldi, C, O'Neill, B. C, Oleson, K and Gao, J. (2018). Avoiding Population Exposure to Heat-Related Extremes: Demographic Change vs Climate Change. *Climatic Change*, 146(3), 423-437.

Jonga, W and Munzwa, K. M. (2010). Urban Development in Zimbabwe: A Human Settlement Perspective. *Theoretical and Empirical Researchers in Urban Management*, 5(14), 120 – 146.

Kaika, M. (2017). 'Don't Call Me Resilient Again!' The New Urban Agenda as Immunology… or… What Happens When Communities Refuse to be Vaccinated with 'Smart Cities' and Indicators. *Environment and Urbanization*, 29(1), 89-102.

Kalantary. C. (2010). Climate Change in Zambia: Impacts and Adaptation. Global Majority. *E-Journal*, 1(2), 85-96.

Karahan, F and Davardoust, S. (2020). Evaluation of Vernacular Architecture of Uzundere District (Architectural Typology and Physical form of Building) in Relation to Ecological Sustainable Development. *Journal of Asian Architecture and Building Engineering*, 19(5), 490-501.

Keja-Kaereho, C and Tjizu, B. R. (2019). Climate Change and Global Warming in Namibia: Environmental Disasters vs. Human Life and the Economy. *Manag Econ Res J*, 5(2019), 7731.

Kellert, S. R. (2003). *Kinship to Mastery: Biophilia in Human Evolution and Development*. Island Press.

Kerpic. (2019). Earthen Heritage Technology, Management. 7 International Conferences, Köycegiz, Muğla Turkey, 05-07 September 2019.

Kibreab, G. (2009). Climate Change and Human Migration: A Tenuous Relationship. *Fordham Envtl. L. Rev*, 20, 357 - 401.

Kinsey, B.H. (1983). Emerging Policy Issues in Zimbabwe's Land Resettlement Programmes. *Development Policy Review*, 1(2), 163-196.

Kinsey, B.H. (1999). Land Reform, Growth and Equity: Emerging Evidence from Zimbabwe's Resettlement programme. *Journal of Southern African Studies*, 25(2), 173-196.

Koczberski, G, Curry, G. N and Imbun, B. (2009). Property Rights for Social Inclusion: Migrant Strategies for Securing Land and Livelihoods in Papua New Guinea. *Asia Pacific Viewpoint*, 50(1), 29-42.

Kofinas, G. P and Chapin, F. S. (2009). Sustaining Livelihoods and Human Well-being during Social-Ecological Change. In *Principles of Ecosystem Stewardship* (pp. 55-75). New York, NY: Springer.

Koopmans, M. E, Rogge, E, Mettepenningen, E, Knickel, K and Šūmane, S. (2018). The Role of Multi-actor Governance in Aligning Farm Modernization and Sustainable Rural Development. *Journal of Rural Studies*, 59, 252-262.

Kulshreshtha, Y, Mota, N. J, Jagadish, K. S, Bredenoord, J, Vardon, P. J, van Loosdrecht, M. C, and Jonkers, H. M. (2020). The Potential and Current Status of Earthen Material for Low-cost Housing in Rural India. *Construction and Building Materials*, 247, 118615.

Kurnio, H, Fekete, A, Naz, F, Norf, C and Jüpner, R. (2021). Resilience Learning and Indigenous Knowledge of Earthquake Risk in Indonesia. *International Journal of Disaster Risk Reduction*, 62, 102423.

Lacroix, T. (2011). Migration, Rural Development, Poverty and Food Security: A Comparative Perspective. Available online: https://halshs.archives-ouvertes.fr/halshs-00921812/file/Migration_and_Rural_Development_FAO.pdf Accessed on 15 October 2021.

Le Bivic, C and Melot, R. (2020). Scheduling Urbanization in Rural Municipalities: Local Practices in Land-use Planning on the Fringes of the Paris Region. *Land Use Policy*, 99, 105040.

Lebo, J and Schelling, D. (2001). *Design and Appraisal of Rural Transport Infrastructure: Ensuring Basic Access for Rural Communities* (Vol. 23). World Bank Publications.

Ledec, G and Quintero, J. D. (2003). Good Dams and Bad Dams: Environmental Criteria for Site Selection of Hydroelectric Projects. Available online: https://openknowledge.worldbank.org/bitstream/handle/10986/20226/303600NWP0Good000010Box18600PUBLIC0.pdf?sequence=1. Accessed on 15 October 2021.

Li, D, Liu, M and Liu, J. (2020). Design Strategy of Rural Settlement Landscape: A Case Study of Xinji Village in Beijing. *Journal of Landscape Research*, 12(2), 26-36.

Li, Q. S, Li, Z.N, Li, G.Q, Meng, J.F and Tang, J. (2005). Experimental and Numerical Seismic Investigations of the Three Gorges Dam. *Engineering Structures*, 27(4), 501-513.

Ling, T.Y and Chiang, Y.C. (2018). Well-being, Health and Urban Coherence-Advancing Vertical Greening Approach Toward Resilience: A Design Practice Consideration. *Journal of Cleaner Production, 182*, 187-197.

Liru, P and Heinecken, L. (2021). Building Resilience: The Gendered Effect of Climate Change on Food Security and Sovereignty in Kakamega-Kenya. *Sustainability 2021*, 13, 3751.

Liu, Y and Li, Y. (2017). Revitalize the World's Countryside. *Nature News*, 548(7667), 275-277.

Liu, Y, Chun, O.U, Yao, X and Yuan, H. (2021). Landscape Design of Hill Ecology and Rural Human Settlement Environment Based on the Analysis of Geographic Information System. *Arabian Journal of Geosciences*, 14(16), 1-18.

Liu, Y, Li, J and Yang, Y. (2018). Strategic Adjustment of Land Use Policy Under the Economic Transformation. *Land Use Policy*, 74, 5-14.

Loayza, N. V, Olaberria, E, Rigolini, J and Christiaensen, L. (2012). Natural Disasters and Growth: Going Beyond the Averages. *World Development*, 40(7), 1317-1336.

Lorenzon, M. (2021). From Chaff to Seagrass: The Unique Quality of Minoan Mudbricks. A Geoarchaeological Approach to the Study of Architectural Craft Specialization in Bronze Age Crete. *Journal of Archaeological Science: Reports*, 40, 103-122.

Lorimer, J. (2008). Living Roofs and Brownfield Wildlife: Towards a Fluid Biogeography of UK Nature Conservation. *Environment and Planning A*, 40(9), 2042-2060.

Lucas, R.E. (1985). Migration Amongst the Batswana. *The Economic Journal*, 95(378), 358-382.

Luetz, J. (2018). Climate Change and Migration in Bangladesh: Empirically Derived Lessons and Opportunities for Policy Makers and Practitioners. In *Limits to Climate Change Adaptation* (pp. 59-105). Springer, Cham.

Mabaso, E and Manyena, S.B. (2013). Contingency Planning in Southern Africa: Events Rather than Processes. *Jàmbá: Journal of Disaster Risk Studies*, 5(1), 1-8.

Mafi-Gholami, D, Jaafari, A, Zenner, E. K, Kamari, A. N, and Bui, D. T. (2020). Vulnerability of Coastal Communities to Climate Change: Thirty-year Trend Analysis and Prospective Prediction for the Coastal Regions of the Persian Gulf and Gulf of Oman. *Science of the Total Environment*, 741, 140305.

Maidanevych, Y.P, Romanishina, T. S, Rysakova, L.E, Bondarenko, N.G and Mihailuk, O.V. (2018). Investment Instruments to Stimulate Depressed Regions' Development. *European Research Studies Journa*l, XXI (2), 476-488.

Mair, J and Duffy, M. (2021). Who has the Right to the Rural? Place Framing and Negotiating the Dungog Festival, New South Wales, Australia. *Journal of Sustainable Tourism*, 29(2-3), 176-192.

Manatsa, D, Wuta, M, Mushore, T. D and Chemura, A. (2020). Report on Revised Agro-Ecological Zones of Zimbabwe (In Press). Revision of Zimbabwe's Agro-Ecological Zones, Harare, Government of Zimbabwe.

Mangwanya, L. (2019). *Lives at Risk: A Study of Tsetse Fly Effects in Hurungwe District, Zimbabwe*, Harare: (Doctoral Dissertation, University of Zimbabwe).

Manyanhaire, I.O, Rwafa, R and Mutangadura, J. (2011). A Theoretical Overview of the Growth Centre Strategy: Perspectives for Reengineering the Concept in Zimbabwe. *Journal of Sustainable Development in Africa*, 13(4), 1-13.

Manyena, B.S. (2006). Rural Local Authorities and Disaster Resilience in Zimbabwe. *Disaster Prevention and Management: An International Journal*, 15(5), 810-820.

Maphosa, B. (1994). Lessons from the 1992 Drought in Zimbabwe: The Quest for Alternative Food Policies. *Nordic Journal of African Studies*, 3(1),53-58.

Marshall, J, Wiltshire, J, Delva, J, Bello, T and Masys, A. J. (2020). Natural and Manmade Disasters: Vulnerable Populations. In *Global Health Security* (pp. 143-161). Springer, Cham.

Mashizha, T.M. (2019). Building Adaptive Capacity: Reducing the Climate Vulnerability of Smallholder Farmers in Zimbabwe. *Business Strategy and Development*, 2(3), 166–174.

Mashula, N, Ntombela, N. G, Kunene, H. P, Sehlapelo, D and Pophiwa, N. (2021). Exploring the Migration Effects of Cyclones and Floods in Southern Africa: A Focus on 2019 Floods and Cyclones Idai and Kenneth. In: *The Increasing Risk of Floods and Tornadoes in Southern Africa* (pp. 175-190). Springer, Cham.

Masiiwa, M. (2005). The Fast Track Resettlement Programme in Zimbabwe: Disparity between Policy Design and Implementation. *The Round Table*, 94(379), 217-224.

Masilela, C and Weiner, D. (1996). Resettlement Planning in Zimbabwe and South Africa's Rural Land Reform Discourse. *Third World Planning Review*, 18(1), 23.

Massey, D. S. (1996). The Age of Extremes: Concentrated Affluence and Poverty in the Twenty-first Century. *Demography*, 33(4), 395-412.

Matamanda, A.R, Chirisa, I, Dzvimbo, M.A and Queen L. C. (2020). The political Economy of Zimbabwean Urban Informality Since 2000 – A contemporary Governance Dilemma. *Development Southern Africa*, 37(4), 694-707.

Matarira, C.H. (1990). Drought over Zimbabwe in a Regional and Global Context. *International Journal of Climatology*, 10(6), 609-625.

Mathews, A. (2019). What Developing Countries can Learn from Europe's Experience with Rural Revitalisation? Available online: http//;doi.org/10.1080/13602365.2019.1458744. Accessed on 15 October 2021.

Matyas, C.J and Silva, J.A. (2013). Extreme Weather and Economic Well-being in Rural Mozambique. *Natural Hazards*, 66(1), 31-49.

Mavhura, E and Mapuva, J. (2021). Barriers for Local Authorities to Invest in Disaster Risk Reduction: Evidence from Zimbabwe. *South African Geographical Journal*, 104(1), 1-15.

Mavhura, E, Manyangadze, T and Aryal, K. R. (2021). A Composite Inherent Resilience Index for Zimbabwe: An Adaptation of the Disaster Resilience of Place Model. *International Journal of Disaster Risk Reduction*, 57, 1102 – 152.

Mavhura, E. (2017). Applying a Systems-thinking Approach to Community Resilience Analysis Using Rural Livelihoods: The Case of Muzarabani District, Zimbabwe. *International Journal of Disaster Risk Reduction*, 25, 248-258.

Mavhura, E. (2017). Building Resilience to Food Security in Rural Communities: Evidence from Traditional Institutions in Zimbabwe. *Journal of Disaster Risk Studies*, 9(1), 1-9.

Mazel-Cabasse, C. (2017). Hybrid Disasters—Hybrid Knowledge. *Resilience: A New Paradigm of Nuclear Safety. From Accident Mitigation to Resilient Society Facing Extreme Situations. Heidelberg, New York: Springer*, 337-351.

McCabe, J.T and Quandt, A. (2019). Drought: A Challenge to Livelihoods, Sustainability and Resilience. In: *The Angry Earth* (pp. 212-226). Routledge.

Mcwilliam, M. (2003). Zimbabwe and the Commonwealth. *The Round Table*, 92(368), 89-98.

Meza, I, Rezaei, E. E, Siebert, S, Ghazaryan, G, Nouri, H, Dubovyk, O and Hagenlocher, M. (2021). Drought risk for agricultural systems in South Africa: Drivers, Spatial Patterns and Implications for Drought Risk Management. *Science of the Total Environment*, 799, 149505.

Mfum-Mensah, O. (2018). *Education Marginalization in Sub-Saharan Africa: Policies, Politics and Marginality*. Rowman & Littlefield.

Mideksa, S, Galang, D. D, Endeshaw, M, Feyera, F, Gebreyohannes, Y, Ararso, D and Solomon, D. (2021). Social Support as Determinants of Disaster Preparedness. *Ethiopian Journal of Public Health and Nutrition*, 4(2), 89-94.

Ministry of Environment and Natural Resources Management. (2010). Zimbabwe's 4th Natural Report to the Convention on Biological Diversity. Republic of Zimbabwe.

Mirza, M. M. Q. (2003). Climate Change and Extreme Weather Events: Can Developing Countries Adapt? *Climate Policy*, 3(3), 233-248.

Mitrică, B, Şerban, P, Mocanu, I, Grigorescu, I, Damian, N and Dumitraşcu, M. (2020). Social Development and Regional Disparities in the Rural Areas of Omania: Focus on the Social Disadvantaged Areas. *Social Indicators Research*, 152(1), 67-89.

Mkodzongi, G and Lawrence, P. (2019). The Fast-Track Land Reform and Agrarian Change in Zimbabwe. *Review of African Political Economy*, 46(159), 1-13.

Mlambo, V. (2018). An Overview of Rural-Urban Migration in South Africa: Its Causes and Implications. *Archives of Business Research*, 6(4). 1-12.

Moallemi, E. A, Malekpour, S, Hadjikakou, M, Raven, R, Szetey, K, Ningrum, D, .. and Bryan, B. A. (2020). Achieving the Sustainable Development Goals Requires Transdisciplinary Innovation at the Local Scale. *One Earth*, 3(3), 300 - 313.

Moore, D. S. (1999). The Crucible of Cultural Politics: Reworking "Development" in Zimbabwe's Eastern Highlands. *American Ethnologist*, 26(3), 654-689.

Moore, D.S. (2005). *Suffering for Territory: Race, Place and Power in Zimbabwe*. Duke University Press.

Morrow, B. H. (1999). Identifying and Mapping Community Vulnerability. *Disasters*, 23(1), 1-18.

Moyana, H.V. (1975). Land and Race in Rhodesia. *African Review*, 5(1), 17-41.

Moyana, H.V. (2002). *The Political Economy of Land in Zimbabwe* (No. rev. ed.). Gweru: Mambo Press.

Moyo, S. (2011). Three Decades of Agrarian Reform in Zimbabwe. *Journal of Peasant Studies*, 38(3), 493-531.

Muchineripi, I. (2020). Zimbabwe Adopts National Human Settlements Policy. Available online: https://africaurban.org/zimbabwe-adopts-national-human-settlements-policy/ Accessed on 15 October 2021

Mugambiwa, S. S and Makhubele, J. C. (2021). Anthropogenic Flash Floods and Climate Change in Rural Zimbabwe: Impacts and Options for Adaptation. *Technium Soc. Sci. J*, 21, 809 - 819.

Mugambiwa, S. S. (2018). Adaptation Measures to Sustain Indigenous Practices and the use of Indigenous Knowledge Systems to Adapt to Climate Change in Mutoko Rural District of Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, 10(1), 1-9.

Mugandani, R, Wuta, M, Makarau, A and Chipindu, B. (2012). Re-Classification of Agro-Ecological Regions of Zimbabwe in Conformity with Climate Variability and Change. *African Crop Science Journal*, 20(2), 361 – 369.

Mukanganise, R. (2011). *Disaster Preparedness at Community Level in Zimbabwe: The Case of Chirumanzu and Mbire* (Doctoral dissertation, PhD Thesis, Harare: Women's University in Africa).

Murdoch, J and Marsden, T. (2013). *Reconstituting Rurality*. London: Routledge.

Murisa, T. (2010). Social Development in Zimbabwe. Harare: Development Foundation of Zimbabwe.

Murombedzi, J. (2003). Pre-colonial and Colonial Conservation Practices in Southern Africa and their Legacy today. *Unpublished IUCN manuscript*.

Murphy, H.H.E. (1997). Rural Lessons for Urban Services. *Journal of Mental Health*, 6(1), 11-22.

Musandu-Nyamayaro, O. (2008). The Case for Modernization of Local Planning Authority Frameworks in Southern and Eastern Africa: A Radical Initiative for Zimbabwe. *Habitat International*, 32(1), 15-27.

Musarurwa, C and Lunga, W. (2015). Climate Change Mitigation and Adaptation: Threats and Challenges to Livelihoods in Zimbabwe. *Asian Journal of Social Sciences and Humanities*, 1(2), 2186-8484.

Mutasa, M. (2011). Climate Change Vulnerability and Adaptation in Failing States: Zimbabwe's Drought Struggle. In *Initiative on Climate Adaptation Research and Understanding through the Social Sciences (ICARUS-2) Meeting at the University of Michigan (May 5–8) themed, "Vulnerability and Adaptation: Marginal Peoples and Environments*.

Mutenga, R. C and Namasasu, O. (1988). Growth Point Development in Zimbabwe: The Case of Chiendambuya, GEM 11(∘), Harare, Mt Pleasant: GAZ.

Mutizwa-Mangiza, N.D. (1990). Decentralisation and District Development Planning in Zimbabwe. *Public Administration and Development*, 10(4), 423-435.

Mutopo, P. (2014). *Women, Mobility and Rural Livelihoods in Zimbabwe: Experiences of Fast Track Land Reform*. Leiden, Boston: Brill.

Muzah, O. (2018). *A Synthesis of Rural Livelihood Approaches in Analysing Household Poverty, Food Security and Resilience: A Case Study of Rushinga Rural District in Zimbabwe* (Doctoral Dissertation).

Naing, N and Hadi, K. (2020). Vernacular Architecture of Buginese: The Concept of Local-Wisdom in Constructing Buildings Based on Human Anatomy. *International Review for Spatial Planning and Sustainable Development*, 8(3), 1-15.

Naminse, E. Y and Zhuang, J. (2018). Does Farmer Entrepreneurship Alleviate Rural Poverty in China? Evidence from Guangxi Province. *PloS one*, 13(3), e0194912.

National Research Council and Geographical Sciences Committee. (2011). *Building Community Disaster Resilience Through Private-Public Collaboration*. National Academies Press.

Ncube, A, Mangwaya, P. T and Ogundeji, A. A. (2018). Assessing Vulnerability and Coping Capacities of Rural Women to Drought: A Case Study of Zvishavane District, Zimbabwe. *International Journal of Disaster Risk Reduction*, 28, 69-79.

Ndlovu, E, Prinsloo, B and Le Roux, T. (2020). Impact of Climate Change and Variability on Traditional Farming Systems: Farmers' Perceptions from South-West, Semi-Arid Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, 12(1), 1-19.

Nelson, D.R, Adger, W.N and Brown, K. (2007). Adaptation to Environmental Change: Contributions of a Resilience Framework. *Annu. Rev. Environ. Resour*, 32,395-419.

Newton, P and Benzeev, R. (2018). The Role of Zero-Deforestation Commitments in Protecting and Enhancing Rural Livelihoods. *Current Opinion in Environmental Sustainability*, 32, 126-133.

Nguyen, D. N, Imamura, F and Iuchi, K. (2017). Public-private Collaboration for Disaster Risk Management: A Case Study of Hotels in Matsushima, Japan. *Tourism Management*, 61, 129–140.

Nhamo, G and Chikodzi, D. (2021). The Catastrophic Impact of Tropical Cyclone Idai in Southern Africa. In *Cyclones in Southern Africa* (pp. 3-29). Springer, Cham.

Nhamo, G, and Chikodzi, D. (Eds.). (2021). *Cyclones in Southern Africa: Volume 3: Implications for the Sustainable Development Goals*. Springer Nature.

Nhamo, G, Dube, K and Saurombe, T. (2021). Impact of Tropical Cyclone Idai on Tourism Attractions and Related Infrastructure in Chimanimani, Zimbabwe. In *Cyclones in Southern Africa* (pp. 245-264). Springer, Cham.

Nharirire, E. (2018). An Investigation into the Relationship between Spiritual Intelligence, Emotional Intelligence, Coping Ability and Burnout among Humanitarian Aid Workers in Zimbabwe (Doctoral Dissertation), Pretoria, UNISA.

Njoh, A. J. (2009). Ideology and Public Health Elements of Human Settlement Policies in Sub-Saharan Africa. *Cities*, 26(1),9-18.

Nwaka, G.I. (1989). Doubts and Directions in Nigerian Urban Policy. *Public Administration and Development*, 9(1), 49-63.

Nyandoro, M. (2021). Forced Migration, Resistance and Adaptation: The Madheruka Cotton Production and Differentiation in Pre-Irrigation Era Sanyati, Zimbabwe, 1950–1967. *South African Historical Journal*, 73(2), 462-493.

Oberlack, C, Tejada, L, Messerli, P, Rist, S and Giger, M. (2016). Sustainable Livelihoods in the Global Land Rush? Archetypes of Livelihood Vulnerability and Sustainability Potentials. *Global Environmental Change*, 41, 153-171.

Onyango, M.A and Uwase, M. (2017). Humanitarian Response to Complex Emergencies and Natural Disasters: Natural Disasters. International Encyclopaedia of Public Health (Second Edition). Available online: http://doi.org/10.1016/B978-0-12-803678-5.00519-1. Accessed on 15 October 2021.

Otto, I. M, Donges, J. F, Cremades, R, Bhowmik, A, Hewitt, R. J, Lucht, W and Schellnhuber, H. J. (2020). Social Tipping Dynamics for Stabilizing Earth's Climate by 2050. *Proceedings of the National Academy of Sciences*, 117(5), 2354-2365.

Owens, T, Hoddinott, J and Kinsey, B. (2003). Ex-ante Actions and Ex-post Public Responses to Drought Shocks: Evidence and Simulations from Zimbabwe. *World Development*, 31(7), 1239-1255.

Parr, J.B. (1966). Outmigration and the Depressed Area Problem. *Land Economics*, 42(2), 149-159.

Passmore, G.C. (1971). Historical Rationale of the Policy of Community Development in the African Rural Areas of Rhodesia. *Zambezia*, 2(1), 61-70.

Patel, S. K, Mathew, B, Nanda, A, Mohanty, B and Saggurti, N. (2020). Voices of Rural People: Community-level Assessment of Effects and Resilience to Natural Disasters in Odisha, India. *International Journal of Population Studies*, 6(1), 3-15.

Paton, D and Johnston, D. (2017). *Disaster Resilience: An Integrated Approach*. Charles C Thomas Publisher, Springfield, Illinois.

Paul, B. K. (Ed.). (2020). *Natural Hazards and Disasters: From Avalanches and Climate Change to Water Spouts and Wildfires [2 volumes]*. ABC-CLIO.

Peek, L. (2008). Children and Disasters: Understanding Vulnerability, Developing Capacities and Promoting Resilience—An Introduction. *Children Youth and Environments*, 18(1), 1-29.

Pendall, R, Goodman, L, Zhu, J and Gold, A. (2016). The Future of Rural Housing. Available online: https://www.urban.org/sites/default/files/publication/85101/2000972-the-future-of-rural-housing_6.pdf. Accessed on 2 September 2019.

Pentland, A, Fletcher, R, and Hasson, A. (2004). Daknet: Rethinking Connectivity in Developing Nations. *Computer*, 37(1), 78-83.

Perera, D, Agnihotri, J, Seidou, O and Djalante, R. (2020). Identifying Societal Challenges in Flood Early Warning systems. *International Journal of Disaster Risk Reduction*, 51, 101794.

Phimister, I. (1993). Rethinking the Reserves: Southern Rhodesia's Land Husbandry Act Reviewed. *Journal of Southern African Studies*, 19(2), 225-239.

Phokaides, P. (2018). Rural Networks and Planned Communities: Doxiadis Associates' Plans

Píša, J, and Hruška, V. (2019). Entrepreneurial In-Migration and Rural Development in Czechia: A Challenge of Integrating the Local and Extra-Local in Rural Planning. *Geographia Polonica*, 92(3), 347-363.

Piwowar, A, and Dzikuć, M. (2020). Poverty and Social Exclusion: Is this a Problem in Rural Areas in the Visegrad Group Countries? *European Research Studies Journal*, 23(2), 13-24.

Plieninger, T and Bieling, C. (2013). Resilience-based Perspectives to Guiding High-Nature-Value Farmland through Socioeconomic Change. *Ecology and Society*, 18(4), 20 – 35..

Prasad, A.S and Francescutti, L.H. (2017). Mitigation United Nations Drought Risk Reduction: Natural Disasters. International Encyclopaedia of Public Health (Second Edition). Available online: http://doi.org/10.1016/B978-0-12-803678-5.00519-1. Accessed on 15 October 2021.

Prasada, D. V. P. (2020). Climate Resilience and Varietal Choice: A Path Analytic Model for Rice in Bangladesh. *Journal of Agribusiness in Developing and Emerging Economies*, 12(1), 40-55.

Putri, I. A. P, Dalimunthe, S. A and Prasojo, A. P. S. (2019). The Right to Live Dangerously: Public Perceptions of Extreme Water Events in Urban Areas. In *2nd International Conference on Strategic and Global Studies (ICSGS 2018)* (Vol. 365). Atlantis Press.

Rasmussen, J. (1990). Small Urban Centres and the Development of Local Enterprises. In: Baker, J. ed, *Small town Africa: Studies in rural-urban interaction* (Vol. 23). Nordic Africa Institute.

Repko, A.F and Szostak, R. (2020). *Interdisciplinary Research: Process and Theory*. Sage Publications.

Robins, S.L. (1994). Contesting the Social Geometry of State Power: A Case Study of Land-use Planning in Matabeleland, Zimbabwe. *Social Dynamics*, 20(2), 91-118.

Roessler, P, Pengl, Y. I, Marty, R, Titlow, K. S and van de Walle, N. (2020). *The Cash Crop Revolution, Colonialism and Legacies of Spatial Inequality: Evidence from Africa* (No. 2020-12). Centre for the Study of African Economies, University of Oxford.

Rubhara, T.T, Mudhara, M, Oduniyi, O.S and Antwi, M.A. (2020). Impacts of Cash Crop Production on Household Food Security for Smallholder Farmers: A Case of Shamva District, Zimbabwe. *Agriculture*, 10(5), 188.

Rufai, M. O. (2018). *Nigerian Newspapers' Coverage of Crime and the Gratification of Readers' Safety Information Need 2010-2014* (Doctoral Dissertation), North-West University, South Africa.

Rukuni, M, Tawonezvi, P, Eicher, C, Munyuki-Hungwe, M and Matondi, P. (2006). Zimbabwe's Agricultural Revolution Revisited. *University of Zimbabwe Publications, Harare*, 119-140.

Sachs, J. D, Schmidt-Traub, G, Mazzucato, M, Messner, D, Nakicenovic, N and Rockström, J. (2019). Six Transformations to Achieve the Sustainable Development Goals. *Nature Sustainability*, 2(9), 805-814.

Sadhu, V. K. K, and Srikonda, R. (2020). Transformation of Vernacular Houses–Causes and Scenario. *International Journal of Engineering Trends and Technology (IJETT)*, 68(5), 38-45.

Sahle, M and Saito, O. (2021). Mapping and Characterizing the Jefoure Roads that have Cultural Heritage Values in the Gurage Socio-Ecological Production Landscape of Ethiopia. *Landscape and Urban Planning*, 210, 104078.

Saidi, U. (2017). Architectural Space-Designs, Meanings and Implications in Zimbabwe: An Artefactual Semiotic Approach. *The Dyke*, 11(2), 1 - 15.

Saja, A.A, Goonetilleke, A, Teo, M and Ziyath, A. M. (2019). A Critical Review of Social Resilience Assessment Frameworks in Disaster Management. *International Journal of Disaster Risk Reduction*, 35, 101096.

Sallu, S.M, Twyman, C and Stringer, L.C. (2010). Resilient or Vulnerable Livelihoods? Assessing Livelihood Dynamics and Trajectories in Rural Botswana. *Ecology and Society: A Journal of Integrative Science for Resilience and Sustainability*, 15(4).1-24.

Salvia, R and Quaranta, G. (2017). Place-based Rural Development and Resilience: A Lesson from a Small Community. *Sustainability*, 9(6), 889-902.

Schultz, J. (2013). Natural Disasters and Local Demographic Change in the United States. *Population and Environment*. 34, 293-312.

Scott, M, Gallent, N and Gkartzios, M. (2019). Planning Rural Futures. In: *The Routledge Companion to Rural Planning* (pp. 633-644). Routledge.

Scott, M. (2013). Resilience: A Conceptual Lens for Rural Studies? *Geography Compass*, 7(9), 597-610.

Scudder, T. (2012). Resettlement Outcomes of Large Dams. In: Biswas, A. K, Altinbilek, D and Tortajada, C. (Eds.). *Impacts of Large Dams: A Global Assessment* (pp. 37-67). Springer, Berlin, Heidelberg.

Seeliger, L and Turok, I. (2013). Towards Sustainable Cities: Extending Resilience with Insights from Vulnerability and Transition Theory. Sustainability 5, 2108–2128.

Seeliger, L and Turok, I. (2014). Averting a Downward Spiral: Building Resilience in Informal Urban Settlements through Adaptive Governance. Environment and Urbanisation, 26(1): 184–199.

Selman, P. (2009). Conservation Designations—Are they Fit for Purpose in the 21st Century? *Land Use Policy*, 26, S142-S153.

Shafqat, R, Marinova, D and Khan, S. (2021). Placemaking in Informal Settlements: The Case of France Colony, Islamabad, Pakistan. *Urban Science*, 5(2), 49-59.

Shammin, M. R, Enamul Haque, A. K and Faisal, I. M. (2022). A Framework for Climate Resilient Community-Based Adaptation. In *Climate Change and Community Resilience* (pp. 11-30). Springer, Singapore.

Sharaf, F. (2020). The Impact of Thermal Mass on Building Energy Consumption: A Case Study in Al Mafraq City in Jordan. *Cogent Engineering*, 7(1), 1804092.

Shekhar, H, Schmidt, A. J and Wehling, H. W. (2019). Exploring Wellbeing in Human Settlements-A Spatial Planning Perspective. *Habitat International*, 87, 66-74.

Shi, G, Zhou, J and Yu, Q. (2012). Resettlement in China. In: Biswas, A. K, Altinbilek, D and Tortajada, C. (Eds.). *Impacts of Large Dams: A Global Assessment* (pp. 219-241). Springer, Berlin, Heidelberg.

Shin, H.B. (2014). Contesting Speculative Urbanisation and Strategising Discontents. *City*, 18(4-5), 509-516.

Sibanda, B.M. (1985). Growth Points — A Focus for Rural Development in Zimbabwe. *Agricultural Administration*, 19(3), 161-174.

Siciliano, G., Del Bene, D., Scheidel, A., Liu, J and Urban, F. (2019). Environmental Justice

Silva, S. D, Nielsen, K. B and Bedi, H. P. (2020). Land Use Planning, Dispossession and Contestation in Goa, India. *The Journal of Peasant Studies*, 47(6), 1301-1326.

Singh, R.B. (Ed.). (2019). *Development Issues in Marginal Regions: Processes, Technological Developments and Societal Reorganisations*. Routledge.

Singh, A. (2020). Rural Housing Scheme in India: At a Glance. Available online: www.commonfloor.com. Accessed on 15 October 2021.

Soames, L. (1980). From Rhodesia to Zimbabwe. *International Affairs (Royal Institute of International Affairs (1944)*, 56(3), 405-419.

Soedirgo, J and Glas, A. (2020). Toward Active Reflexivity: Positionality and Practice in the Production of Knowledge. *PS: Political Science & Politics*, 53(3), 527-531.

Squires, V. R and Qi, L. (2018). Greater Central Asia: Its Peoples and their History and Geography. *This Volume*, 251-72.

Stainton, A, Chisholm, K, Kaiser, N, Rosen, M, Upthegrove, R, Ruhrmann, S and Wood, S. J. (2019). Resilience as a Multimodal Dynamic Process. *Early Intervention in Psychiatry*, 13(4), 725-732.

Stedman, R. C, Parkins, J. R and Beckley, T. M. (2005). Forest Dependence and Community Well-Being in Rural Canada: Variation by Forest Sector and Region. *Canadian Journal of Forest Research*, 35(1), 215-220.

Steiner, F. R. (2012). *The Living Landscape: An Ecological Approach to Landscape Planning*. Island Press.

Stevenson, J. R, Becker, J, Cradock-Henry, N, Johal, S, Johnston, D and Seville, E. (2017). Economic and Social Reconnaissance: Kaikōura Earthquake 2016. *Bulletin of the New Zealand Society for Earthquake Engineering*, 50(2), 343–351.

Sujuan, H.A.N. (2020). Optimal Design of Rural Human Settlements Under the Background of New Era. *Journal of Landscape Research*, 12(2), 71-73.

Sultana, F. (2018). Gender and Water in a Changing Climate: Challenges and Opportunities. In *Water Security Across the Gender Divide* (pp. 17-33). Springer, Cham.

Sun, S.Y and Wu, H.L. (2012). On the Transfer of the Right of Using Rural Residence Land. *Journal of Hunan University of Science and Technology* (Social Science Edition), 01.

Tastemir, I. A and Arpacioglu, U. (2019). Evaluation of the Energy Efficiency of the Mudbrick Building Material in the Building Envelope at Traditional Rural Architecture; Case Study of Tongurlar Village in Golpazarı.Kerpic'19 – Earthen Heritage, New Technology, Management, 7th International Conference.

World Bank. (2019). Zimbabwe: Agriculture Sector Disaster Risk Assessment, Harare: World Bank

Tickamyer, A.R and Kusujiarti, S. (2020). Riskscapes Of Gender, Disaster and Climate Change in Indonesia. *Cambridge Journal of Regions, Economy and Society*, 13(2), 233-251.

Tickamyer, A.R and Duncan, C.M. (1990). Poverty and Opportunity Structure in Rural America. *Annual Review of Sociology*, 16(1), 67-86.

Toniolo, S. (2018). The Normality of Adaptation Organisational Resilience and the Interplay Between Risk and Protective Factors. Available online: http://tesi.cab.unipd.it/62270/1/Toniolo_Simone.pdf. Accessed on 15 October 2021.

Traczykowski, L. (2017). *The Ethics of Natural Disaster Intervention* (Doctoral dissertation, University of Birmingham).

Tura, H. (2014). Women's Right to and Control over Rural Land in Ethiopia: The Law and the Practice. *International Journal of Gender and Women's Studies*, 2(2), 137-165.

Tyagi, R., Vishwakarma, S., Yadav, S. Sand Stanislavovich, T.A. (2021). Community Self-

UKAID. (2010). The Livelihoods Centred Approach to Disaster Risk Reduction: Lessons from Matebeleland South, Zimbabwe. Practical Action Southern Africa.

Umeh, E and Onyekperem, C. (2019). Global Warming Issues, Challenges and Vulnerable Africa–Cleaner Energy Possibilities, Emission Reduction Analysis and Mitigation Strategies. In *SPE Nigeria Annual International Conference and Exhibition*. OnePetro.

United Nations. (2017). Resolution Adopted by the General Assembly on 6 July 2017, Work of the Statistical Commission Pertaining to the 2030 Agenda for Sustainable Development (A/RES/71/313).

Useem, M, Kunreuther, H and Michel-Kerjan, E. (2020). Leadership Dispatches. In *Leadership Dispatches*. Stanford University Press.

Van der Ploeg, J. D, Jingzhong, Y and Schneider, S. (2012). Rural Development through the Construction of New, Nested, Markets: Comparative Perspectives from China, Brazil and the European Union. *Journal of Peasant Studies*, 39(1), 133-173.

Van der Post, C.H.M. (2004). Human Sprawl and the African Wilderness of the Okavango. *South African Geographical Journal*, 86(2),122-130.

Van Wyk, B. (2013). *Field Guide to Trees Of Southern Africa*. Penguin Random House South Africa.

Varpio, L and MacLeod, A. (2020). Philosophy of Science Series: Harnessing the Multidisciplinary Edge Effect by Exploring Paradigms, Ontologies, Epistemologies, Axiologies, and Methodologies. *Academic Medicine*, 95(5), 686-689.

Vasbinder, J. W. (Ed.). (2018). *Disrupted Balance-Society at Risk* (Vol. 6). World Scientific.

Vitale Brovarone, E and Cotella, G. (2020). Improving Rural Accessibility: A multilayer Approach. *Sustainability*, 12(7), 2876.

Walsh-Dilley, M and Wolford, W. (2015). (Un)Defining Resilience: Subjective Understandings of 'Resilience' from the Field. *Resilience*, 3(3), 173-182.

Weigend, G.G. (1985). German Settlement Patterns in Namibia. *Geographical Review*, 75(2)156-169.

Weiner, D, Moyo, S, Munslow, B and O'Keefe, P. (1985). Land-use and Agricultural Productivity in Zimbabwe. *The Journal of Modern African Studies*, 23(2), 251-285.

White, I and O'Hare, P. (2014). From Rhetoric to Reality: Which Resilience, Why Resilience, And Whose Resilience in Spatial Planning? *Environment and Planning C: Government and Policy*, 32(5), 934-950.

Williams, A.D. (2015). A Framework for A Sustainable Land Use Management System in Traditional Xhosa Cultural Geo-Social Zone of the Rural Eastern Cape South Africa. Available online: https://scholar.ufs.ac.za/bitstream/handle/11660/2328/WilliamsAD.pdf?sequence=1and isAllowed=y. Accessed on 14 October 2021.

Wiryomartono, B. (2022). The Ontology of Home: Recollection and Retreat. In *Architectural Humanities in Progress* (pp. 195-210). Springer, Cham.

World Bank Group. (2018). *Overcoming Poverty and Inequality in South Africa: An Assessment of Drivers, Constraints and Opportunities*. Washington DC: World Bank.

Yang, H, Dietz, T, Yang, W, Zhang, J and Liu, J. (2018). Changes in Human Well-Being And Rural Livelihoods Under Natural Disasters. *Ecological Economics*, 151, 184-194.

Yankson, P.W.K and Owusu, G. (2007). Poverty in Ghana is Basically a Rural Phenomenon: Are we Underestimating Urban Poverty? Available online: http://ugspace.ug.edu.gh/handle/123456789/611. Accessed 14 October 2021.

Yao, D, Peng, Z, Kaneko, Y, Fry, B and Meng, X. (2021). Dynamic Triggering of Earthquakes in the North Island of New Zealand following the 2016 Mw 7.8 Kaikōura earthquake. *Earth and Planetary Science Letters*, 557, 116723.

Yuan, J, Lu, Y, Ferrier, R.C, Liu, Z, Su, H, Meng, J and Jenkins, A. (2018). Urbanization, Rural Development and Environmental Health in China. *Environmental Development*, 28, 101-110.

Zamisa, N. A and Mutereko, S. (2019). The Role of Traditional Leadership in Disaster Management and Disaster Risk Governance: A Case of Ugu District Municipality By-laws. *Journal of Disaster Risk Studies*, 11(1), 1-9.

Zhao, X, Sun, H, Chen, B, Xia, X and Li, P. (2019). China's Rural Human Settlements: Qualitative Evaluation, Quantitative Analysis and Policy Implications. *Ecological Indicators*, 105, 398-405.

Zhou, W, Ma, Z, Guo, S, Deng, X and Xu, D. (2021). Livelihood Capital, Evacuation and Relocation Willingness of Residents in Earthquake-Stricken Areas of Rural China. *Safety Science*, 141, 105350.

Zinyama, L and Whitlow, R. (1986). Changing Patterns of Population Distribution in Zimbabwe. *GeoJournal*, 13(4), 365-384.

Zinyama, L.M. (1988). Changes in Settlement and Land Use Patterns in a Subsistence Agricultural Economy: A Zimbabwe Case Study, 1956–1984. *Erdkunde*, 42, 49-59.

Zoomers, A, Van Noorloos, F, Otsuki, K, Steel, G and Van Westen, G. (2017). The Rush for Land in an Urbanizing World: From Land Grabbing Toward Developing Safe, Resilient and Sustainable Cities and Landscapes. *World Development*, 92, 242-252.

Zywert, K and Quilley, S. (Eds.). (2020). *Health in the Anthropocene: Living Well on a Finite Planet*. University of Toronto Press.

# APPENDICES

## Appendix 1: My Publications

| Category | Title of Paper/Publication | Abstract | Status | DOI |
|---|---|---|---|---|
| **A1:** | Zooming Regions into Perspective: Climate Change, Resilience and Settlement Planning Systems | This chapter is informed by literature and document review and content analysis. The chapter draws on the recent tropical cyclonic disasters that are associated with most African dwellers succumb largely to the impacts of natural occurrences following the disasters. The chapter recognises that the disasters are artificial albeit linked to anthropogenic activities. The chapter observes that the existing infrastructure in the affected area is not adaptable enough to deal with the environmental change, as such, leading to huge costs repairing the damage caused. The findings of the study underpinning this chapter confirm that most developments in the rural areas of Africa are incremental and not guided by any form of planning. Rural houses are typically developed without any standardized template and. The rural dwellers often develop sub-standard buildings constructed without heeding building standards. Thus, this chapter suggests that planning standards should be prerequisite for the development of sustainable rural settlements in Africa. By extension, there is also need to develop context specific building materials for the construction of durable and affordable housing structures in rural Africa. | Published | R. Brears (ed.), *The Palgrave Encyclopedia of Urban and Regional Futures*, https://doi.org/10.1007/978-330-51812-7_132-1 |
| **A2:** | Rural Land-use Planning and Livelihood Dynamics in Post-2000 Zimbabwe | This chapter advances a debate for rural land-use planning by making a nuanced analysis of the dynamics surrounding livelihoods by households under the impact of climate change, economic stress and urbanisation in Zimbabwe post-2000. It is argued that the period has seen many changes in the rural landscape with the general net effect that has pushed households to | Published | https://link.springer.com/chapter/10.1007/978-330-76624-5_14 |

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| | | damage their environment, destroying biodiversity and making it difficult for the practice of sustainable land-use planning as espoused in various policy and legislative -instruments of the country. Using archival data and case studies, the chapter examines the concepts and realities of the interface of climate change and urbanisation. The research employed a desktop review of published documents and governmental papers. Climate change is both a cause and effect, particularly with respect to drought and famine that has caused households to resort to various strategies, including migration to rural business centres, growth points and to intermediate and major cities and towns within the country or outside. Remittances now play a major role in cushioning the rural households. A community-based resilience model is suggested under these circumstances. | | |
| **A3:** | Conflicts, Confrontations and Conduits in Rural Environments: Is Resilience at Work in Gokwe South Rural District? | This article explores conflicts, confrontations and conduits for sustainable development in rural environments. Fragility and degradation with a slight resilience manifest heavily in Gokwe South Rural District (GSRD), Zimbabwe. The article notes rural development as a double-edged sword, bringing tremendous opportunities for innovation but also causing increased ecological degradation. As such, it often results in conflicts and confrontations among stakeholders. Like many Zimbabwean rural settlements, GSRD is experiencing serious land disputes. Conflicts arise from the proposed changes, like extension of infrastructure, perceived by some stakeholders as contrary to their interests and wishes. Using focus group discussions and thematic analysis, a trend of how conflicts and confrontations emerged was established in GSRD. The findings show that land transition from rural to urban status | Accepted | |

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| | | without consultations instigates conflict between different development agencies and communities. | | |
| **A4:** | Socio-Ecological Dynamics within Rural Settlements: Evidence from Mbire District in Zimbabwe | Humans are a part of and not separate from nature and, as such, policies that enhance the co-relationship of humans and nature while adaptive is a necessity now than before. The article investigates the socio-ecological dynamics within rural settlements in Mbire, Zimbabwe. The article provides reasons beyond people's migration to Mbire from some parts of Zimbabwe. It brings out the increase in school dropouts in Mbire and how teachers are understaffed. The study unravels the issues concerning black magic that was practised then, the school dropouts in Mbire, the history of people moving in search of salt, their communication with spirit mediums and cotton farming. Interviews and desktop research were used, with content analysis for data analysis and collection. The remedy for meeting challenges arising from socio-ecological changes in facilitating adaptive measures that meet the emerging needs of communities without compromising nature's rights. | Published | DOI: 10.1177/2321024922109000 3 |
| **B1:** | Indicators and Measurement in Climate Change, Spatial Planning and Resilience in Rural Settlements | Climate change impacts on both rural and urban livelihoods. This is a result of the effects of climate change on agricultural production where agriculture forms the backbone of rural economies. Rural communities are more vulnerable to the effects of climate change due to their marginalised location, low levels of technology and reliance on rain fed agriculture. A resilient system has the capacity to respond positively to change, including monitoring, anticipating and managing actions to be taken in response to and preparation for on-going changes in climate. This conceptual paper addresses the issue of climate change adaptation and resilience strategies in rural Zimbabwe. This research contributes to literature on indicators and measurement of climate | Submitted | |

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| | | change, resilience and spatial planning with particular reference to rural settlements. | | |
| **B2:** | Resilience and Climate Change in Rural Areas: A Review of Infrastructure Policies Across Global Regions | Increasing attention is being paid to the role of policy frameworks in climate change research and new studies show that they form an essential source of resilience. However, the role of policy frameworks for infrastructure in respect of resilience and climate change remains under-explored, as there is limited empirical evidence on what and how they can be formulated. This article contributes to this field of research by examining how infrastructure policy in rural areas regarding climate change is planned and implemented across different regions in the world. The study combines documentary and literature reviews from initiatives undertaken at regional, national and local levels. The literature draws on the related policy experiences in North America, South America, Asia, Australia and Africa. The findings show that, both hard and soft approaches are used to enhance infrastructure related climate change resilience. However, most of these strategies are still in experimental stages or taken at national level. As a result, the attempts initiated do not tally with the capacity and climate change challenges of rural regions. Rural regions, based on their unique characteristics, call for different infrastructure-climate change resilience strategies to be effective. | Published | doi/abs/10.1080/23789689.2020.1871538?journalCode=tsri20 |
| **B3:** | Resilience Thinking in the Rural Human Settlements' Development and Management | The article makes a case for the integration of resilience thinking in the debate on rural human settlements in regional planning. It observes the numerous definitions of resilience within different research traditions, disciplines and fields, such as sociology, psychology, medicine, engineering, economics, ecology and political science have affected the decision-making processes in different human settlements across the globe. The dynamics of integrating | Published | 10.1177/0973005221100167 4 |

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| | | resilience theory and practice into rural settlement planning and implications for sustainable development are little understood. The article suggests the broadening of resilience drawing on diverse perspectives that appeal to wide ranging interdisciplinary experiences. Using the multi-case study approach, the article suggests how ideas of resilience can be translated into practice and how practices of resilience can be theorised in the context of regional planning in Zimbabwe. Undoubtedly, an integrated framework for the development country's space economy should accommodate a wide range of concepts, strategies and models of resilience together with the underpinning policy implementation modalities. | | |
| **C1:** | Opportunities in Master and Local Planning for Resilient Rural Settlement in Zimbabwe | With a predicted increase in climate change and its impacts across the globe, the mainstreaming of disaster management in development planning forms the key in preserving development gains. Likewise, the level of disaster risk adaptiveness determines the threats of hazardous events. This article explores the potential for embracing rural local development plans/ local development planning as a tool for fostering disaster resilience in Zimbabwe. Thus, the major question is, "how can local development plans be used as tools for mainstreaming disaster management for disaster resilience in rural Zimbabwe?" In answering this question, the study employs literature review using case studies drawn from experiences in countries across the globe. The results were analysed using thematic analysis. Results indicate that local development plans can successful be used for improving disaster risk adaptiveness through land-use zoning, infrastructure and building codes, capital budgeting among other dimensions. Furthermore, based on the demonstrated failure and costs of contingency disaster management over three | Published | https://doi.org/10.1016/j.jrurstud.2021.05.026 |

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| | | decades. However, the successful mainstreaming of disaster management in local development planning demands a number of factors to be accounted for. These factors include institutional capacity building, building political will for long-term investment in disaster adaptiveness as opposed to relief and also cultural transformation where development planners have to see disaster management as a corner stone to delivering their overall rural development targets, rather than view it as separate from development. Furthermore, the acceptability of policies to local knowledge systems and communities is critical. | | |
| **C2:** | The Scope and Limits in Embracing Model Building By-laws and Standards in Rural Construction in Zimbabwe | This article reflects on the acceptability, applicability and possibilities for adopting model building by-laws in Zimbabwe's rural construction industry by looking at various cases all around the country. The effective use of model building by-laws in Zimbabwe's rural precincts has not been well pronounced, yet, the increased fall and crumbling of structures as time passes by and the increased uncertainty that clouds many villagers in the event of uncertain and hazardous weather events. This has prompted modern-day discussions on the need for sustainable and resilience building in rural areas and, the need to enforce building standards and by-laws in rural areas becomes a pre-requisite. This comes as a wakeup call for rural planners to enforce building standards and by-laws, especially after events of the Cyclone Idai disaster that caused the massive loss of people's lives and property and left many people homeless. | Not yet Published | |
| **C3:** | The Monitoring, Control and Management of Wildlife Fires in Zimbabwe under a Changing Climate: | Climate change impact, along with the spreading, frequency and conflagrations of wildfires has increased recently due to the increases in population growth. The centralised approaches to natural resources management have failed dismally and so is the participatory approach that, | Published | https://doi.org/10.1007/978-330-76624-5_28 |

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| | Challenges and Prospects for Doing It Right | instead of enhancing the management of resources, has given disappointing and unexpected results towards the sustainable management of natural resources. Before the 2000 fast-track land resettlement programme (FTLRP) in Zimbabwe, it was a misnomer in wildlife zones (game and nature reserves), communal, resettlement and commercial farming areas to have rampancy in wildfires out of hand. The state of affairs then can be attributed to attitudes and perceptions that encouraged good practice by the stakeholders. One could call that an environmental stewardship ethic anchored by state and voluntary institutions that meant for good towards the protection of common-pool resources. Environmental education that was instilled in the school curricula and informal education assisted immensely in environmental stewardship. With the FTLRP, practices like preparing fire guards by communities and grass cutting, have generally disappeared. It could be a matter of the tragedy of the commons or prisoner's dilemma at play to the detriment of the environmental resources and beneficiaries at large. Using case studies of selected wildlife zones, communal, resettlement and commercial farming areas in Zimbabwe, the present paper seeks to assess the change on the monitoring, control and management of wildlife fires seeking to justify it as a priority area in Zimbabwe. The chapter uses a desktop approach to explore literature relevant to the debates presented in the chapter and to concretise the arguments. A look to the ancient practices of environmental and wildlife fire management is relevant towards sustainable development. | | |

## Appendix 2: Key Informant Interview

Name of Officer:……

Position:……..

Organisation:……

Department:……
….

1. Tell me about the mandate of your organisation/department.

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   …

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   …

2. How is your department/organisation structured to serve the interest of the communities at various levels in: micro, meso, and macro?

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3. What initiatives (projects/programmes) and interventions are you doing to help deliver your mandate?

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4. What challenges do you face in delivering your mandate?

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5. How are you coping to that we still find you in this place and still in operation?

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6. How are you working with the communities in keeping with your mandate?

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7. What can be done to improve the life of communities in light of the environmental and manmade risks facing the world today?

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8. What opportunities do you see in working with local communities in so far as making them resilience is a goal?

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9. Any suggestions based on this interaction?

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## Appendix 3: Interview Guide/Focus Group Discussion Guide

1. Tell me about this place (village, ward, district) in terms of the following:

   (a) Demographic characteristics:…….

   (b) Ecological characteristics:…….

   (c) Hydrological and related characteristics:……...

2. What environmental challenges have you observed over the past:

   (a) 2 years: ……

   (b) 5 years: ……

   (c) 6 – 10 years: ……

   (d) 11 – 30 years?: ……

3. To whom/what do you attribute the changes?

   ……

   ……

   ……

4. How are people settled here?

   - The process……

- The pattern…….

- The institutions……..

5. What challenges are you facing as inhabitants of this place?.....

……
…..

……
…..

6. What risks face this place?

- Environmental
    - Climate

- Demographic -

- Resources

7. Who are the primary actors in bringing sanity and safety with respect to environmental and demographics induced risks

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8. To what extent do you attribute climate change as a major contribute to the changes in life that you are experiencing?

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9. Can settlement planning assist in reducing challenges faced?

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10. What needs to be done in managing the challenges?
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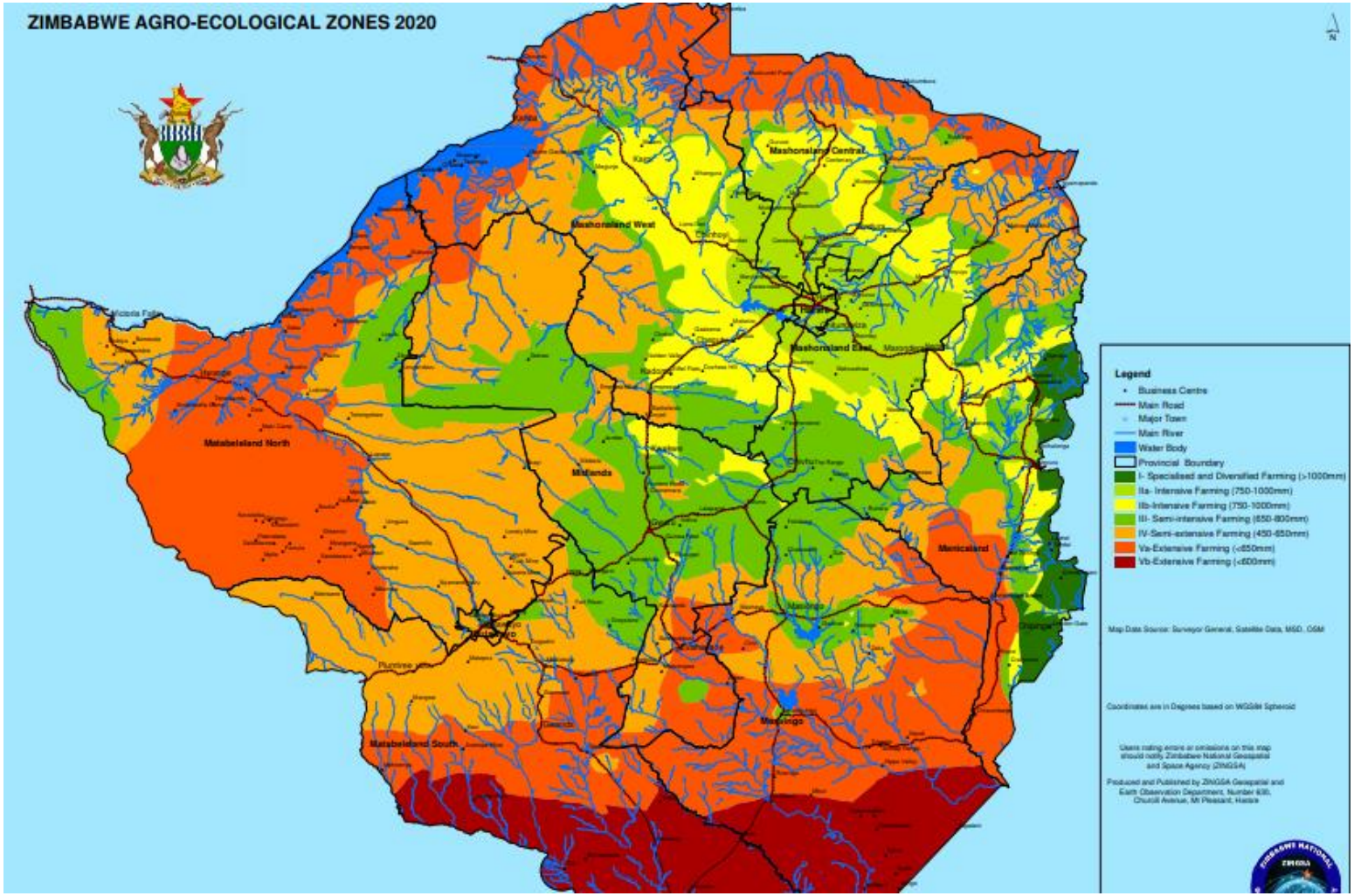
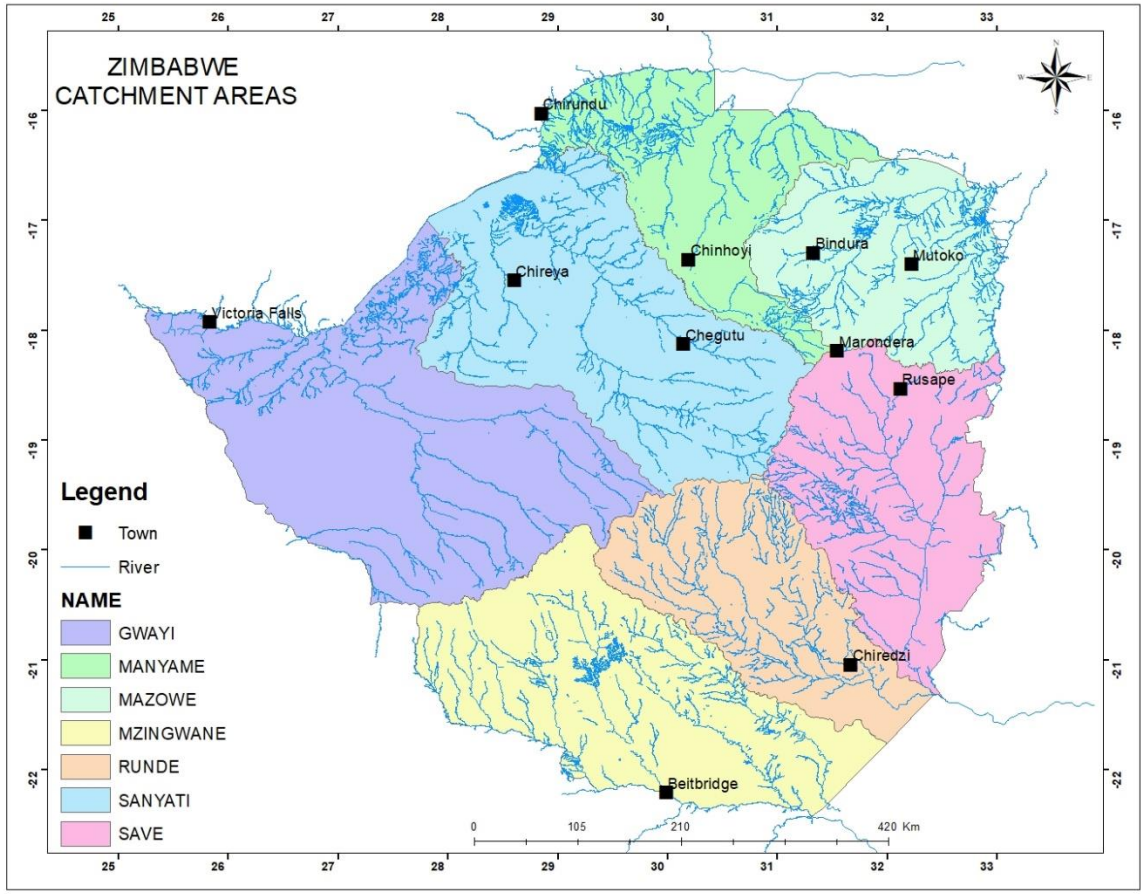
## Appendix 4: New Agro-ecological Map of Zimbabwe



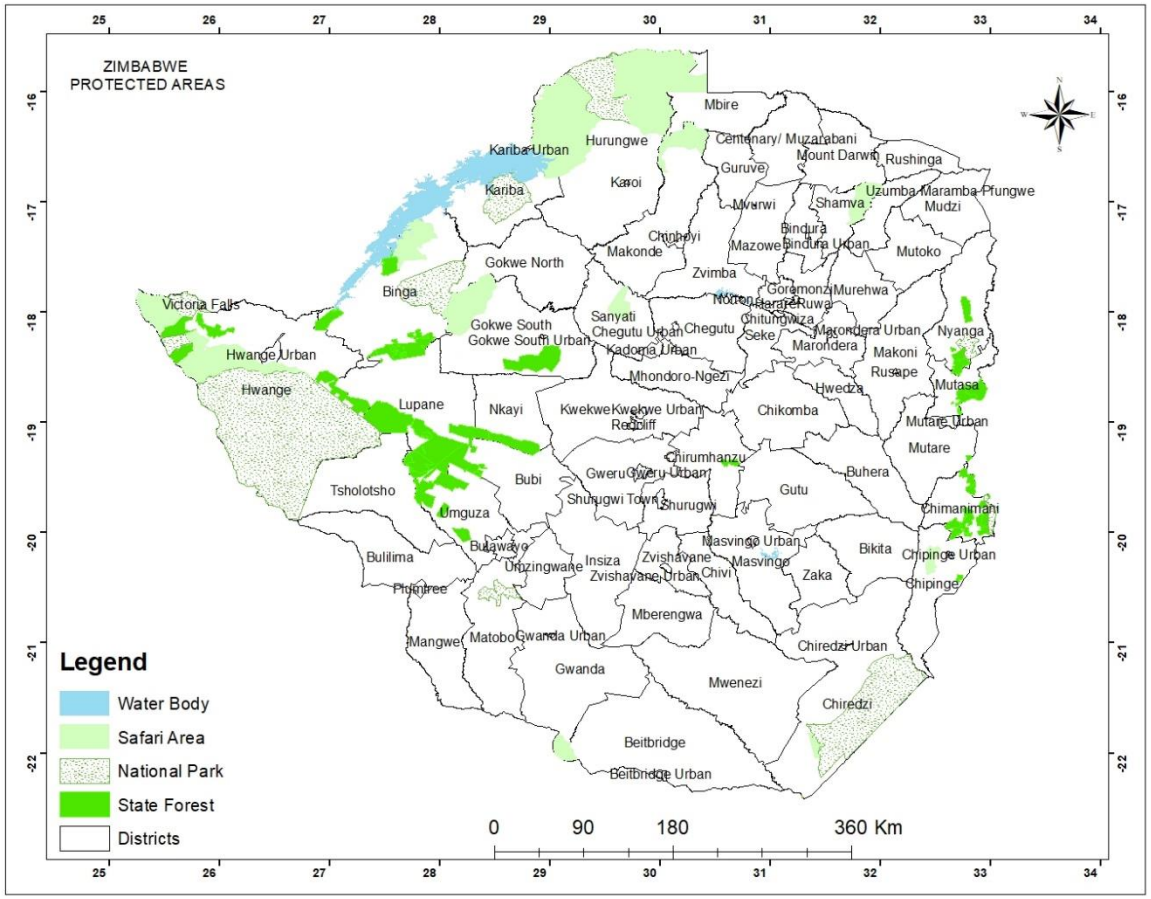

Source: The modified Zimbabwean agro-ecological zones 2020 (https://zimfact.org/factsheet-climate-change-redraws-zimbabwes-agro-ecological-map/#:~:text=On%20September%2015%2C%202020%2C%20the,by%20climate%20change%2C%20Cabinet%20said)

## Appendix 5: River Catchments of Zimbabwe



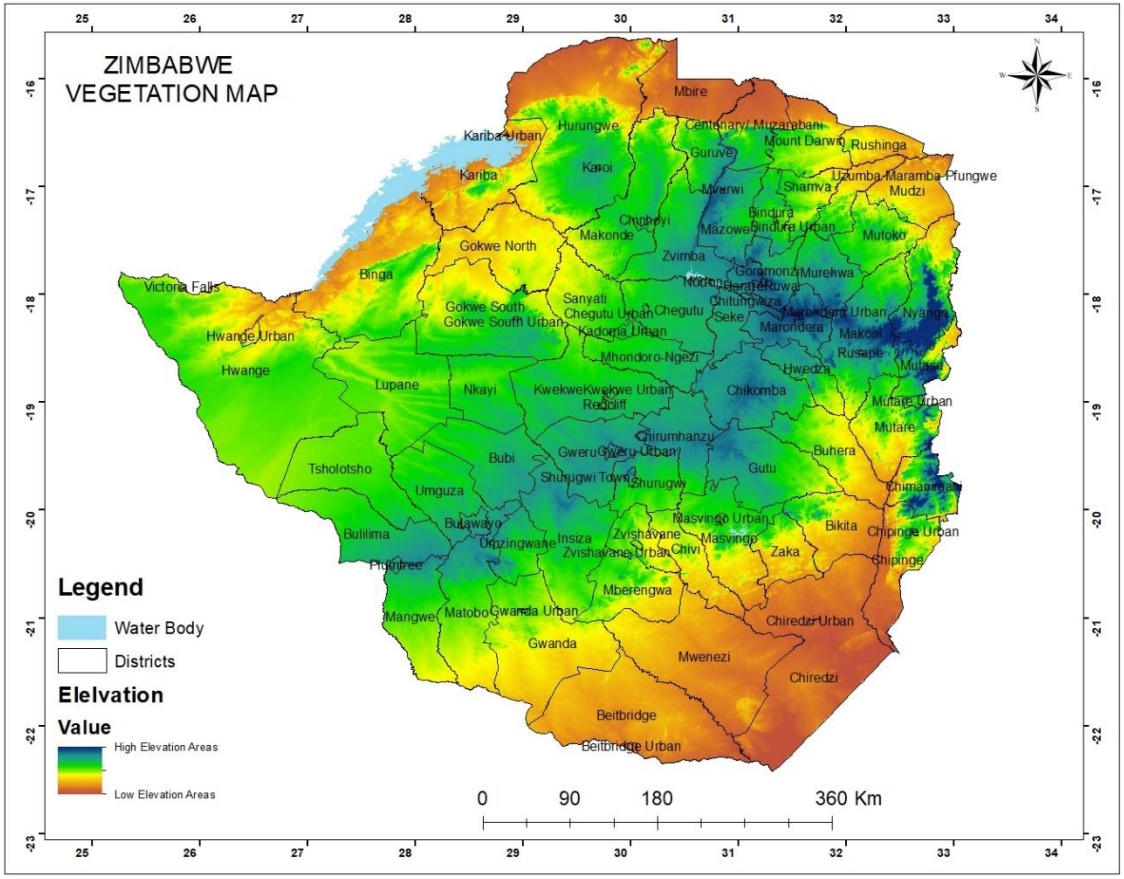

**Source: Adapted from:** https://esdac.jrc.ec.europa.eu/ESDB_Archive/EuDASM/Africa/lists/czw.htm**: Accessed 24 August 2021**

## Appendix 6: Protected Areas of Zimbabwe



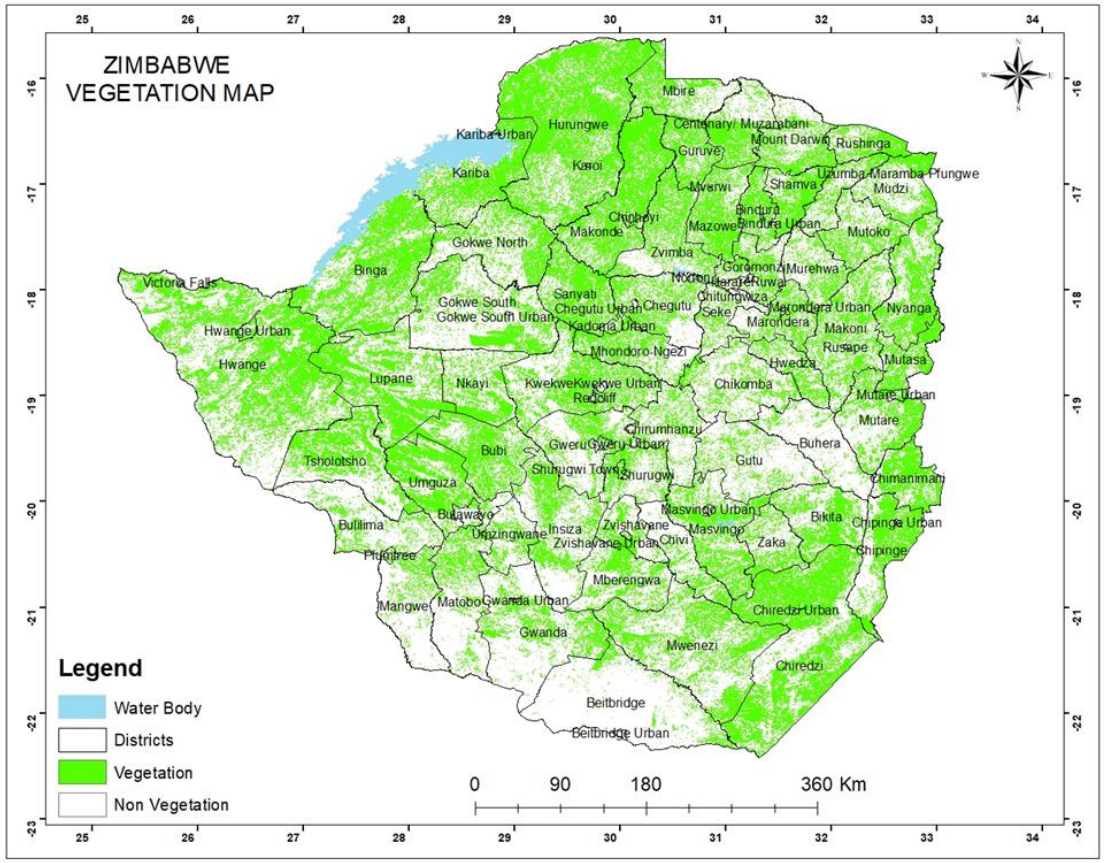

**Source: Adapted from:** https://esdac.jrc.ec.europa.eu/ESDB_Archive/EuDASM/Africa/lists/czw.htm**: Accessed 24 August 2021**

## Appendix 7: Elevation Map of Zimbabwe



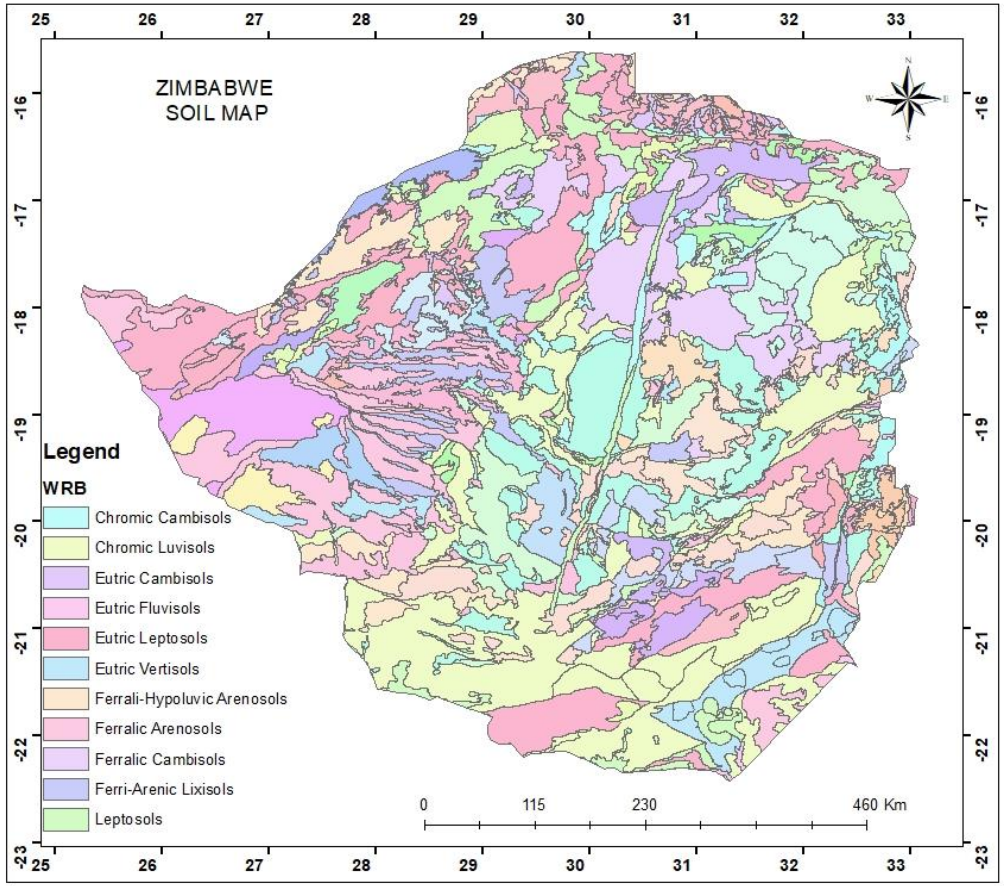

**Source: Adapted from:** https://esdac.jrc.ec.europa.eu/ESDB_Archive/EuDASM/Africa/lists/czw.htm**: Accessed 24 August 2021**

## Appendix 8: Vegetation Map of Zimbabwe




**Source: Adapted from:** https://esdac.jrc.ec.europa.eu/ESDB_Archive/EuDASM/Africa/lists/czw.htm**: Accessed 24 August 2021**

## Appendix 9: Soil Map of Zimbabwe




**Source: Adapted from:** https://esdac.jrc.ec.europa.eu/ESDB_Archive/EuDASM/Africa/lists/czw.htm**: Accessed 24 August 2021**