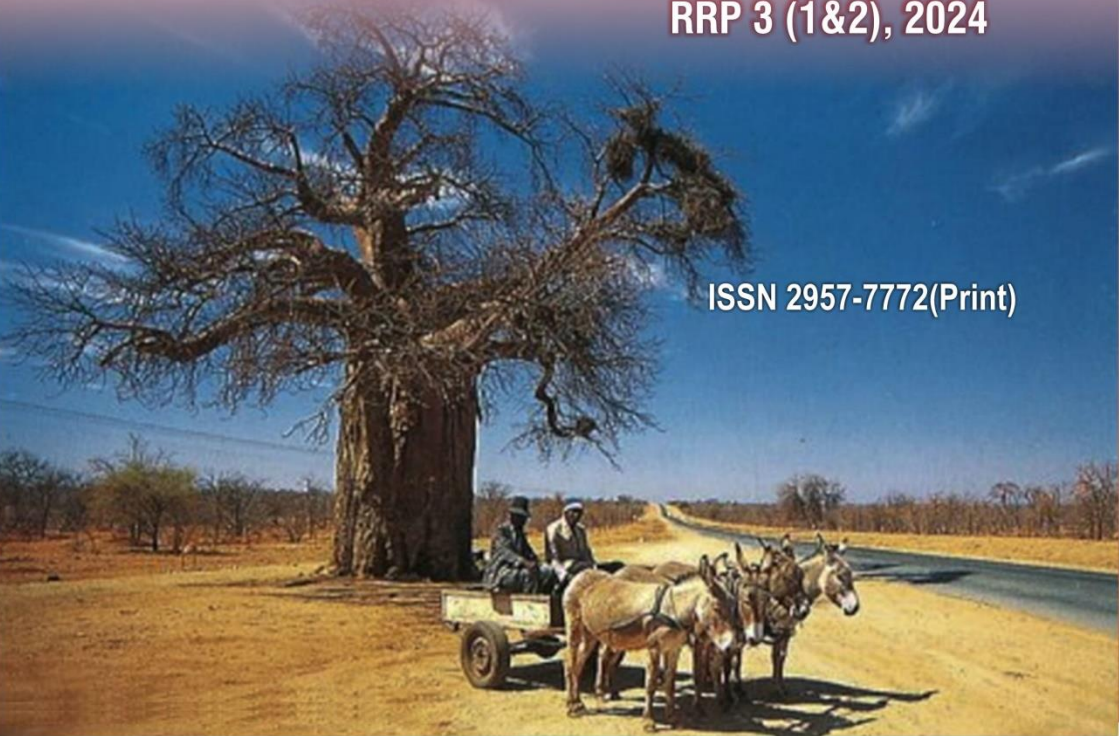




# REVIEW OF *Rural Resilience Praxis*

RRP 3 (1&2), 2024

ISSN 2957-7772(Print)



REVIEW OF  
***Rural  
Resilience  
Praxis***  
RRP 3(1&2), 2024

ISSN 2957-7772(Print)

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Stand No. 1901 Barrassie Rd,  
Off Shamva Road  
Box 350  
Bindura, Zimbabwe

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# About the Journal

## JOURNAL PURPOSE

The purpose of the *Review of Rural Resilience Praxis* is to provide a forum for disaster risk mitigation, adaptation, and preparedness.

## CONTRIBUTION AND READERSHIP

Sociologists, demographers, psychologists, development experts, planners, social workers, social engineers, economists, among others, whose focus is on rural resilience.

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ISSN 2957-7772(Print)

## SCOPE AND FOCUS

In as much as the urban economic trajectory is increasing by each day, the rural economy, especially in many developing countries, still comprises a great proportion of the extractive and accommodation industries. Retaining some spaces as rural areas remains critical given the integral role rural areas play in providing ecosystem services to both wildlife and humanity. In this light, rural resilience as practice beckons for critical studies especially in the face of the ever-threatening extreme weather events and climate change that then impact on the livelihoods and lifestyles of the rural communities. *Review of Rural Resilience Praxis (RRRP)* comes in as a platform for critical engagement by scholars, practitioners, and leaders as they seek to debate and proffer solutions to the rural sectors' sustainable growth trajectory, which is resilient to the vagaries of climate change. This journal is also aimed at championing the philosophy of the right to be rural. The issue of conviviality between the different constituencies of the sectors, compiled with the competing challenges of improving rural spaces while also making the conservation, and preservation debates matter is the hallmark of this platform of critical thinking and reflection. The journal is published bi-annually.

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# Rural Accessibility under Siege: Extreme Climate Events and Road Infrastructure Damage in Southern Africa

HALLELUAH CHIRISA<sup>1</sup>

## Abstract

Climate change has had adverse impacts on rural infrastructures especially those situated in areas with poor road infrastructure. Rural accessibility is under threat in Southern Africa due to extreme climatic events. The vagaries of climate change are not only disturbing the livelihoods, but the transport infrastructures and livelihoods in rural contexts. The article critically examines the view that rural accessibility is under siege from extreme climate events that are destroying road infrastructure. Climate change has had adverse impacts on rural areas leaving road infrastructure damaged and that has resulted in poor accessibility in these areas. The article stems from the argument that Southern African countries' rural accessibility is under siege because post-colonial governments have failed to create rural development frameworks that are resilient to climate change. The study used a qualitative research methodology using secondary data, which has the main advantage of easy accessibility. The data was gathered from secondary sources journals and newspaper articles and the data was analysed using narrative data analysis analytical tool. The study revealed that cyclones are destructive to the road infrastructure in Southern Africa with most roads and bridges being damaged rendering accessibility of most areas useless as the road infrastructure is wiped away. The study concludes that post-colonial state development drives are under threat from climate change as it is destroying infrastructure. There is a need for risk and disaster preparedness in Southern Africa through the development of good road networks that are climate resilient in rural areas. Governments in Southern Africa must create resilient communities through multiple rural road transport networks.

**Keywords:** *cyclone, development, Marxism, periphery, post-coloniality*

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## INTRODUCTION

Rural areas is a generic term which refers generally to areas of open country and small settlements but the definition of rural areas in both policy-oriented and scholarly literature are terms often taken for granted or left undefined, in a process of definition that is often fraught with difficulties (IFAD, 2010). In Zimbabwe rural areas are communally defined formerly called reserves or tribal trust lands in colonial days they consist of villages, wards, and districts (Kinsey, 1999). Rural development and planning in Zimbabwe are 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 (Mashizha, 2019).

Globally rural areas are declining and under threat because of the forces of climate change and urbanisation as rural areas are underdeveloped, they are easily affected by climate change and creation of peri-urban areas (Chirau *et al.*, 2020). Developing countries are vulnerable to extreme weather events in the present-day climatic variability and this causes substantial economic damage (Mizra, 2003). Extreme weather events such as floods have potentially damaging implications for developing countries in Africa (Mugambiwa and Tirivangasi, 2017). World Bank (2010) observes that natural hazards, such as earthquakes, fires, floods, and cyclones contribute significantly to infrastructural destruction and human deaths.

Since early 2000, in Southern Africa generally and Zimbabwe in particular, the occurrence of natural disasters and environmental risks has led to the development risks and vulnerability of rural infrastructure and inaccessibility. Rural settlements are continuously exposed to threats due to policy bias and unforeseeable weather calamities as evidenced by the widespread damage of rural infrastructures and livelihoods by natural disasters (Andharia, 2020). Costs are of concern in developing countries, where the additional funds needed to address climate change concerns are limited or non-existent (Chinowsky *et al.*, 2015). The limitations of these available funds are challenging developing countries to identify the threats that are posed by climate change, develop adaptation approaches to the predicted changes, incorporate changes into mid-range and long-term development plans and secure funding for the proposed and necessary adaptations (UNFCCC, 2015).

Of particular concern in this area is the impact of climate change on road infrastructure specifically, the construction and expansion of road infrastructure are linked to economic growth, development and social welfare (Chinowsky *et al.*, 2015). Because of their exposure to environmental



conditions, transport infrastructure systems, including roads are particularly vulnerable to climate change (Koetse and Rietveld, 2009). Therefore, the risks of climate change to roads threaten the entangled factors of economic growth, development, and social welfare benefits of infrastructure expansion (Chinowsky *et al.*, 2015). Rural road infrastructure is lagging behind in developing countries with most of the roads easily affected by climate change and extreme weather events such as floods rendering rural areas inaccessible destroying livelihoods. Most studies have examined the cost of policies to cushion climate change using carbon taxes, but few examine the impacts of climate change on rural road infrastructures and accessibility as climate change can affect the growing rural economies and livelihoods through the destruction of road networks that were already poor in developing countries (Nyasimi *et al.*, 2023, Chinowsky *et al.*, 2015 and Blanc *et al.*, 2014). The impacts of extreme climate change events such as flooding is noted to have remarkable impacts on Southern Africa (Mavhura, 2018, Chitongo *et al.*, 2019) and the impacts of climate change on rural accessibility has not been given attention.

This study seeks to bring to the fore the impacts of climate change on rural accessibility amid the poor road networks that were created prior to climate change (ReliefWeb, 2020). Rural road infrastructure remains behind in many developing countries, and, with the advent of climate change, the study seeks to understand the impacts of climate change on the road infrastructure in Southern Africa. The study seeks to examine the impacts of extreme climate events on road infrastructure. The study seeks to explore the rural inaccessibility induced by climate change. It is at the backdrop of the impacts of the extreme climate change events that this study explores the impacts of climate change on the accessibility of rural areas amid extreme climate change events. The study is significant as it can move beyond academic corridors and move to inform policy makers on ways to develop the road networks in Southern Africa to reduce rural inaccessibility. The study can be important to development agency on how rural development should be modelled to respond to the impacts of climate change. The article is organised in this way, introduction, theoretical framework, literature review, methodology, presentation of findings, discussion of the findings, conclusion and the reference.

## **THEORETICAL FRAMEWORK**

The theory that underpins this study is the Marxist theory of uneven development proposed by Harvey (1989). The theory focuses on the spatial inequities and how some spaces are not developed while some of the spaces

are centres of development. The study adopts the Marxist theory of uneven development on spatial disparities and disintegration. Harvey (1989) interpreted spatial disparities by introducing a concept of uneven geographical development. Marxist perspective and understanding of spatial inequalities started to form around the concept of uneven distribution of resources and development (Gyuris 2014). This theory is a product of Karl Marx's theorising concerned with the uneven social relations between the workers that he termed proletariats and the owners of production that he termed the bourgeoisie (Mkhize 2018). This work was found in the works of Karl Marx although the ideas were more concerned with spatial disparities and unequal development.

David Harvey is the main proponent of the Marxist rural and urban approach to unequal development of urban spaces over rural spaces. Marxian spatial planning theorists condemn capitalism for subjecting other segments of society to poverty and fragmented spatial form (Harvey 1989). The theory identifies the vulnerability of rural economies to climate change as being exacerbated by the uneven development of road infrastructure with most urban societies being more developed towards resilience to climate change. The lack of development in rural road infrastructure exposes the rural communities to the vagaries of extreme weather events such as flooding that can wipe away the entire road network leaving rural communities inaccessible. Such spatial arrangements of development leave visible patterns of uneven development and in recent years in Zimbabwe, it has left some rural communities inaccessible because of climate change effects on rural road infrastructure (Nyahunda and Tirivangasi, 2021).

## **LITERATURE REVIEW**

This section of the study critically presents the review of the literature from past studies to guide and situate the study within the historical context and craft the discourse for this study. The literature that was reviewed in this study was about the impacts of climate change on rural road infrastructures and rural accessibility.

### **THE IMPACTS OF EXTREME CLIMATE EVENTS ON ROAD INFRASTRUCTURE AND RURAL ACCESSIBILITY**

Rural road infrastructure is vulnerable to the impacts of extreme climate events rendering these areas inaccessible in some cases and in most developing countries road infrastructures are affected by climate change. Le Roux *et al.* (2019) observe that the climate in sub-Saharan Africa has a direct impact on rural and urban communities' socioeconomic structure evolution

through the infrastructure. African countries rural areas tend to be particularly vulnerable to the effects of climate vulnerability and in the past four decades (1978-2018) have experienced more than 1500 recorded weather-related disasters (Meteorological, climatological and hydrological) causing damages to transport systems in the rural areas mostly (Diouf *et al.*, 2020). These impacts on rural areas are heavy on road infrastructure in rural areas as a result of poor road networks that are due to uneven infrastructural development in developing countries that favours urban centres (Moyo *et al.*, 2023). These disasters have had significant impacts on countries' economies and rural communities' accessibility and their livelihoods because of the road infrastructure destruction (Le Roux *et al.*, 2019).

Communities in Africa are projected to be some of the worst affected by climate change this is due to their high socio-economic vulnerability, growing rural populations high dependency on natural resources low adaptive capacity in resource-stricken environments, but also due to the relatively strong climate change signal over Africa, including a projected increase in extreme events (Mbokodo *et al.*, 2015). For African countries, the lack of adequate road infrastructure and the long distances to markets and essential services are the major development hurdles and continue to make rural communities especially susceptible to the impacts of climate vulnerability hindering accessibility of these communities (Le Roux *et al.*, 2019). The uneven development is making rural areas vulnerable to the impacts of extreme climate events in Southern Africa as rural road infrastructure remains behind. The design of climate-resilient road infrastructure requires knowledge about climatic conditions that affect materials and structures within the road reserve (Blanc *et al.*, 2014). Chinowsky *et al.* (2015) observe that economic growth is widely held to depend on the quality, quantity and orientation of a country's backbone infrastructure and climate change has placed a strain on most of the road infrastructures in developing countries. Chinowsky *et al.* (2015) observe how in Mozambique installed infrastructure is vulnerable to climate change with the most likely threats being shifts in severity and character of extreme weather events as roads are sensitive to extreme heat above certain temperature thresholds, paved roads weaken, causing rapid degradation.

Perhaps more importantly, a higher frequency and severity of floods will increase road washouts already a serious problem in many countries even under the low-end projections of sea level rise, coastal areas will be subjected to greater inundation due to cyclones reaching further inland destroying road infrastructure (Strzepek *et al.*, 2010). Engel *et al.* (2017) observe that in Cameroon floods cause scouring and gullyng of roads damage the foundation

of the railway tracks and cause overflows on the rails and mudslides that damage the tracks. Mbane and Ezeuduji. (2022) argue that episodes of heavy rainfall disrupt the entire road transport system and loss of traction and control, delays, and reduced speed accidents. Strzepek *et al.* (2014) observe that in Ghana climate change will directly affect road infrastructure in several ways high temperatures will cause roads to easily develop cracks, and rising sea levels can flood gravelled and unpaved roads adjacent to the sea and rural areas where the road transport network is poor. This shows that the uneven development has a huge bearing on the rural areas where road transport network is poor.

There is a gap in the existing literature on the impacts of climate change on the accessibility of rural areas in Africa as incidents of extreme events of climate change have shown the threat that poor road infrastructures in Africa are. Saghir (2021) observe that Africa is particularly vulnerable to the extreme impacts of climate change as it faces exponential collateral damage posing systemic risks to its economies, infrastructure investments, water and food systems public health, agriculture and livelihoods threatening to undo its hard-fought development and reverse decades of rural economic progress. The impacts of climate change and extreme weather events on rural road infrastructure is not well documented and understood along the lines of uneven development in most Southern African countries and this study seeks to close that gap in literature. The study is providing an understanding on how the uneven development in rural road infrastructure is leaving rural communities vulnerable to extreme weather events.

Saghir (2021) argues that the impacts of climate change on infrastructure can be acute or chronic and acute climate impacts which result in a sudden shock to the system, often from an extreme event such as a flood the event may have widespread impacts like coastal flooding leading to the inaccessibility of rural communities. Saghir (2021) argues that in 2000 flooding in south Mozambique destroyed road links between the capital city, Maputo, and the rest of the country for almost one year, including the rail line to Zimbabwe this led to the decline of Mozambique capita economic growth and the destruction of rural economies as the rural areas were inaccessible. It is important to argue that the under development of rural road networks emanates from colonial era Saghir (2021) observed that the colonial governments in Southern Africa only developed highways in Southern Africa as the rural areas were not important for them. This uneven development strategy continued even in the post-colonial states the rural networks are still poor (Mudavanhu *et al.*, 2015; Mavhura, 2018; Ncube-Phiri *et al.*, 2014). It is

at the backdrop of the impacts of climate change road infrastructures that this study becomes important, as most studies have focused on the impacts of climate change on livelihoods and rural economies rather than the looming danger of climate change on accessibility of rural areas.

## **RESEARCH METHODOLOGY**

This study utilised the qualitative methodology leaning towards a case study research design with a view to understanding the impacts of climate change on rural infrastructure as it is affecting accessibility. The case study research design allows the researcher to build a study in an anthropological way by assessing cases from past studies and experiences related to the problem under study (Blackstone and Parrin, 2015). The case study research design becomes appropriate in this study as it was used to explore emerging cases in this study. The study engaged secondary data is articles and journals available on the internet on extreme weather events affecting rural accessibility.

## **FINDINGS**

This section presents the findings of the study, and it focuses on the objectives of the study that is to understand the impacts of extreme weather event on road infrastructure in line with the uneven development in rural spaces of Southern Africa. The findings of the study also focus on the study objective of understanding the impacts of extreme weather events on the rural inaccessibility.

### **THE IMPACTS OF EXTREME WEATHER EVENT ON ROAD INFRASTRUCTURE**

The study sought to understand the impact of extreme weather events on road infrastructure to understand the magnitude of these events in Southern Africa and how they affect rural accessibility. As observed by ReliefWeb (2019), Southern African rural spaces are not well developed as they lack road infrastructure, and this has exacerbated the impacts of extreme weather events on these areas. ReliefWeb (2017) observed that in Mozambique and Madagascar Cyclone Dineo affected Inhambane Province with areas around Vilankuno, Massinga, Murrombene, Maxixe and Jangano districts having their roads and bridges wiped away. South African Government (2017) observed that Cyclone Dineo affected rural infrastructure in Mpumalanga, Northern KZN, and Limpopo (Vhembe Malamulele, Mopani, Phalaborwa) wiping away road, bridges and communication lines. World Vision (2020) observed that Cyclone Idai and Kenneth left a trail of destructions in the rural spaces of Mozambique (Sofala and Gaza Provinces) and Madagascar (Maxixe) destroying road infrastructure. Chatiza (2019) observed that Cyclone Idai left a trail on the road infrastructure in Zimbabwe affecting the

accessibility of rural areas. These impacts of extreme weather events in Southern African rural areas have affected the accessibility of rural spaces.

### **THE IMPACTS OF EXTREME WEATHER EVENTS ON THE RURAL AREAS INACCESSIBILITY.**

The findings of the study revealed that climate change has had impacts on rural road infrastructure rendering the rural areas and the economies in these areas inaccessible in Zimbabwe. The Herald (21-02-2017) notes that Cyclone Dineo destroyed road infrastructure in Zimbabwe, Midlands (Mberengwa, and Gokwe) and Bulawayo with the Nkankezi River Bridge as one of the infrastructures-that was wiped away by the cyclone-induced floods. The Herald (17-02-2017) indicated that in Mount Darwin and Mutoko Cyclone Dineo wiped out the roads and bridges making the rural areas inaccessible during the flooding as most of the bridges and roads were gone. Chatiza (2019) indicate that Cyclone Dineo affected road infrastructure making it inaccessible for humanitarian support during the floods in 36 districts that were affected by the floods from the Cyclone. Mabaso *et al.* (2021) revealed that Cyclone Dineo affected Midlands, Matebeleland South, Manicaland and Masvingo with most of the road transport infrastructure being wiped out of site making the areas inaccessible leaving the people stranded and straining government resources towards airlifting the aid.

Chivhenge (2021) indicates that Cyclone Dineo had a storm and landslides that caused human deaths and destroyed road infrastructure. The Chronicle (21-02-2017) indicate that the rains during Cyclone Dineo destroyed vital bridges and roads with travellers being stranded after Khami River along the Bulawayo-Tsholotsho Road became impassable due to the floods as motorists waited a whole for water to subside while others had to turn back. Dube *et al* (2018) indicated that the district worst affected by Cyclone Dineo is Tsholotsho as it wiped out the road infrastructure and made the district inaccessible. Moses and Ramotonto (2018) have indicated that during Cyclone Dineo the storm damaged road infrastructure such as roads and bridges in various parts of the country. IOM Zimbabwe (2017) observes that rainfall worsened by Tropical Cyclone Dineo resulted in severe flooding that led to the washing away of road infrastructures such as bridges and roads in most districts.

CNBCAfrica (18 February, 2017) posit that in South Africa the storm from Cyclone Dineo caused severe flooding in the Limpopo Province roads and bridges were destroyed interrupting water and electricity and leaving most rural areas in the province inaccessible and taking months of rehabilitation.

South African Government (17 February, 2017) indicate that the impact of Cyclone Dineo was widespread flooding with impacts on roads and bridges in rural townships mostly. Meyiwa (2019) observes that Cyclone Dineo had a wide impact on the Southeast African regions particularly South Africa, Zimbabwe and Mozambique were affected with bridges and roads being covered by floods and some parts of Madagascar were affected by this flooding.

World Vision (2019) observes that Cyclone Idai and Cyclone Kenneth in 2019 had devastating impacts on Sofala Province in Mozambique, road infrastructure bridges and roads were destroyed especially in the rural areas of the province with accessibility becoming impossible by road. Charrua *et al.* (2021) observed that Cyclone Idai affected the road infrastructure in Mozambique such that it damaged the road infrastructure leaving the province in a 10m depth of floods submerging and wiping away road infrastructure. MSF (2019) observes that Cyclone Idai affected Chikwawa, District, Zomba, Phalombe, and Nsanje districts in Malawi wiping away roads and bridges that were not strong or that had grown old. This rendered these areas inaccessible as the cyclone did not have an impact on lives, but infrastructure was destroyed (ActionAid, 2019).

Chanza *et al.* (2020) indicate that Cyclone Idai in Zimbabwe exposed deficiencies in the country's disaster management and poor road infrastructures in Southern Africa as most of the countries that were affected by the Cyclone had some inaccessible rural areas. Chatiza (2019) indicates that roads and bridges in Chimanimani and Chipinge were severely damaged, and some 1500km of the road network was rendered unusable for months, affecting market access and livelihoods. World Bank (2019) revealed that the roads and bridges infrastructure of approximately 90% of the road networks in Chimanimani and Chipinge were damaged 584km of roads were damaged by Cyclone Idai flooding and landslides. Munsaka (2021) observes that Cyclone Idai resulted in the loss of many human lives, loss of livelihoods and massive damages to infrastructure rendering most of the rural areas inaccessible.

OXFAM (2019) indicates that Cyclone Idai struck Mozambique and Zimbabwe with landslides and floods leaving a trail of destruction on the infrastructures such as roads and bridges in most rural areas where road networks were already weak and in a state of deterioration in the Sofala and Manicaland Provinces. Chivhenge (2021) observes that since the year 2000 up to the present about 1000 people have lost their lives to cyclones and road infrastructure is destroyed in most rural areas with Chimanimani and Chipinge

being the new additions the list. Dube *et al.* (2021) indicated that Cyclone Idai affected road infrastructure such as bridges and roads in the rural areas with direct losses in critical infrastructure such as roads connecting villages and townships in Mozambique, Zimbabwe and Malawi. Humanitarian Coalition (2019) indicated that roads and bridges were damaged in rural areas where the transport network is poor and most of the villages were disconnected from help.

Marango and Chitongo (2021) indicates that most of the road infrastructure in rural areas are poor and in a dilapidated state making them vulnerable to floods and other extreme climate events. Chikowore *et al.* (2019) indicated that due to the extensive nature of infrastructure damage induced by the impacts of Cyclone Idai, not all infrastructure is replaced indicating that some of the rural areas were still inaccessible because of the cyclone. The New Humanitarian (2019) revealed that Chimanimani was cut off from aid as much of the infrastructure was especially badly damaged by Cyclone Idai a large section of the highway was washed away with bridges connecting villages and townships gone. Ndlovu (2021) observes that there was no infrastructure in terms of roads and bridges in the affected areas raising the need for critical recovery building.

## **DISCUSSION**

The findings of the study revealed that Southern Africa floods are the common extreme weather event caused by climate change that affects the road transport infrastructure through the destruction of the roads and bridges. Consistent with the study is Pregolato *et al.* (2017) who argue that flooding especially flash flooding events that start predominantly due to intense precipitation can affect the road transport infrastructure just as they affected Newcastle City in 2013 as these floods rendered some roads impassable. The study showed that cyclone-induced floods affect areas with infrastructures that were built using weak materials.

The study revealed that rural road infrastructures are vulnerable to cyclones and flooding as these road infrastructures are destroyed rendering the rural areas inaccessible. Buttressing the findings are Haque *et al.* (2023) who observe that floods can have an impact on rural areas that are built on areas that are flat with no high ground like most of the rural areas that were affected by the floods in Bangladesh that wiped away all roads and bridges along the Teesta River Basin leaving the areas around inaccessible. Cyclone-induced floods remain one of the biggest extreme weather events that affects Southern Africa with most road infrastructures being erased to the ground. The study



revealed that most of the areas located in the Manicaland Province (Chimanimani, Honde Valley and Chipinge) that have valleys are affected by the cyclones that migrate from Mozambique and the road infrastructure is affected most of the times. In support of the study is Munyai *et al.* (2021) who observes that rural areas and infrastructures located in valleys and wetlands are more vulnerable to flood risks and disasters. Similar to the study is ReliefWeb (2023) that observes that the Eastern Cape floods caused damages to the roads and bridges in the area at an alarming cost margin making the rural areas inaccessible by road transport.

The findings of the study showed that rural road infrastructures are affected by extreme weather events such that their connection to the townships and all the major towns are mostly affected by cyclones through being washed away. The study revealed that rural economies are vulnerable to extreme weather events as lack of access to road infrastructure after an extreme weather event can affect the whole economy as road transport is the only transport for rural areas in developing countries. In support of these study findings is the conceptual framework of the concept of uneven development that argues that development in capitalist societies focuses on the core relegating the periphery to poor living conditions making the periphery vulnerable to floods and rendering these areas inaccessible. The study showed that the vulnerability of the rural areas' accessibility is exacerbated by the poor networks that are already existing in these rural areas with most of them having one main road that is poorly developed.

Concomitant with the study findings, Koks *et al.* (2021) observe that the Western Europe July 2021 floods that affected most of the road infrastructure had a huge magnitude in the rural areas where the road network was poor and old. The negligence of road development in rural areas is not only common in Africa alone but in Europe as well. Consistent with these findings is the conceptual framework of the concept of uneven development by Harvey (1989) who argues that areas with less economic resources like rural areas are neglected by the capitalists. In Zimbabwe, most of the rural areas with no natural resources like the rural areas in Matabeleland are not well developed as observed by NewsDay Zimbabwe (26 March, 2023) where there is a lack of investment and a generally poor human and development.

The study revealed that rural road infrastructures are vulnerable to cyclones as the two Cyclones Dineo and Idai affected the road infrastructure making the rural areas inaccessible even for humanitarian aid. The study revealed that the cyclones in rural areas of Southern Africa affect the road transport

infrastructure as most of the infrastructures are old with little or no maintenance leaving them vulnerable to climate change impacts. The study showed that cyclones bring with them landslides that affect the road infrastructures closing the roads and bridges and making these roads inaccessible. Concurrent with these findings is He (2021) argues that floods reduce transportation network capacity either directly through physical destruction rendering roads unusable, especially in the rural areas through flood water accumulation on the roads and bridges even washing away these infrastructures.

## **CONCLUSION AND RECOMMENDATIONS**

The study sought to understand how rural accessibility is under siege from extreme weather events and close the literature gap by paying attention to rural road infrastructure vulnerability to climate change. The study revealed that the uneven development between rural and urban infrastructure where urban infrastructures are well developed is exposing the vulnerability of rural areas rendering them inaccessible. The study revealed that Southern African road network is poor and the region is vulnerable to extreme weather events. The study revealed that extreme weather events have had destructive impacts on Southern African rural communities because of the uneven development in the road infrastructure. The rural road transport infrastructure in Southern Africa is under siege from extreme weather events. It can then be concluded that the uneven development of road infrastructure that Southern African post-colonial governments inherited and continued with have rendered rural communities inaccessible due to extreme weather events vulnerability.

In conclusion, it can be concluded that the post-colonial Southern African revolutionary pledges of peace, unity and development are coming short of living less than they aimed as most of the countries in the region rural are becoming inaccessible after every climate change extreme weather event. The post-colonial southern African countries have failed to create resilient road infrastructures that can respond to climate change hence after every flooding event livelihoods' are lost because the areas become inaccessible for rescue missions. The rural areas in southern Africa remain vulnerable to climate change because of poor development and infrastructural development as most of the development is focused on the cities and towns rendering the rural areas inaccessible in times of disasters.

The study concludes that disaster preparedness in Zimbabwe and Southern Africa in general is still lagging behind as the road infrastructure is failing to be resilient to climate change shocks. Lessons can be drawn in Southern Africa from countries in the first world that are largely affected by

earthquakes that have adopted resilient methods of building infrastructures that can withstand these shocks as the same can be done in the region through building road infrastructures that can withstand the shocks from climate change.

There is a need to build improved road infrastructure networks that can allow multiple access to and from rural areas to allow the rescue and revival of the economies. There is a need for improved rural and urban planning that involves the building of strong infrastructures that can withstand the problems of climate change. There is a need for regular maintenance of existing road infrastructures to reduce their vulnerability to flooding and other climate change shocks.

## REFERENCES

- Andharia, J. (2020). Thinking about Disasters: A Call for Intersectionality and Transdisciplinarity in Disaster Studies. *Disaster Studies: Exploring Intersectionalities in Disaster Discourse*, 3-32.
- Blanc, E., Strzepek, K., Schlosser, A., Jacoby, H., Gueneau, A., Fant, C., ... and Reilly, J. (2014). Modeling US Water Resources under Climate Change. *Earth's Future*, 2(4), 197-224.
- Blackstone, N.W. and Parrin, A.P. (2020). Stress, Development, and Evolution in Coral Reef Communities. *Morphogenesis, Environmental Stress and Reverse Evolution*, pp.233-244.
- Chanza, N., Siyongwana, P. Q., Williams-Bruinders, L., Gundu-Jakarasi, V., Mudavanhu, C., Sithole, V. B. and Manyani, A. (2020). Closing the Gaps in Disaster Management and Response: Drawing on Local Experiences with Cyclone Idai in Chimanimani, Zimbabwe. *International Journal of Disaster Risk Science*, 11, 655-666.
- Charrua, A.B., Padmanaban, R., Cabral, P., Bandeira, S. and Romeiras, M.M. (2021). Impacts of the Tropical Cyclone Idai in Mozambique: A Multi-temporal Landsat Satellite Imagery Analysis. *Remote Sensing*, 13(2), 201-213.
- Chatiza, K. (2019). Cyclone Idai in Zimbabwe: An Analysis of Policy Implications for Post-Disaster Institutional Development to Strengthen Disaster Risk Management.
- Chikowore, G., Nhavira, J. D., Munhande, C., Mashingaidze, T. and Sibanda, M. (2019). Natural Disasters and Development Opportunities: Cyclone Idai, Challenges, Integration and Development Alternatives in Zimbabwe and Sub-Saharan Africa in the New Millennium. *The Fountain: Journal of Interdisciplinary Studies*, 3(1), 1-14.

- Chinowsky, P. S., Schweikert, A. E., Strzepek, N. L. and Strzepek, K. (2015). Infrastructure and Climate Change: A Study of Impacts and Adaptations in Malawi, Mozambique, and Zambia. *Climatic Change*, 130, 49-62.
- Chirau, T., Mapitsa, C.B., Amisi, M., Masilela, B. and Dlakavu, A. (2020). A Stakeholder View of the Development of National Evaluation Systems in Africa. *African Evaluation Journal*, 8(1), p.9.
- Chitongo, L., Tagarirofa, J., Chazovachii, B. and Marango, T. (2019). Gendered Impacts of Climate Change in Africa: The Case of Cyclone Idai, Chimanimani, Zimbabwe, March 2019. *The Fountain: Journal of Interdisciplinary Studies*, 3(1), 30-44.
- Chivhenge, E. (2021). The Impacts of Tropical Cyclones in Zimbabwe.
- Dube, S. K., Kohno, N., Entel, M., Fakhruddin, S. H. M., Greenslade, D., Leroux, M. D. ... and Thuy, N. B. (2018). Recent progress in storm surge forecasting. *Tropical Cyclone Research and Review*, 7(2), 128-139.
- Dube, K., Chapungu, L. and Fitchett, J. M. (2021). Meteorological and climatic aspects of cyclone Idai and Kenneth. *Cyclones in Southern Africa: Volume 2: Foundational and Fundamental Topics*, 19-36.
- Engel, T., Fink, A. H., Knippertz, P., Pante, G. and Bliedernicht, J. (2017). Extreme Precipitation in the West African Cities of Dakar and Ouagadougou: Atmospheric Dynamics and Implications for Flood Risk Assessments. *Journal of Hydrometeorology*, 18(11), 2937-2957.
- Gyuris, F. and Gyuris, F. (2014). Non-Marxist Reactions to the Marxist Problematization of Spatial Unevenness. *The Political Discourse of Spatial Disparities: Geographical Inequalities Between Science and Propaganda*, 123-189.
- Harvey, D. (1989). From Managerialism to Entrepreneurialism: The Transformation in Urban Governance in Late Capitalism. *Geografiska Annaler: Series B, Human Geography*, 71(1), 3-17.
- Haque, S., Ikeuchi, K., Shrestha, B. B., Kawasaki, A. and Minamide, M. (2023). Establishment of Flood Damage Function Model for Rural Roads: A Case Study in the Teesta River Basin, Bangladesh. *Progress in Disaster Science*, 17, 100269.
- 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.
- Koetse, M. J. and Rietveld, P. (2009). The Impact of Climate Change and Weather on Transport: An Overview of Empirical Findings. *Transportation Research Part D: Transport and Environment*, 14(3), 205-221.

- Koks, E., Van Ginkel, K., Van Marle, M. and Lemnitzer, A. (2021). Brief Communication: Critical Infrastructure Impacts of the 2021 Mid-July Western European flood event. *Natural Hazards and Earth System Sciences Discussions*, 2021, 1-11.
- Le Roux, A. L. I. Z. E., Maritz, J., Arnold, K., Verhaeghe, B. and Roux, M. (2019). Lessons Learned and Recommendations from Embedding Climate Change Adaptation into the Roads Sector. In *12th International Conference on Low-Volume Roads* (p. 353).
- Mabaso, A., Chivhenge, E., Zingi, G.K. and Museva, T. (2021). Provision of Green Infrastructure as an Urban Resilience Strategy in Masvingo City, Zimbabwe. *Climate Change Impact, Adaptation and Mitigation in Zimbabwe*, p.19.
- Marango, T. and Chitongo, L. (2021). Trust a Resilience Builder for Sustainable Development in a Disaster-prone District: Insights from Chimanimani Rural District, Zimbabwe. *African Journal of Governance and Public Leadership*, 1(1), 10-22.
- Mashizha, T. M. (2019). Adapting to Climate Change: Reflections of Peasant Farmers in Mashonaland West Province of Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, 11(1), 1-8.
- Mavhura, E. (2018). Analysing Drivers of Vulnerability to Flooding: A Systems Approach. *South African Geographical Journal= Suid-Afrikaanse Geografiese Tydskrif*, 101(1), 72-90.
- Meyiwa, S. (2019). Numerical Modelling of Tropical Cyclone Dineo and Its Rainfall Impacts Over North-Eastern South Africa.
- Mbane, T.L. and Ezeuduji, I.O. (2022). Local Resident Safety in Cape Town Township Tourism. *African Journal of Development Studies*, 12(2), 249.
- Mbokodo, I., Bopape, M. J., Chikoore, H., Engelbrecht, F. and Nethengwe, N. (2020). Heatwaves in the Future Warmer Climate of South Africa. *Atmosphere*, 11(7), 712.
- Mizra, P. (2003). Challenging HR Assumptions. *Human Resources*, August, pp.8-9.
- Mkhize, N. B. (2018). Addressing the Spatial Inequality of Economic Infrastructure through Spatial Planning: A Case of the Proposed Edendale Town Centre in Msunduzi Municipality (Doctoral Dissertation).
- Moses, O. and Ramotonto, S. (2018). Assessing forecasting Models on Prediction of the Tropical Cyclone Dineo and the Associated Rainfall over Botswana. *Weather and climate extremes*, 21, 102-109.
- Moyo, E., Nhari, L. G., Moyo, P., Murewanhema, G. and Dzinamarira, T. (2023). Health Effects of Climate Change in Africa: A Call for an Improved Implementation of Prevention Measures. *Eco-Environment & Health*, 2(2), 74-78.

- Mudavanhu, C., Manyena, S. B., Collins, A. E., Bongo, P., Mavhura, E. and Manatsa, D. (2015). Taking Children's Voices in Disaster Risk Reduction a Step Forward. *International Journal of Disaster Risk Science*, 6, 267-281.
- Mugambiwa, S. S. and Tirivangasi, H. M. (2017). Climate Change: A Threat Towards Achieving 'Sustainable Development Goal Number Two' (end hunger, achieve food security and improved nutrition and promote sustainable agriculture) in South Africa. *Jambá: Journal of Disaster Risk Studies*, 9(1), 1-6.
- Munsaka, E., Mudavanhu, C., Sakala, L., Manjeru, P. and Matsvange, D. (2021). When Disaster Risk Management Systems Fail: The Case of Cyclone Idai in Chimanimani District, Zimbabwe. *International Journal of Disaster Risk Science*, 12, 689-699.
- Munyai, R. B., Chikoore, H., Musyoki, A., Chakwizira, J., Muofhe, T. P., Xulu, N. G. and Manyanya, T. C. (2021). Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa. *Water*, 13(24), 3490.
- Ncube-Phiri, S., Chipu, M. and Mucherera, B. (2014). The Complexity of Maladaptation Strategies to Disasters: The Case of Muzarabani, Zimbabwe.
- Ndlovu, T. (2021). An Analysis of Drought Preparedness Interventions in Daluka Ward, Lupane District, Matabeleland North, Zimbabwe (Doctoral Dissertation, University of the Free State).
- Nyahunda, L. and Tirivangasi, H. M. (2021). Barriers to Effective Climate Change Management in Zimbabwe's Rural Communities. In *African Handbook of climate change adaptation* (pp. 2405-2431). Cham: Springer International Publishing.
- Nyasimi, M. and Huyer, S. (2017). Closing the Gender Gap in Agriculture under Climate Change. *Agriculture for Development*.
- Pregolato, M., Ford, A., Wilkinson, S. M. and Dawson, R. J. (2017). The Impact of Flooding on Road Transport: A Depth-disruption Function. *Transportation Research Part D: Transport and Environment*, 55, 67-81.
- Saghir, J. (2021). Adaptation to climate change in the Middle East and North Africa. *Joint Commentary Series: Viewpoint*.
- Strzepek, K., Yohe, G., Neumann, J. and Boehlert, B. (2010). Characterising Changes in Drought Risk for the United States from climate change. *Environmental Research Letters*, 5(4), 044012.
- Todes, A., Sim, V. and Sutherland, C. (2009). The Relationship between Planning and Environmental Management in South Africa: The Case of KwaZulu-Natal. *Planning Practice & Research*, 24(4), 411-433.