African Journal of Geophysics and Earth Sciences (AJGES)
E-ISSN 2978- 3305 (Online); ISSN 2978- 3291 (Print)

Indexed by SABINET and EBSCO

Volume 1, Number 2, December 2025
Pp 59-72

Disaster Management Strategies in South Africa: A Case of the KwaZulu-Natal Floods of April 2022.

DOI: https://doi.org/10.31920/2978-3305/2025/v1n2a3

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Abstract

Disasters, particularly those caused by climate change, are increasing in Africa, yet most national policies remain mainly reactive rather than proactive. This paper reviews disaster management strategies in South Africa, using the case study of the catastrophic KwaZulu-Natal (KZN) floods of April 2022, one of the country's most recent and devastating climate-induced disasters. The study employed narrative literature review methodology. Findings reveal that while South Africa has a comprehensive disaster management framework, it is overly

focused on reactive measures such as response and recovery, with insufficient attention given to proactive strategies. Early warning systems were found to be ineffective in reaching vulnerable communities, especially those in the informal settlements, and financial constraints hindered long-term resilience-building efforts. The study recommends that a shift from reactive to proactive governance is essential. It concludes that integrating DRR into national development policy, strengthening early warning systems, addressing socio-economic vulnerabilities, and increasing long-term funding for resilience are critical to preparing South Africa for future climate-induced disasters. The paper contributes new insights into the intersection of climate resilience, vulnerability, and governance in disaster management.

Keywords: *disaster management, floods, strategies, climate change, policy, KwaZulu-Natal*

Introduction

In recent decades, communities worldwide, particularly in Africa, have experienced an increase in catastrophic events with profound socio-economic and ecological consequences. While climatic variability has contributed to some of these disasters, anthropogenic drivers also intensify their scale and impact (Sari, 2024). According to the IPCC's 2022 report (AR6, WGII), many parts of Africa are projected to experience more frequent and intense extreme weather events, particularly heatwaves, heavy rainfall, floods, and droughts. It is one of the most disaster-prone regions in the world, where droughts, floods, cyclones, epidemics, and hurricanes often result in catastrophes that cause widespread devastation to communities, economies, and ecosystems. Although South Africa does not rank among the highest on the global multi-hazard index, it remains vulnerable to multiple climate-related disasters, which pose significant threats to both human and ecological health (Muyambo et al., 2023). According to the World Health Organisation (2009), disasters are described as significant disruptions to the functioning of a country, community, or society due to perilous events interacting with vulnerabilities, exposure, and capacity, leading to losses across economic, environmental, and material domains (Hung et al., 2024). Despite ongoing policy efforts, disaster risk impacts remain severe in many African countries, reflecting governance, resource, and capacity gaps. South Africa, despite having a comparatively advanced disaster management framework,

remains vulnerable to these challenges, as evidenced by the floods that struck the KwaZulu-Natal and Eastern Cape provinces in April 2022. Over the past few decades, Africa has faced a substantial disaster burden, which has been exacerbated by climate change, environmental degradation, rapid urbanization, poverty, land disputes, and political and religious tensions (Olu et al., 2016). Natural disasters displace millions globally, damage infrastructure, and hinder economic productivity (Suk et al., 2019). According to the Centre for Research on the Epidemiology of Disasters (CRED) and UNDRR (2019), in 2018 alone, natural disasters worldwide affected 61.7 million people, resulted in 10,373 deaths, and caused billions of dollars in damages, underscoring the scale of vulnerability.

In early April 2022, the province of KwaZulu-Natal experienced unprecedented rainfall, particularly in Durban, which brought catastrophic flooding and exposed the extent to which structural inequalities persisting nearly three decades after apartheid continue to shape vulnerability (Thinane et al., 2023). Over 300 mm of rain fell in certain areas between April 11 and 12, 2022, leading to widespread flooding, landslides, and significant damage to infrastructure. The disaster claimed more than 440 lives, displaced over 40,000 people, and destroyed over 600 schools, homes, bridges, and roads (KZN Economic Development, Tourism and Environment Affairs, 2023). This event highlighted some flaws in South Africa's Disaster Risk Reduction (DRR) framework and preparedness, despite the existence of the Comprehensive Disaster Management Act (DMA), which guides disaster response and recovery. Following the 2022 floods, the South African government initiated a phased response strategy aimed at restoring services and supporting affected communities. This approach was implemented in three stages: immediate humanitarian relief, stabilisation and recovery, and reconstruction (KZN Economic Development, Tourism, and Environment Affairs, 2023). Although considerable scholarly research has examined various aspects of disaster management, including disease outbreaks (Olu et al., 2016; Dzinamarira, 2021), each disaster presents distinct challenges that require focused analysis. The KwaZulu-Natal floods of April 2022 highlighted critical issues in South Africa's disaster management strategies, underscoring the need for context-specific evaluation. This study therefore reviews South Africa's disaster management framework with particular reference to the KwaZulu-Natal floods, in order to assess its effectiveness in terms of preparedness, response, and recovery. The rest of the paper is structured

as follows: theoretical framework, methodology, findings and discussion, conclusion, recommendations, and limitations.

Theoretical Framework

In South Africa, disaster management is a national responsibility under the Disaster Management Act (DMA), which requires coordinated action among government, civil society, and local communities. Disasters can be broadly classified as natural (e.g., floods), human-inflicted, or caused by technological failures (Siriporananon and Visuthismajarn, 2018, cited in Chizwina and Ngulube, 2023). To evaluate the effectiveness of South Africa's disaster management framework, this study draws on two complementary theoretical perspectives central to disaster risk governance. The first theory is Disaster Risk Reduction (DRR), with foundations that can be traced back to early disaster management cycles proposed by individuals like Baird et al. (1975) and the United Nations (1992). The other is the Vulnerability theory, proposed by Wisner, Blaikie, Cannon, and Davis (1994, 2004). These frameworks provide the analytical lens for assessing how governance, preparedness, and resilience shaped outcomes during the KwaZulu-Natal floods of April 2022 and whether national approaches align with international best practice.

DRR theory, emphasised by UNDRR (2015), focuses on the proactive reduction of vulnerability and exposure to hazards before they escalate into disasters, through hazard identification, vulnerability assessments, and capacity-building initiatives. Its preventive orientation contrasts with the predominantly reactive, response-driven models historically observed in South Africa, where floods and other extreme events have often prioritised short-term response and recovery. South Africa's location within one of Africa's climate hotspots increases its susceptibility to climate change-induced extreme weather, including floods and droughts, which affect health, economic stability, and ecosystems (Muyambo et al., 2023). Hybrid governance approaches, recognising the interaction between state and non-state actors, are particularly relevant, as evidenced by the 2022 floods, where NGOs, faith-based organisations, and community groups assumed critical roles in relief and coordination (Clark-Ginsberg et al., 2022). A persistent challenge remains the availability of timely and accurate data, essential for informed decision-making, which was inadequate during the

floods (Ledraa and Al-Ghamdi, 2019). DRR theory therefore highlights the need for a proactive, preventive approach rather than a reactive model.

Vulnerability theory, originally propounded by Wisner, Blaikie, Cannon, and Davis (1994; 2004), examines why certain communities are disproportionately affected by disasters by analysing how historical, social, economic, and political factors shape exposure and resilience. Early contributions by Hewitt (1983) and later refinements by Lavell and Oliver-Smith (2000) reinforced the significance of vulnerability as a lens for understanding disaster risk.

Methodology

This study adopts a narrative literature review within a qualitative research approach to evaluate South Africa's disaster management framework and the impact of the 2022 floods. The narrative review enables the integration of insights from a broad range of secondary sources, including scholarly articles, government reports, policy documents, and media accounts, to construct a coherent analysis of disaster management practices. Sources were selected for their relevance, credibility, and recency, drawing from international organisations such as the UNDRR, peer-reviewed journals, and official publications from the South African government, including reports from the National Disaster Management Centre. Rather than following rigid inclusion and exclusion criteria, the narrative review allows for a flexible and interpretive synthesis of literature. This approach makes it possible to highlight recurring themes and debates across diverse sources, including the effectiveness of the Disaster Management Act (DMA), gaps in disaster risk reduction (DRR) and preparedness, the influence of social and economic vulnerabilities, the role of early warning systems, and post-disaster recovery efforts. The analysis is organised thematically, drawing on relevant theoretical frameworks to provide a critical reflection on strengths, weaknesses, and areas for improvement in South Africa's disaster management strategies.

Findings and discussion

The analysis identified four recurring themes: inadequate focus on disaster risk reduction; weak early warning systems and preparedness; social vulnerability and inequality; and financial constraints, particularly the underfunding of DRR initiatives.

Inadequate Focus on Disaster Risk Reduction

One of the most significant themes to emerge from the thematic analysis is the inadequate prioritisation of disaster risk reduction within South Africa's disaster management policies, particularly in relation to the Disaster Management Act (DMA). While the DMA outlines the necessary structures for post-disaster response and recovery, it demonstrates a clear lack of emphasis on proactive measures for preventing disasters or preparing communities in advance, especially concerning extreme weather events such as floods. Sari (2024) stresses that disaster preparedness requires a systematic, well-planned approach, incorporating a series of actions to ensure continuity. Yet in South Africa, the April 2022 floods exposed the absence of such planning: early warnings were issued but failed to translate into timely evacuations, critical infrastructure collapsed, and municipal governments lacked continuity plans for essential services.

The findings suggest that South Africa's disaster management system has traditionally focused on reactive measures rather than proactive, long-term risk reduction strategies. According to Suk et al. (2019), this focus is increasingly inadequate given the complexity of modern disasters, which are often compounded by climate change, population movement, and economic globalisation, dynamics that also shape South Africa's vulnerability, as seen in the April 2022 floods. This analysis confirms a structural gap; DRR and preparedness remain secondary to highly visible relief operations, leaving long-term vulnerabilities unaddressed. This reactive approach undermines long-term resilience, as it fails to reduce vulnerabilities before disasters occur, as illustrated by the April 2022 floods, where communities in informal settlements suffered disproportionate losses due to the absence of proactive mitigation. The study highlighted the importance of integrating DRR into all levels of disaster management, from national frameworks to local municipal planning and community-based initiatives. To strengthen resilience, South Africa must move beyond post-disaster relief and invest in robust hazard identification, vulnerability assessments, and community-driven DRR initiatives (Suk et al., 2019; Chizwina & Ngulube, 2023).

Weak Early Warning Systems and Preparedness

The analysis highlighted systemic weaknesses in South Africa's early warning systems and disaster preparedness, particularly during the April 2022 floods. Although the South African Weather Service issued alerts, they were not translated into timely, actionable information for vulnerable communities. Vulnerable communities were not alerted promptly, and even when warnings were issued, local governments and communities were poorly equipped to respond. In Durban, for instance, informal settlement residents reported receiving no warnings, while municipalities lacked evacuation protocols or adequate shelters. This highlights a crucial gap in South Africa's approach to disaster preparedness, where early warning systems, although present, were not operationalised through coordinated local response plans.

The lack of community-based preparedness initiatives and flood-resistant infrastructure was a significant issue identified in the analysis, with flood-prone informal settlements left without protective infrastructure or community-based preparedness initiatives. Local governments and communities lacked the capacity to act upon the early warnings due to poor coordination and the absence of detailed, actionable plans for evacuation and shelter. Due to weak coordination and the absence of clear evacuation and sheltering strategies. The findings suggest that the gap in preparedness is compounded by a general lack of public awareness and education on disaster risks and responses, with many residents unaware of evacuation routes or basic safety measures. According to Chizwina and Ngulube (2023), this inadequacy in preparedness measures not only exacerbated the immediate impact of the floods but also hindered effective recovery efforts. This aligns with previous findings by Ledraa and Al-Ghamdi (2019), who emphasised the importance of local-level decision-making and community involvement in disaster response, a point underscored in South Africa, where the absence of empowered municipal and community structures left vulnerable populations without an effective response mechanism. The 2022 floods demonstrate that without empowered local structures and resources, early warning systems remain symbolic rather than functional. Ultimately, this lack of preparedness exposes the structural implementation gap in South Africa's disaster governance: formal systems exist on paper, but without genuine integration of top-down policy and bottom-up community action, they fail in practice.

Globally, the focus has shifted from reactive response to a more proactive risk management approach that aims to manage risks rather than merely responding to disasters (Jackson et al., 2017). While South Africa's Disaster Management Act reflects this paradigm, its practical implementation remains heavily response-oriented. South Africa's Disaster Management Act (DMA) has been effective in managing response and recovery, but it has placed less emphasis on mitigation and preparedness, as evident in the April 2022 floods, where recovery measures were rolled out rapidly, but proactive mitigation strategies, such as improved drainage in Durban's informal settlements, had long been neglected. Chizwina and Ngulube (2023) assert that disaster management requires a proactive, well-organised strategy that includes planning, preparation, response, and recovery efforts, yet South Africa's disaster governance often struggles with the planning and preparedness phases, undermining the cycle's effectiveness.

Social Vulnerability and Inequality

The 2022 floods also exposed South Africa's deep social inequalities, disproportionately affecting communities in informal settlements located on unstable slopes and flood-prone areas. Vulnerability theory provides a theoretical lens to explain why socio-economic and environmental inequalities translate into unequal disaster impacts among communities. The thematic analysis identified that communities in informal settlements, often with substandard housing, inadequate infrastructure, and limited access to basic services such as healthcare and education, were the most severely affected by the floods, with Durban's informal settlements on unstable slopes and floodplains experiencing the greatest destruction and loss of life. The study revealed that the underlying causes of vulnerability, such as poverty, inequality, and the legacy of apartheid, continue to leave certain communities more exposed to disaster risks, a spatial legacy that forced many Black South Africans into high-risk areas lacking adequate infrastructure. These communities are not only more likely to experience physical damage during disasters but are also less able to recover due to their limited resources and lack of social capital, as seen after the floods, when recovery in informal settlements lagged due to limited savings, weak insurance coverage, and minimal government assistance. As Thinane et al. (2023) argue, KZN's informal settlements are systematically marginalised

by poor infrastructure and planning, making them hotspots of disaster vulnerability.

These findings align with vulnerability theory, which highlights that the socio-economic status of individuals plays a critical role in determining their exposure to disaster risks and their ability to recover (Olu et al., 2016). The findings further highlight the need for disaster management policies that consider social inequalities and incorporate strategies for protecting vulnerable populations, policies that explicitly address structural inequality, rather than treating disasters as equal-opportunity events. Disaster risk reduction strategies must therefore include measures to address these vulnerabilities, underscoring that DRR in South Africa cannot succeed without tackling entrenched social vulnerabilities, particularly the spatial and economic inequalities that continue to shape disaster risk, ensuring that those most at risk are given the necessary support to prevent and cope with disasters (Olu et al., 2016; Thinane et al., 2023). While the South African Weather Service issued forecasts before the April 2022 KwaZulu-Natal floods, these warnings did not translate into effective community protection. Vulnerable settlements lacked access to communication channels, warnings were delivered in technical formats that were not easily understood, and municipalities had no actionable evacuation or sheltering plans. Basher (2006) argues that early warning systems are only effective when they are people-centred, inclusive, and linked to community-level preparedness. The South African case demonstrates precisely this gap between technical forecasting and practical readiness, revealing that without community-based disaster preparedness, early warning systems remain ineffective.

Financial Constraints, Resource Allocation, and Underfunding of DRR

The thematic analysis identified chronic underfunding as a major barrier to effective disaster risk reduction (DRR) in South Africa. While the National Disaster Management Centre (NDMC) was established to oversee disaster risk reduction and preparedness, its budget allocations remain heavily aligned toward response and recovery, with minimal funding for long-term prevention measures, reflecting a national tendency to prioritise immediate relief over sustained resilience-building. Han et al. (2023) argue that disaster mitigation and the creation of resilient communities require strategic allocation of resources, including healthcare services, public health campaigns, and transportation for the most

vulnerable groups. Yet in South Africa, disaster funding remains overwhelmingly reactive, with resources directed toward relief and reconstruction rather than preventive measures. The April 2022 KwaZulu-Natal floods revealed the consequences of this imbalance. Drainage systems in flood-prone settlements had not been upgraded, health facilities were overwhelmed, and evacuation routes were inaccessible. The neglect of such investments left informal settlements disproportionately exposed, illustrating how chronic underfunding of DRR perpetuates vulnerability and undermines national disaster preparedness.

Thematic analysis revealed that critical investments in infrastructure, such as flood barriers, enhanced drainage systems, and climate adaptation projects, are frequently underfunded or overlooked in favour of immediate disaster relief efforts, as illustrated in Durban, where inadequate drainage systems and collapsing bridges during the 2022 floods highlighted years of underinvestment in preventive infrastructure. This short-term approach not only undermines the effectiveness of DRR but also exacerbates the vulnerabilities of communities that are at high risk of future disasters, particularly in informal settlements, where repeated flooding compounds poverty and housing insecurity. Ledraa and Al-Ghamdi (2019) assert that governments and organisations must prioritise investment in long-term resilience-building initiatives, such as infrastructure improvements and community capacity-building, to reduce the risks posed by extreme weather events. The findings underscore that without sustained, strategic investment in DRR, South Africa will remain locked in a cycle of recurrent disasters and costly recoveries.

Conclusion

There is clear evidence that climate change is intensifying extreme weather events across Africa and increasing the likelihood of recurring disasters such as floods and droughts. The KwaZulu-Natal floods of 2022 exposed some weaknesses in South Africa's disaster management system, not only in terms of preparedness and funding but also in its failure to address structural vulnerabilities that place informal settlements and marginalised populations at heightened risk. Although the Disaster Management Act (DMA) has institutionalised disaster response and recovery, the overall approach remains predominantly reactive. Drawing on Disaster Risk Reduction (DRR) theory and Vulnerability theory, this study highlights the

urgent need to shift from relief-focused interventions towards resilience-building strategies.

Recommendations

Disaster risk reduction should be integrated into South Africa's national development agenda and across sectoral policies, with municipalities developing Local DRR Action Plans. Early warning systems should be strengthened through a nationwide multi-hazard system that reaches all communities, particularly informal settlements, supported by community-based preparedness programmes, disaster simulations, clear evacuation routes, and awareness-building in schools and community centres. Social vulnerabilities must be addressed by linking disaster management to social protection and urban development policies, improving infrastructure in informal settlements, ensuring access to essential services, and promoting community participation in planning, Finally, funding for DRR and resilience-building should be increased, prioritising preventive infrastructure, resilient housing, and climate adaptation projects, with resources decentralised to municipalities and community organisations and monitored through transparent systems to ensure long-term effectiveness and sustainability.

Limitations

This study has several limitations. Firstly, the reliance on secondary data means the findings are based on previously published works, which may not fully capture the current on-the-ground realities. Secondly, while the study focuses on South Africa, its conclusions may not be universally applicable across the country and other African nations, as each case has its unique socio-economic conditions, governance systems, and disaster risk profiles. Lastly, given the dynamic nature of climate change and disaster risk management, the conclusions of this study may need to be revised as new data, regulations, and technological advancements emerge.

References

Barton, C., 2019. Disaster risk management: Current approaches and future directions. Disaster Prevention and Management, 28(3), pp.350–364.

Basher, R., 2006. Global early warning systems for natural hazards: systematic and people-centred. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 364(1845), pp.2167–2182.

Baxter, A.E., Wilborn Lagerman, H.E., & Keskinocak, P., 2020. Quantitative modeling in disaster management: A literature review. IBM Journal of Research and Development, 64(1/2), pp.3:1–3:13.

Chizwina, S., & Ngulube, P. (2023). Disaster risk identification and business continuity planning in community libraries in the North West Province in South Africa. SA Journal of Libraries & Information Science, 89(1).

Chizwina, D., & Ngulube, P. (2023). Disaster management in Africa: A framework for action. African Disaster Management Journal, 18(2), 45-58.

Clark-Ginsberg, A., Blake, J., & Patel, K. (2022). Hybrid governance and disaster management in Freetown, Sierra Leone, Monrovia, Liberia, and Dar es Salaam, Tanzania. Disaster, 46(2), 450-472.

Clark-Ginsberg, A., Gurney, R., & O'Callaghan, S. (2022). Hybrid governance in disaster risk reduction: Insights from Africa. Disaster Policy & Governance, 14(1), 33-48.

CRED & UNDRR, 2019. Human Cost of Disasters: An Overview of the Last 20 Years (2000–2019). Brussels: Centre for Research on the Epidemiology of Disasters & United Nations Office for Disaster Risk Reduction

Dzinamarira, T., Mapingure, M., Kwibasira, G., Mukwenha, S., & Masuka, G. (2021). COVID-19: Comparison of the response in Rwanda, South Africa, and Zimbabwe. MEDICC Review, 23(3-4).Han, S., Kang, J., Lyu, F., Baig, F., Park, J., Smilovsky, D., & Wang, S. (2023). A cyberGIS approach to exploring neighborhood-level social vulnerability for disaster risk management. Transactions in GIS, 27, 1942-1958.

Hewitt, K., 1983. Interpretations of Calamity from the Viewpoint of Human Ecology. Boston: Allen & Unwin.

Hung, K., MacDermot, M., Hui, Y. C., Chan, T., Mashino, S., Mok, C., Leung, P. H., Kayano, R., Abrahams, J., Wong, C., Chan, E., & Graham, C. (2024). Mapping study for health emergency and disaster risk management competencies and curricula: Literature review and cross-sectional survey. Globalization and Health, 20, 15.

IPCC, 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Edited by H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem & B. Rama. Cambridge: Cambridge University Press. DOI:10.1017/9781009325844.

Jackson, S., Fazal, N., Gravel, G., &Papowitz, H. (2017). Evidence for the value of health promotion interventions in natural disaster management. Health Promotion International, 32, 1057–1066.

KZN Economic Development, Tourism, and Environment Affairs. (2023). Reflecting on the April/May 2022 KZN floods - One year later.

Lavell, A. & Oliver-Smith, A., 2012. The social construction of disaster risk: Seeking root causes. International Journal of Disaster Risk Reduction, 1(1), pp.5–9

Ledraa, T., & Al-Ghamdi, S. (2019). Planning and management issues and challenges of flash flooding disasters in Saudi Arabia: The case of Riyadh City. Journal of Architecture and Planning, 32(1), 155-171.

Muyambo, F., Belle, J., Nyam, Y., &Orimoloye, I. (2023). Climate-change-induced weather events and implications for urban water resource management in the Free State Province of South Africa. Environmental Management, 71, 40–54.

Olu, O., Usman, A., Manga, L., Anyangwe, S., Kalambay, K., Nsenga, N., Woldetsadik, S., Hampton, C., Nguessan, F., & Benson, A. (2016). Strengthening health disaster risk management in Africa: Multi-sectoral and people-centred approaches are required in the post-Hyogo Framework of Action era. BMC Public Health, 16, 691.

Sari, B. (2024). A comprehensive review of disaster management models and approaches based on American studies. Dokuz Eylül ÜniversitesiSosyalBilimlerEnstitüsüDergisi, 26(3), 983-1005.

Siriporananon, P. & Visuthismajarn, P., 2018. Household vulnerability to floods and coping strategies in Thailand. Jàmbá: Journal of Disaster Risk Studies, 10(1), a499.

Suk, J., Vaughan, E., Cook, R., & Semenza, J. (2019). Natural disasters and infectious disease in Europe: A literature review to identify cascading risk pathways. The European Journal of Public Health, 30(5), 928–935.

Thinane, J., Masuku, M., Baloyi, E., Bentley, W., Naicker, L., Khuzwayo, S., & Hove, R. (2023). Responsible public theology on climate change

devastation: Disastrous flooding in KwaZulu-Natal, South Africa. Pharos Journal of Theology, 104(4).

UNDRR (United Nations Office for Disaster Risk Reduction). (2015). Sendai Framework for Disaster Risk Reduction 2015–2030. United Nations.

Wisner, B., Blaikie, P., Cannon, T. & Davis, I., 2004. At Risk: Natural Hazards, People's Vulnerability and Disasters. 2nd ed. London: Routledge.

World Health Organization (WHO), 2009. Terminology on Disaster Risk Reduction. Geneva: World Health Organisation.

World Health Organisation (WHO). (2024). Defining disasters and the global framework for response. World Health Organisation.