

Article

Assessment of the Dynamics towards Effective and Efficient Post-Flood Disaster Adaptive Capacity and Resilience in South Africa

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Abstract: Government employees, municipal officials, and communities in South Africa have grappled with post-apartheid environmental challenges, such as floods, droughts, severe storms, and wildfires. These disasters are a result of both natural and human activities. The government implemented different policies and strategies after 1994 to address these issues. While acknowledging some success in managing these disasters with the current adaptive measures, the frequency and intensity of disasters have increased, causing significant damage to life and property, particularly among the vulnerable population. This paper uses qualitative and quantitative data collection approaches to explore possible systematic and structural weaknesses in addressing post-disaster situations in South Africa. Floods appear to be the most frequent natural disaster in South Africa. The paper uncovered the fact that disaster management is a multi-sectoral and multidisciplinary field. Although various institutional arrangements exist, they do not seem appropriate for assisting vulnerable groups. While officials have made some progress in implementing post-disaster projects, challenges still hinder sustainability. Furthermore, regrettably, despite the level of success in addressing disasters, most measures have failed to achieve the intended results for a variety of reasons. The consolidated long-term measures suggested by the participants yielded a proposed ‘South African Floods Post-Disaster Checklist or Model’, which was non-existent in South Africa. By implementing more effective and efficient post-disaster measures, the proposed tool can help policymakers and strategic partners standardise post-disaster resilience and adaptive capacity in various sectors’ sustainability contexts.

Keywords: disasters; institutional arrangements; model; projects; recovery; vulnerability



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1. Introduction

Community resilience determines the extent to which a community can return to the pre-disaster phase (Korstange, 2010) [1]. [An individual’s psychological capability to overcome extreme vulnerability is also a component of resilience (Korstanje, 2019) [2]. Resilient people adapt to change and can face challenges (Campos, 2019) [3]. The problem with disasters is that they often create enormous environmental difficulties affecting people in multiple ways (Nojavan et al., 2018) [4]. Virus outbreaks, terrorism, and other new post-modern disasters are examples of emerging disasters (Korstanje, 2010) [1]. In contrast, classical disasters that pose risks globally may include tsunamis, floods, earthquakes, hurricanes, droughts, bush fires, and heatwaves (Kurosaki, 2017; Rosselló et al., 2020) [5,6]. Some of these disasters are a reality in South Africa. Wen et al.’s (2023) [7] study points out that climate change exacerbates disaster risks and increases the frequency and impacts of disaster losses and damage. Like other developing countries, South Africa faces climate change-related challenges (Flato et al., 2016; National Disaster Management Centre (NDMC), 2018) [8,9]. According to Wen et al. (2023) [7], climate change can severely

disrupt measures to achieve sustainable development goals (SDGs). The Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 Cycle states that global warming has reached 1.5 °C above pre-industrial levels due to global greenhouse gas emission pathways (Djalane, 2019) [10]. South Africa has been declared one of the world's climate change hotspots (Hewitt, 2013) [11]. According to Ziervogel et al. (2014) [12], the annual temperature in South Africa has risen by about 1.5 °C above the global average of 0.65 °C over the past five decades. Vulnerable groups need protection from disasters (Korstanje, 2019) [2]. These are women, children, older people, and people with disabilities. The current paper thus sets out to understand institutional arrangements to pursue effective post-disaster governance in South Africa.

According to Flato et al. (2016) [8], there is a high likelihood that extreme flooding, drought, and other natural disasters will become more frequent in South Africa. Consequently, the country will continue to face adverse environmental challenges, such as increased drought, floods, and temperature extremes, which will affect the livelihoods of a large population (Hewitt, 2013) [11]. Vermaak and Van Niekerk (2004) [13] warned that flooding, fires in informal settlements, bush/grass fires, and human-caused disasters, such as mining accidents and pollution spills, are likely to have massive impacts on South Africa. Kreibich et al. (2022) [14] concurred that the recent floods in KwaZulu-Natal (KZN) Province in April 2022 caused over 400 casualties and damage to infrastructure worth \$4 billion, which is a prime example of the negative impact of disasters in South Africa. These floods displaced many people (Mabaso, 2023) [15], with the figure believed to be around 40,000. Even in August 2023, some people still live in temporary shelters. Relatedly, Owusu-Sekyere et al. (2021) [16] revealed that disasters affect economic growth because of the disruption of the functioning of a community, as well as material, economic, human, and environmental losses in terms of critical infrastructure, transport, agriculture, and tourism, resulting in unemployment and the loss of production and revenue.

Post-disaster planning, monitoring, and management are seemingly insufficient (Faling et al., 2012) [17]. Anilkumar and Banerji (2021) [18] suggest that limited human resources, a lack of transparency and accountability, inexperienced implementing agencies, corruption, delays in establishing the institutionally supported purchase of land, and the escalation of prices can exacerbate post-disaster failure. Thus, the paper also discusses the prevalent post-disaster challenges and those encountered when implementing post-disaster legislation and processes in South Africa. Proper management processes are necessary to reduce flood-related socio-economic and environmental losses (Adedeji et al., 2012) [19]. Therefore, developing adaptive-oriented strategies can assist decision-makers in improving the regulated systems' responsiveness and resilience to disruptions (Borowski and Stathopoulos, 2019) [20]. Moreover, the study focuses on determining the projects implemented post disaster in communities.

Researchers and academics have documented the factors that promote or hinder the achievement of SDGs (Ozili, 2022) [21]. However, few studies indicate the global progress and challenges linked to sustainable development and sustainability (Seddiky et al., 2020) [22]. Many commentators and scholars, such as Nespeca et al. (2020) [23], Rosselló et al. (2020) [6] and Kunguma (2022) [24], have opined that, amidst the escalating incidence of natural disasters, there appears to be a noticeable dearth of awareness and accessible information on preparing for and responding to such events. According to Rosselló et al. (2020) [6], there is a lack of knowledge regarding the nature and scope of the impact of disasters on tourism. Bang et al. (2019) [25] further highlight that post-disaster management research has received insufficient attention with no standardised mechanism to deal with post-disaster scenarios effectively and efficiently. Schwarz et al. (2023) [26] believe that, in some instances, post-disaster information is only available on a temporal and ad-hoc basis, resulting in temporal structures, inadequate resources, and inaccessible areas. The lack of knowledge was further demonstrated by how officials handled flood disaster incidents in KZN Province in April and May 2022, Eastern Cape Province in May 2023,

Western Cape Province in June 2023, and Northern Cape Province June–July 2023. Floods also impacted the country in May–June 2022, September 2022, and February–March 2023.

To address upcoming disaster incidents, new thinking is required (O'Brien et al., 2010) [27]. Hewitt (2013) [11] asserts that, considering its challenges, South Africa needs to find ways to increase its resilience to extreme weather events. As a result, many researchers and scholars, such as Korstanje (2019) [2], Davis-Reddy and Hilgart (2021) [28], Naidoo and Cartwright (2022) [29], and Singh et al. (2023) [30], have commented on these factors. Their observations ranged from weak coordination among various disaster management structures, interoperability challenges of disaster databases, inconsistencies in disaster reporting, working in silos, community exclusion, to emotional and psychological effects. Subsequently, they recommended approaches including the diversification and expansion of measures to deal with the obstacles encountered post disaster. However, the use of institutional structures that integrate capacity building and resilience to address post-disaster situations is absent from various works of literature. In light of these gaps, this paper analysed the factors that contribute to the post-disaster adaptive capacity and resilience of vulnerable urban and rural communities and systems in South Africa under the following subheadings: (i) post-disaster institutional arrangements in South Africa; (ii) factors hindering effective and efficient disaster management in South Africa; (iii) existing post-disaster measures in place; and (iv) proposed alternative strategies for adapting to disasters in the country.

For the international audience, the research will add value to the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030 goal, which advocates for the active participation of all stakeholders and role players, including non-government organisations (NGOs), communities, and government agencies (Seddiky et al., 2020) [22]. The Sendai Framework also aims to increase resilience to current and future disasters (Seddiky et al., 2020) [22]. Moreover, this paper will contribute valuably towards sustainability and the sustainable development literature that helps improve post-disaster strategies, reduce vulnerabilities, and enhance the overall resilience of the region and beyond. The proposed 'Post-floods Checklist' will assist officials and communities in standardising post-disaster activities in rural and urban disaster-vulnerable communities. The research hypothesises that building the capacity and resilience of vulnerable people ensures the effective governance of disasters in the post-disaster phase and leads to sustainability. Section 2 of the paper discusses the materials and methods. Section 3 details the empirical evidence. Section 4 presents the results and discussions. Section 5 articulates our conclusions, limitations, and recommendations.

2. Materials and Methods

The subsequent section outlines the materials and methods for the study to investigate disaster-resilient measures and the adaptive capacity of post-disaster measures in South Africa. Even though reports indicate an increase in the frequency and severity of disasters worldwide, the study was limited to South Africa. Another limitation was that the study focused only on post-disaster efforts instead of actions taken before the disaster. It concentrated on how institutional arrangements shape the post-disaster phase to understand and assist communities in fostering their disaster resilience and adaptive capacity. The post-disaster phase usually involves decision making to speed up implementation procedures (Lizarralde, 2012) [31]. Unfortunately, this is not the case in South Africa—the post-disaster phase is still ineffective and inefficient; hence, the focus of the study.

2.1. Study Areas

This study gathered data between October 2020 and July 2021 in different provinces throughout South Africa, focusing mainly on KZN Province, as seen in Figure 1. South Africa is predominantly semi-arid and experiences significant climate variability, including droughts, floods, and storms (Van Riet, 2012) [32]. For instance, in February 2023, floods affected the Eastern Cape, KZN, Gauteng, Limpopo, the Northwest, the Northern Cape, and

Mpumalanga Provinces, and, subsequently, the then Minister of Cooperative Governance and Traditional Affairs declared a national state of disaster.

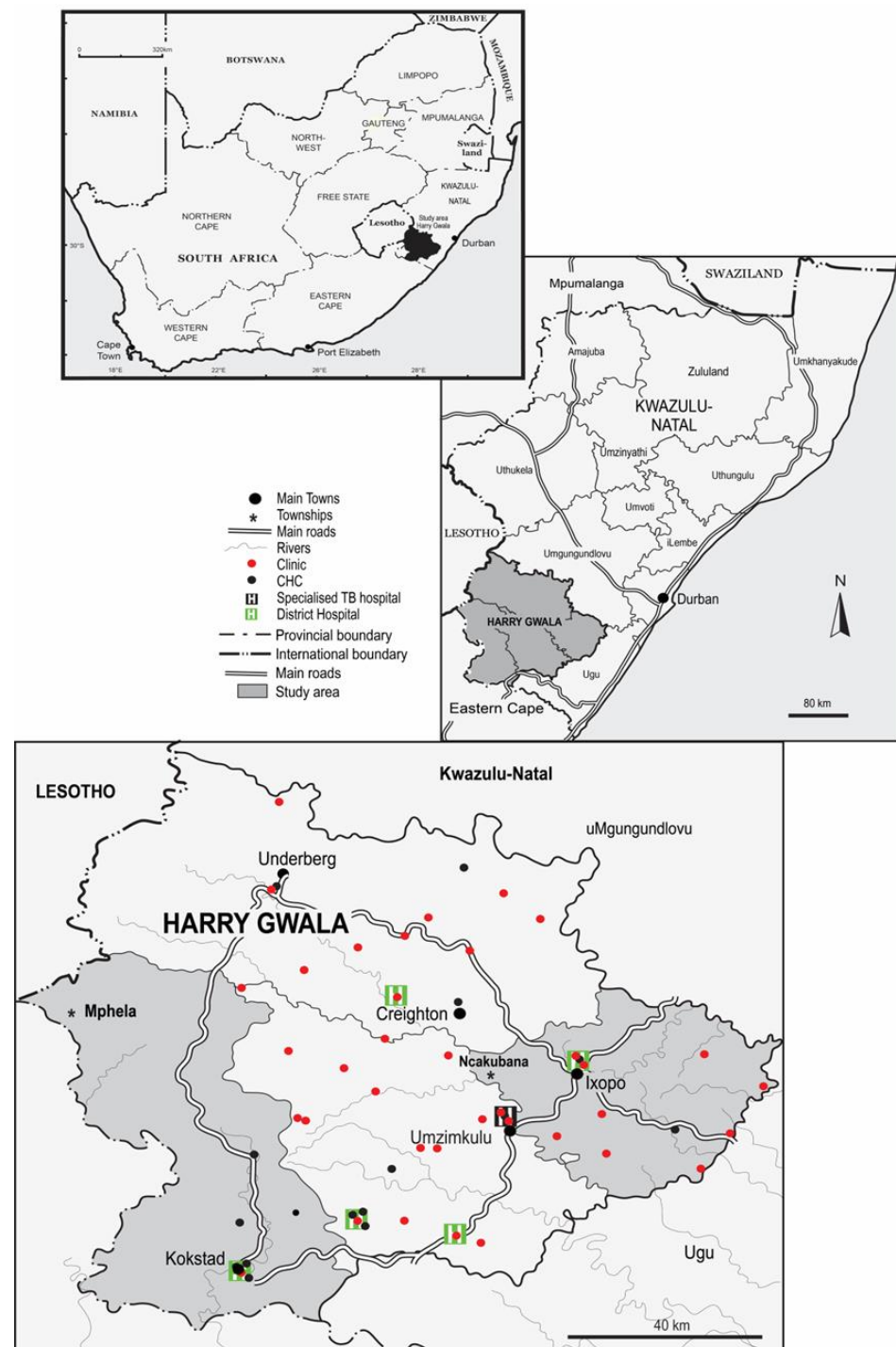


Figure 1. Location of study sites: Greater Kokstad and Ubuhlebezwe LMs. Source: Cartography Unit, University of the Witwatersrand (2022).

The community study sites were in KZN, under the Harry Gwala District Municipality (HGDM), Greater Kokstad, and the Ubuhlebezwe Local Municipalities (LMs) (Figure 1). The 10-year trend analysis of the 2007/08 to 2017/18 NDMC annual reports determined that the two community study areas of Mphela Township and Ncakubana were more susceptible to disasters than the other areas. The choice of these communities was informed by the repeated occurrence of disasters, such as floods, droughts, fires, and storms, and

the extensive damage to buildings, roads, bridges, and utility infrastructure (Strydom and Savage, 2018; KZN Provincial DMC, 2018) [33,34]. Additionally, the province is home to vulnerable communities, and these disasters have exacerbated the existing social vulnerabilities, such as poverty, inequality, and access to resources (KZN Provincial DMC, 2018) [34].

2.2. Research Methodology

The research used the following methodology, as illustrated in Figure 2 below.

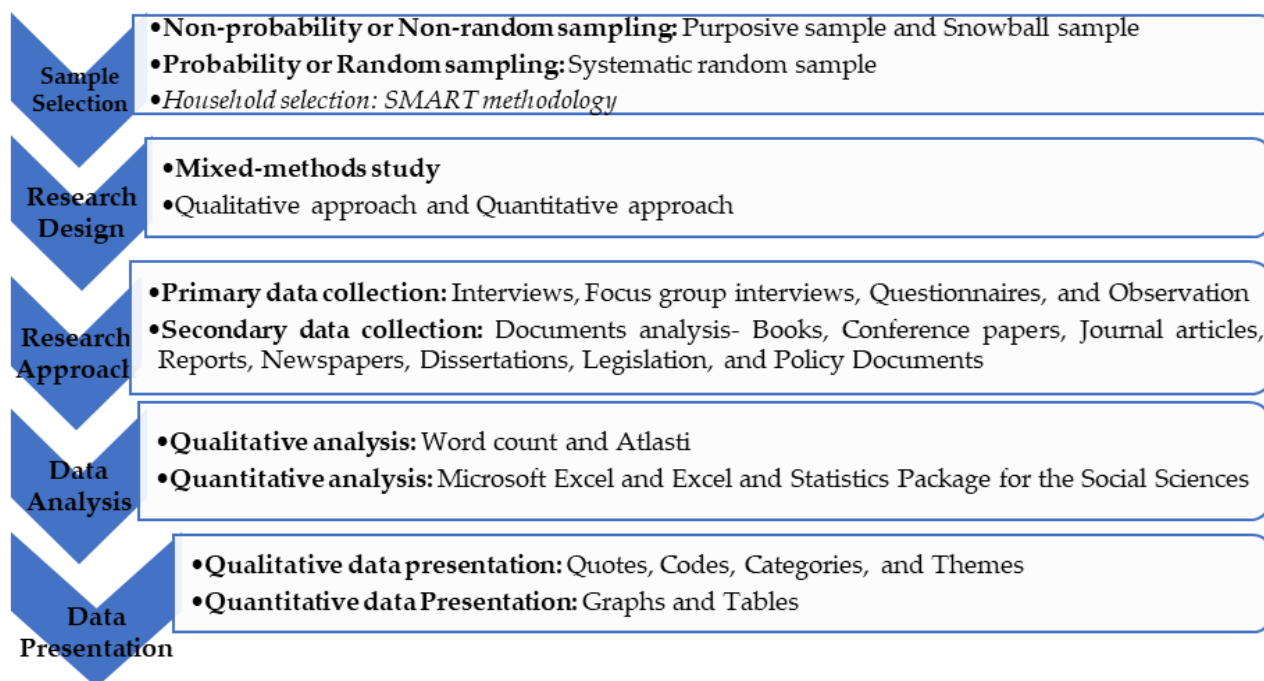


Figure 2. Research methodology. Source: Researcher's field notes.

2.2.1. Sample Techniques and Study Population

The study employed non-probability or non-random and probability or random sampling methods (Burger and Silima, 2006; Bezuidenhout et al., 2014) [35,36] to select 90 respondents from various institutions, as indicated in Figure 3. The study considered purposive and snowball sampling methods for the non-probability sampling. Purposive sampling assisted in capitalising on expert knowledge that would contribute specific information (Suri, 2011) [37]. The choice of the individuals was based on particular traits, such as expertise, skills, experience, exposure, and willingness to participate. These guidelines selected a purposive sample, including disaster management officials, six HGDM Advisory Forum members, and two ward councillors. The snowball sample included 27 respondents from three spheres of government. The time constraints, inadequate human and financial resources, and large population size necessitated using random sampling (Etikan and Babatope, 2019) [38]. For probability sampling, there was an equal chance for individuals or social artefacts to be included in the population (Rossouw, 2003; Bezuidenhout et al., 2014; Creswell and Creswell, 2018) [35,39,40]. Thirty-five systematically randomly sampled participants were from the community study areas of Mphela Township and Ncakubana.

Since it was impossible to include all community members, the research implemented the SMART methodology formula to calculate each community's total sample size because it is simple and the selection method is easy (Etikan and Babatope, 2019) [38]. As a rule of thumb, it is customary to draw 10% of the population as a sample (De Vos, 1998) [41]. The researchers chose the community sample size and households using the following formula:

(a) Determine the sample size: margin of error X study population (total).

- (b) Calculate the sample interval (SI) to obtain the basic sampling unit (BSU): total/sample size.
- (c) Starting with number 1, take the randomly selected number as the first BSU in the survey area.
- (d) To choose the second BSU, add the SI to the first BSU.
- (e) Repeat the above process (d) for subsequent households (HHs).

As a result, Mphela Township's systematic sample was the 16th household, as the area's 10% sample was 152.3. Then systematic random sample for Ncakubana was the 19th household because the village's 10% sample was 176.6 and was between the 18th and 19th households. After that, the researcher distributed questionnaires to 16 and 19 homes in Mphela Township and Ncakubana, respectively. Therefore, 35 families in total participated in the study.



Figure 3. Research participants.

The research participants were from eight provinces. These comprised disaster management officials ($n = 34$), the HGDM Advisory Forum ($n = 6$), councillors ($n = 2$), community members ($n = 35$), and community focus group members ($n = 13$), as they all play distinct roles post disaster. Ninety people ($n = 90$), in total, took part in the study.

2.2.2. Research Design

This mixed methods study research design employed qualitative and quantitative data collection procedures (Van Ness et al., 2011; Fakis et al., 2014; Creswell and Creswell, 2018) [39,42,43]. This approach sought to integrate the strengths of both qualitative and quantitative methods, allowing researchers to gain a more comprehensive understanding of the research problem and provide a richer and more robust data analysis. This method provided a more holistic and nuanced understanding of complex research questions, allowing researchers to address both the breadth and depth of post-disaster situations in South Africa. The method also gave the researchers valuable knowledge for proposing disaster response strategies that minimise vulnerabilities and the overall resilience of the province and beyond. Specifically, the study used the qualitative method to obtain data involving the social and human dimensions of post-disaster management. This method provided an in-depth understanding of the complex interactions between climate change, disasters, sustainability, and human responses. The quantitative approach enabled the researcher to quantify the physical damage caused by flood disasters, such as the number and type of

destroyed homes, infrastructure damage, economic losses, and demographics. The tools used for data collection were a blend of open-ended and closed questions.

2.2.3. Research Approach

The researcher collected data using face-to-face, telephonic, virtual, and e-mail interviews and questionnaires. The study was conducted through a comprehensive analysis of the relevant literature and empirical research based on mixed quantitative and qualitative methodologies. Using multiple data collection methods strengthened the study (Yin, 2011) [44]. Before the main study, a pilot study tested the research data collection instruments and procedures. Five disaster management officials with extensive field experience were requested to provide feedback on the data collection instruments. The pilot study assisted the researchers in fine-tuning and amending the process where necessary to ensure a successful main study (De vos et al., 2017) [45]. This process contributed to the study's effectiveness and success (De vos et al., 2017) [45]. Where there was physical interaction, the researcher collected data following strict COVID-19 protocols, including wearing masks, physical distancing between the researcher and participants, and constant sanitisation of the surroundings. Adherence to COVID-19 protocols helped the participants to feel at ease and safe.

The study used documents, interviews, focus group interviews, questionnaires, and observation analysis, as discussed below. Documents were a valuable source of information (Henning, 2009) [46]. The researcher collected data from various government and non-government sources, including books, conference papers, journal articles, reports, newspapers, dissertations, national and provincial legislation, and policy documents (Mouton, 2006; Yi and Yang, 2014; Zonke and Matsiliza, 2015) [47–49]. The study interviewed 34 disaster management officials and two ward councillors with the appropriate knowledge to answer the research questions (Yin, 2011; Peng et al., 2013) [44,50]. There was also an administration of six HGDM Advisory Forum members' questionnaires via e-mail and telephone. Additionally, 35 households responded to questionnaires. The observations were open-ended, since they used general questions, and participants were encouraged to share their thoughts (Creswell and Creswell, 2018) [39]. As with Mouton (2006), Kobus (2007), Wagner et al. (2012), and Ranjan and Abenayake (2014) [47,51–53], the observation data was from stakeholders during transect walks. This study validated the interview and questionnaire results by conducting Ncakubana and Mphela Township focus group interviews (Eighmy and Hall, 2012) [54].

2.2.4. Data Analysis and Presentation

After data collection, the researchers captured the collected data and prepared it for analysis (Froggatt, 2001; Dube, 2018) [55,56]. The study concurrently scrutinised the data obtained from questionnaires, interviews, and literature. Descriptive statistical techniques, Microsoft Excel, and Statistical Package for the Social Sciences (SPSS) Statistics 27 were employed to examine the quantitative data. This technique enabled the data to be presented in textual analysis, tabulations, correlations, and statistical graphs, such as bar charts and pie charts, for quick interpretation and easy understanding. Qualitative data analysis was used to code and label data to determine similarities and differences (Dube, 2018) [55]. Thematic analysis was applied to review the data from open-ended questions and literature. This tool transforms raw qualitative data into a reliable theory and makes data readily accessible for analysis (Mohajan and Mohajan, 2022) [57]. After the development of categories, the study created themes (Lester et al., 2020) [58]. This analytical process assisted in identifying concepts, similarities, and conceptual reoccurrences in the data (Mohajan and Mohajan, 2022) [57]. Word Cloud and Atlasti were considered for the qualitative data analysis. Finally, the researchers compared the findings to the existing literature (Merriam and Tisdell, 2016) [59].

2.2.5. Ethical Considerations

Regarding ethical considerations, the researcher acquired an ethics clearance certificate on 18 August 2020 from the University of the Witwatersrand's ethics committee and shared it with the study participants. The protocol number for the ethics certificate is H20/02/32. Moreover, the researcher sought permission from the Ubuhlebezwe and Greater Kokstad LMs municipal managers to conduct research in the study areas of Ncakubana and Mphela Township, respectively. The researcher provided the participants with participants' information sheets, consent forms, and the relevant data collection tools during the data collection phase. Moreover, the researcher sought consent from the participants in the telephonic interviews to record the discussion using the Call Recorder App. The participants filled out interview schedules and questionnaires anonymously. Thus, in line with the signed consent forms, the study used pseudonyms to label the participants.

3. Results

The paper analysed data based on the objectives set out at the beginning of the study, including post-disaster institutional arrangements in South Africa, factors hindering effective and efficient disaster management, and strategies for minimising disaster impacts on livelihoods among the population.

3.1. Post-Disaster Institutional Arrangements in South Africa

This section discusses the results regarding disaster management institutional arrangements. It entails disaster management stakeholders and role players, as well as the relevant legislative documents and resources.

3.1.1. Disaster Management Participants

The question informed the research regarding the involvement of different participants in disaster management activities, particularly post-disaster flooding. This section established the participant's connection to the South African disaster management discipline. Disaster management is a multidisciplinary and multi-sectoral field (DM Act, 2002; Prinsloo and van der Walddt, 2016) [60,61]. In addition, Van Riet (2012) [32] states that disaster management is multi-sectoral, integrated, continuous, and multidisciplinary. The study participants came from all three spheres of government and communities, as seen in Figure 4. The South African Government comprises national, provincial, and local levels (Constitution of the Republic of South Africa, 1996) [62]. Besides being severely affected by disasters, communities are also an essential resource in recovery, dependent on their involvement in correct implementation (Singh et al., 2023) [30]. Seddiky et al. (2020) [22] support the view that sustainable development in Africa should begin at the local level. Local governments' and communities' input and views regarding recovery plans and projects can assist in ensuring effective project implementation (Singh et al., 2023) [30]. The nature of the research participants confirms that disaster management is a multi-sectoral and multidisciplinary field, resulting in the perspectives of multiple stakeholders.

3.1.2. Disaster Management-Specific Acts and Policies Availability

The objective of the question about the existence of disaster management (DM) acts and policies was to determine whether the institutions were equipped to withstand disasters. In total, 33 disaster management officials responded that disaster-specific acts and policies were in place. Only one participant said no, acts or policies were not in place. Table 1 shows the results.

Notably, almost all participants indicated that disaster-specific acts and policies were in place in their organisations. Organisations are taking proactive steps to ensure they are well-equipped to respond to disasters, should they arise.

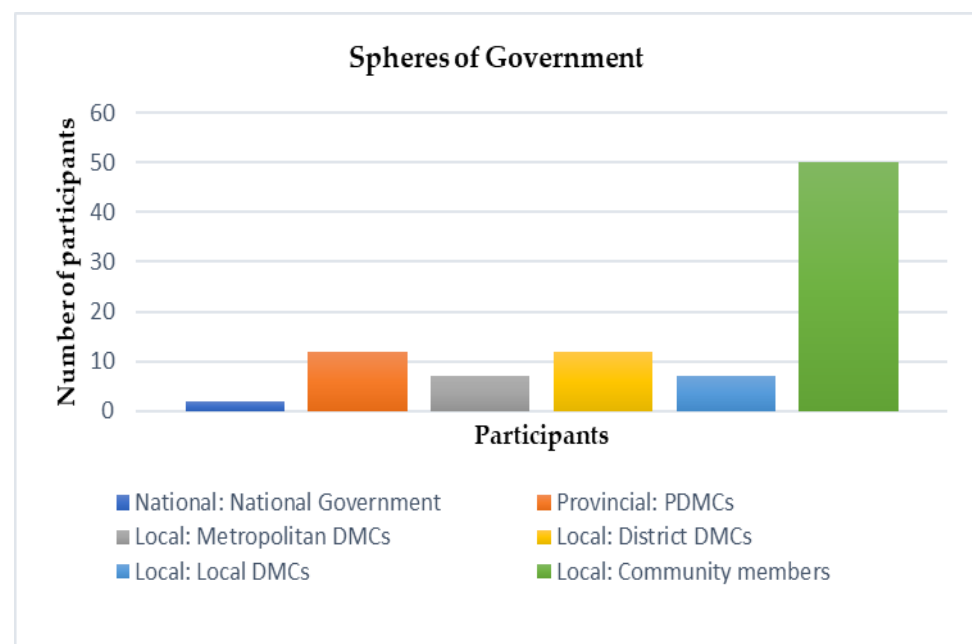


Figure 4. Participants' specific spheres of government.

Table 1. Disaster management-specific acts and policies availability.

Availability	Responses	Percentage
Yes	33	97%
No	1	3%

3.1.3. Disaster Management-Relevant Legislative Documents

The purpose of the question about relevant legislative documents for disaster management was to elicit the participants' perspectives on various legislative documents in their respective organisations and areas. Reviewing and analysing policies and guidelines helped to understand the relationship between international, continental, and national content on disaster management (Chabalala, 2017) [63]. Disaster management officials reported that various laws and policies were in place, as depicted in Figure 5. The UN adopted the SDGs, the Sendai Framework for DRR, and the Paris Agreement on Climate Change as the primary global frameworks in 2015 (Djalane, 2019) [10].

Noticeably, according to the disaster management officials' responses, the National Disaster Management Framework (NDMF) and the DM Act were the most frequently mentioned post-disaster instruments, as shown in Figure 5. They were selected 16 and 12 times, respectively. According to Raju and van Niekerk (2013) [64], the DM Act and the NDMF are primarily responsible for governing disaster management in South Africa. Some officials relied on different documents, since they did not mention specific documents.

Five participants selected the DM Act from the responses for advisory forum members. Likewise, five participants chose the NDMF. Furthermore, community respondents surveyed about disaster management legislative documents and by-laws revealed their lack of familiarity with them. Similarly, none of the focus group members knew about disaster management legislation or policies. Their answers ranged from, "none", "I do not know", "I do not know what they are", to "I am not aware". The apparent lack of knowledge in the community was a huge surprise and cause for concern.

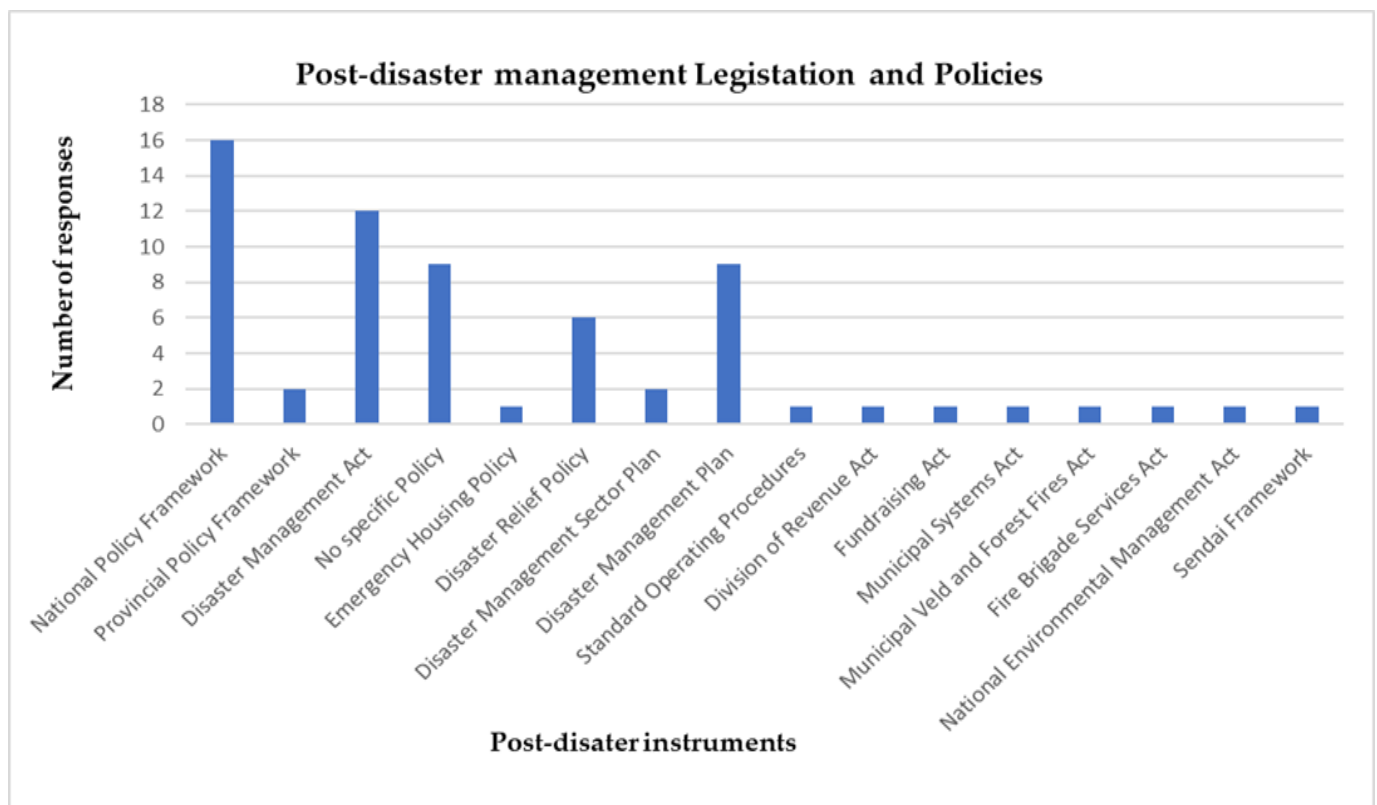


Figure 5. Post-disaster management policy documents.

Flood-Specific Legislation or Policy

Flooding is among the most visible effects of climate change (Samu and Kentel, 2018) [65]. Therefore, it was essential to ascertain whether disaster management institutions in South Africa had flood-specific legislation or policies. It was also important to determine whether the policies implemented were generic or flood-specific. Only one disaster management participant said yes, meaning the institution had flood-related legislation or policies. Surprisingly, the responses revealed that many participants' organisations did not have a flood policy. Some respondents, however, justified the lack of policies by citing various reasons. For example, the Provincial DMC's deputy director stated:

"We have a sectoral Disaster Management Framework that talks to all types of disasters. There is also a Flood Management Plan for the Sector".

(Pers. Comm. 2021w)

Moreover, the Local Municipality DMC in KZN Province addressed the lack of flood-specific policies, uttering that:

"There are no specific policies on floods, except by-laws that prohibit the mushrooming of informal settlements that ensure building control".

(Pers. Comm. 2020j)

The district DMC manager, on the other hand, detailed:

"Not for floods, as there are generic documents, such as a Contingency Plan and Disaster Management Plan. The Plan is not talking to divers and boats; only Fire Stations assist when floods occur. Normally when there are floods, the affected individuals are evacuated, and once the water has subsided, they return to their houses".

(Pers. Comm. 2021u)

The majority of the organisations had no specific flood control legislation or policy. The advisory forum and disaster management officials' results showed a troubling trend,

with participants stating the lack of flood-specific policies. Instead, they relied on generic documents such as disaster management plans and by-laws.

Disaster-Vulnerable Groups' Specific Policies

Communities experience different outcomes during disasters due to people's vulnerability (King et al., 2019) [66]. Since the study focused on vulnerable groups, it was imperative to establish whether there were specific acts and policies for vulnerable groups and to specify them. The study sought disaster management officials' opinions on whether policies were in place to assist vulnerable groups within their organisations. According to 21 disaster management officials, or 62% of all participants, their organisations had specific policies for vulnerable groups. Ten respondents were unsure, accounting for 29% of the total. The response was no for three participants or 9%. Figure 6 displays the results.

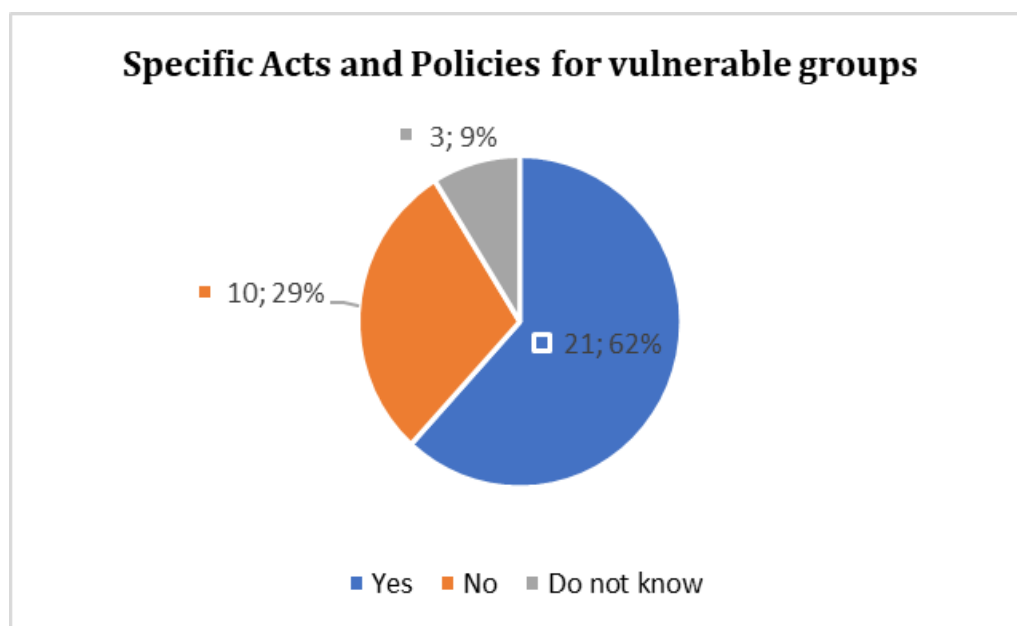


Figure 6. Disaster-vulnerable groups' specific policies.

However, further exploration indicated that the approach incorporated vulnerable groups' information into other policies, rather than implementing policies specifically for them. Thus, they are primarily dependent on the current DM Act and NDMF. Some DMCs even rely on other departments and NGOs to assist vulnerable groups. Yet again, this was a concerning revelation, as it might mean officials do not prioritise vulnerable groups.

3.2. Factors Hindering Effective and Efficient Post-Disaster Management in South Africa

The study also looked into South African disaster management officials' challenges when implementing the DM Act. Since challenges are likely to occur at different scales, disasters affect some people more than others, depending on their vulnerability (O'Brien et al., 2010) [27]. The goal was to attain the participants' opinions on whether there were challenges in implementing the DM Act and policies post disaster and the nature thereof. Atlasti was used to analyse the responses for the study. Table 2 shows the participants' perspectives on the challenges of implementing the DM Act and policies post disasters.

Table 2. Challenges encountered when implementing the DM Act and policies post disasters.

No.	Recurring Responses Codes	Details of Responses
a.	Lack of a multistakeholder approach	Some disaster management officials mentioned a lack of a multistakeholder approach, as stakeholders were working in silos.
b.	Prevalent situations exacerbating existing challenges	Overwhelmingly negative responses exacerbated the challenges encountered by disaster management officials.
c.	Unsatisfactory commitment by the sector and municipal departments	Unsatisfactory commitment by sector and municipal departments at different levels contributed to the difficulties encountered.
d.	Inadequate funding arrangements	Almost all respondents expressed concern about insufficient funding to assist with institutional arrangements.
e.	Insufficient institutional arrangements	Most DMC officials were dissatisfied with the lack of institutional arrangements internally and externally.
f.	Political interference and unfairness	Other issues raised by some DMC officials were political interference and unfairness, particularly where vulnerable groups' needs were compromised to accomplish political achievements.

Source: Field Survey, April–July 2021.

The responses support the idea that wide-ranging challenges impede post-disaster legislation and policy implementation. Similarly, the challenges affecting sustainable development in Africa are renewable resources, poor infrastructure, unemployment, high population growth, climate change adaptive capacity, and the recent COVID-19 pandemic (Seddiky et al., 2020) [22]. It appears that authorities have no control over the challenges.

Common Challenges Encountered during the Post-Disaster Phase

It was critical to evaluate the obstacles that disaster management officials encounter in the aftermath of disasters. Table 3 shows the results of the challenges coded using Atlasti:

Table 3. Common challenges encountered during the post-disaster phase.

Recurring Responses Codes	Responses	Percentage
(a) Power dynamics	7	21%
(b) Limited funding arrangements	8	24%
(c) Vulnerable communities' challenges	8	24%
(d) High frequency of disasters	5	14%
(e) DM officials' roles and responsibilities	8	24%
(f) Shortage of resources	8	24%
(g) Multistakeholder complications	23	68%

Source: Field Survey, April–July 2021.

Most of the challenges experienced were beyond the scope of disaster management officials in nature. Multistakeholder complications were the most frequently mentioned challenges by participants. They were mentioned 23 times, representing 68% of the total participants. Notably, the least prevalent obstacle was the high frequency of disasters, as this was selected five times, representing 14% of the participants. To elaborate, one of the officials stated:

There are high expectations from the community to get houses and groceries. Community members complained about the material received from disaster management, saying they wanted houses, not relief materials only. Some complained about not being the beneficiaries, and some complained about their households not being assessed.

(Pers. Comm. 2020d)

Another manager was of the view that:

Community: Some people who are not affected deliberately destroy their belongings; to be given the provided relief materials. Moreover, some take chances and claim to have been affected, whereas they were not. Political leaders: They request relief materials to be sent to people not affected, especially during election season. Stakeholders: Delayed disaster response by stakeholders. It can take days before the stakeholders respond.

(Pers. Comm. 2021a)

There are varying levels of complexity among the challenges presented in Table 2. Uncertainties hinder effective response planning (O'Brien et al., 2010) [27]. These challenges are likely to have devastating effects on sustainable development. In addition to the severity of the disasters, the country suffers from several other issues. Another crucial aspect was determining whether disaster management advisory forum members encountered challenges after disasters. Challenges stated, among others, included funding and administrative matters. The majority of the respondents, 75%, identified funding as the biggest problem. This means most organisations lack funding and the appropriate resources required for post-disaster activities. Councillors identified the continuous occurrence of disasters and the inadequate resources and systems to assist disaster victims.

3.3. Existing Post-Disaster Measures in Place in South Africa

It was crucial to identify current projects implemented after disasters. The study wanted to determine the systems and processes for effective post-disaster management in South Africa. Therefore, disaster management officials', councillors', and focus groups' questions focused on current projects to assist vulnerable groups. Table 4 details the projects some disaster management officials had implemented to help vulnerable groups.

Table 4. Projects in place to assist vulnerable groups post disasters.

Projects	Responses	Percentage
(a) Shelter or relocation	4	12%
(b) Information dissemination	7	21%
(c) Establishment of structures	2	6%
(d) Temporary measures	6	18%
(e) Long-term measures	9	26%
(f) None	11	32%

Source: Field Survey, April–July 2021.

Table 4 shows diverse projects implemented in different communities. According to four disaster management officials, which is 12% of the participants, one of the current projects is the provision of shelter or relocation. Seven respondents, 21% of the total, indicated information dissemination. Another response was the establishment of structures from two participants, or 6%. On the other hand, a group of nine participants, accounting for 26%, revealed they had implemented long-term measures. However, it was concerning that most participants, 11, equalling 32%, indicated that no projects were in place. For the existing projects, the Gauteng metropolitan municipality manager stipulated some of the information dissemination and temporary measure projects and indicated:

Outreaches are fundamental in curbing or reducing the impact. These are known as awareness or preparedness plans, which help communities deal with a hazard prevalent in a particular ward. These projects are proactive in nature rather than reactive. Post-disaster projects regarding KPA 4 of the Disaster Management Act are reactive and involve relief material supply to the displaced. Post-disaster projects are a by-the-way approach in that one waits for an incident to happen and becomes active. Contingency plans are activists based on those programmes that are developed and activated.

(Pers. Comm. 2021q)

Another view was from the district municipality senior manager, who elaborated on the short- and long-term projects and said:

Most disasters are short-term. The vulnerable groups are only evacuated to temporary facilities, and they move back to their homes after disaster incidents. Sometimes, they are provided with temporary shelter. However, the challenge is that the neighbours that are not affected burn down the houses to get temporary dwellings as they are perceived to be better. Providing temporary homes thus exacerbates the situation.

(Pers. Comm. 2021u)

Councillors' responses to whether projects were implemented after disasters also varied. One councillor answered no, while another said yes. The councillor who answered yes explained:

"Yes, there are people we will build houses for".

(Pers. Comm. 2021cb)

When asked about specific disaster management projects in the area, almost all focus groups' community members revealed that they were unaware of any such projects. Surprisingly, only one person responded positively and mentioned the project. The responses of some participants ranged from "no", "not really", "not sure", to "do not know".

The possibility of implementing non-structural and structural measures exists. Departments such as housing, education, social development, EMS, environmental affairs, and home affairs need to assist with implementation. Some projects are long-term in nature, while others are short-term or ongoing. Another observation about the projects was that they varied from area to area. In agreement, Gajanayake et al. (2018) [67] believe that adaptation choices may differ depending on the affected community members, thus, influencing their disaster resilience. Post-disaster projects must prioritise and address community needs (NDMF, 2005) [68]. However, a lack of resources sometimes makes it challenging to implement some necessary projects. Thus, there might be a necessity to prioritise implementing projects to address the urgent needs of vulnerable groups more promptly.

3.4. Proposed Alternative Strategies for Adapting to Disasters

It is important to understand vulnerable communities and the flood risk they encounter to implement the necessary measures (Chakraborty et al., 2019) [69]. This question intended to ascertain respondents' recommendations for assisting vulnerable groups in South Africa post disaster to increase disaster capacity and resilience, particularly to floods. Stakeholders and role players enhance the understanding of flood risks, resulting in more effective and long-term flood management (Tingsanchali, 2012) [70]. Table 5 presents the proposed measures suggested by the participants analysed using Atlasti.

Table 5. Proposed measures by research participants.

No.	Recurring Responses	Details of Responses	Responses	Percentage
(a)	Collaboration of stakeholders and role players	Many participants from various sectors of society resonated with the stakeholder and role-player coordination proposal, as there was a concern about working in silos.	25	28%
(b)	Skills development	Participants believed it was critical to ensure community skills development for officials and community members, as they felt some individuals lacked skills.	28	31%
(c)	Prioritise vulnerable groups	Various proposed measures included providing RDP houses, relocation, food, and service delivery, such as water connections to ensure vulnerable groups do not suffer.	46	51%

Table 5. Cont.

No.	Recurring Responses	Details of Responses	Responses	Percentage
(d)	Address social ills	A minority of respondents suggested a novel solution to address perceived social ills that primarily affect vulnerable groups. For example, there were concerns about taverns staying open late, theft, and break-ins, resulting in fatalities.	6	7%
(e)	Development of disaster management documents	Respondents explored the significance of developing various disaster management documents. They included flood plans, vulnerable group plans, relevant frameworks, standard operating procedures (SOPS), and a memorandum of understanding.	10	11%
(f)	Fully functional DMCs	The DMC officials from various levels of government agreed that there should be a fully functional DMC to assist them in prioritising vulnerable groups, since the current set-up is inadequate. Thus, there must be an adequate allocation of resources.	11	12%
(g)	Improved service delivery	One of the most common pleas from the community was for officials from all spheres of government to improve service delivery. The priority areas were water, electricity, roads, and drainage. However, the top priority appears to be shelter and social grants assistance. Some community members suggested additional infrastructure.	40	44%
(h)	Funding allocation	Participants suggested that there should be funding allocation dedicated to post-disaster management activities	10	11%

Source: Field Survey, April–July 2021.

The respondents proposed a broad range of short- and long-term measures. House reconstruction was one of the most popularly suggested strategies. After Hurricane Mitch, officials implemented a houses reconstruction project in Nueva Choluteca, Honduras. Besides its advantages, agencies, organisations, and governments prefer it because it is tangible and provides evidence that resources are being spent (Lizarralde, 2012) [31]. A similar project was the one by the central government in Turkey after the 1999 earthquake (Lizarralde, 2012) [31]. Some stakeholders will have to work together for the measures to be effective. Furthermore, since various departments fall under different spheres of government, most strategies require budgets from all spheres of government. Stakeholders will need effective and efficient planning and monitoring tools. The involvement of community members is crucial for implementing the recommended initiatives.

4. Discussion

Disaster management is complex because it involves many aspects of society, ranging from the social, political, cultural, physical, and environmental, to the economic (Becker, 2009) [71].

4.1. Existing Disaster Management Institutional Arrangements

A transdisciplinary approach may enable a broader insight into a disaster and the implementation of DRR measures (Culwick and Patel, 2017) [72]. This phenomenon was observed in the Muysoki et al. (2015) [73] study, where various role players and stakeholders played significant roles post disaster. According to Figure 4, the research participants came from all three spheres of government. They were also from different provinces. The diversity is proof of the cliché that disaster management is everybody's business. All these stakeholders and role players need to work together to ensure that disaster management is effective and efficient. Another observation was that the provincial and national participants could work across lower spheres. The cross-cutting nature of interventions can strengthen institutional arrangements in terms of providing essential resources. It will be a valuable approach post disaster. However, Fan (2015) [74] observes that part of the problem is that the government focuses on the technical approach to risks

while hardly incorporating the sociocultural aspects of vulnerability and sustainability, resulting in deficient laws.

Disaster management officials' responses in Figure 5 and Table 1 affirm the availability of several legislations and policies addressing different post-disaster objectives in South Africa. Meanwhile, Van Niekerk (2005) [75] argues that, before 1994, South Africa lacked a comprehensive approach to disasters and disaster risks because they were considered "acts of God" that were unpredictable or unpreventable. However, the results show that the South African Government's traditional approach to disasters has shifted and is now consistent with international best practices in disaster management (NDMC and Reid, 2008) [76]. Many participants use the amended DM Act of 2002. It may be because this act prescribes a comprehensive approach to disaster management, as it includes principles, key stakeholders and role-players, some post-disaster procedures, and the establishment of critical institutional arrangements. Zuma et al. (2012) [77] state that chapters 4 and 5 of the DM Act govern the roles of the provincial government and municipal government, respectively. Seddiky et al. (2020) [22] believe there should be local, state, and federal policy coherence. In the South African context, it is local, provincial, and national government. This explanation may be another reason most participants selected the DM Act.

Numerous participants also mentioned the 2005 NDMF. Interestingly, Raikes and McBean (2016) [78] expressed concern that most Canadian Provincial Emergency Management legislation lacks regulatory guidelines for how local governments can reduce community vulnerability. Barnes et al. (2019) [79] agree that developing regulatory frameworks, which include mitigation strategies and plans to mitigate potential disaster effects, is an effective strategy for dealing with natural hazards. As a result, one can conclude that a well-informed disaster management policy is a catalyst for change (Barnes et al., 2019) [79]. Unfortunately, the Ncakubana and Mphela Township community members interviewed were unaware of the DM Act and policies. The lack of knowledge about the DM Act and DM framework can lead to disregarding laws and policies. It is a concern that the communities may not support the legislation and policy framework, since they do not know about them. Out of the 17 SDGs, the ones relevant to post-disaster management are SDGs 1, 11, and 13 (Djalane, 2019) [10]. One of the legislative gaps is that the DM Act does not provide a comprehensive approach to ensuring that post-disaster intervention is effective and efficient in offering adaptive disaster capacity and disaster-resilient communities (DM Act, 2002) [61]. The findings suggest that, despite the legislation and policies in place, there may be a lack of appropriate strategies, resulting in the ineffective and inefficient implementation of flood post-disaster activities. The recent post-disaster flood incident measures in South Africa prove such assertions. There is a need for more improvements and inclusiveness post disaster.

Additionally, disaster management officials revealed no flood-specific policies, as organisations rely on disaster management plans, acts, the NDMF, and other documents. Even Sri Lanka had no specific disaster management plans (Caymaz et al., 2013) [80]. A similar trend is evident in Pakistan, where the disaster management plan is multi-hazard in nature and not specific regarding the type or magnitude of the disaster for the NDRF to be activated. Another study conducted in 85 countries by Nohrstedt et al. (2021) [81] shows no specific flood policies. Even though floods are the most prevalent disasters in the country, the results similarly revealed that most participants do not have flood-specific policies in their organisations. This assertion stems from the reliance on other policies by the participants. Despite such arrangements, it was still worrisome that the DMCs had not developed flood-specific disaster management policies, though floods are one of the most common disasters. The approach suggests a generic approach to dealing with floods and a lack of prioritisation. These efforts seem unlikely to contribute to disaster resilience and adaptive capacity to ensure sustainable development. The Sendai Framework stipulates that contingency plans should be community-specific (Seddiky et al., 2020) [22]. Therefore, having community flood-specific plans will help disaster management officials to be well-prepared. Thus, activating a plan not specific to the disaster could be futile.

Moreover, from the results, most participants indicated that their organisations do not have specific policies for vulnerable groups, as stipulated in Figure 6. The study can categorically state that the existing policies are broad. Consequently, they do not assist vulnerable groups effectively and efficiently. The Sendai Framework emphasises that women, children, and people with disabilities must be prioritised in all disaster management phases and DRR processes (Seddiky et al., 2020) [22]. Some organisations even rely on NGOs to assist them in dealing with vulnerable groups. The challenge of depending on NGOs is that they may lack experienced leadership and they are exposed to large-scale corruption and misappropriation (Seddiky et al., 2020) [22]. In South Africa, relying only on NGOs' documents will not be feasible, as NGOs are private entities and operate differently from the NDMC, PDMCs, and MDMCs. DMCs have some standardisation in all three spheres of government. Therefore, there are clear lines of communication and accountability. The relevant stakeholders and role players should be strongly encouraged to address this critical gap.

4.2. Tangible and Intangible Challenges Encountered Post Disasters

Some challenges are pervasive among all participants, while others affect only a few. As highlighted in Table 3, respondents cited power dynamics, funding arrangements, vulnerable communities' challenges, the high frequency of disasters, disaster management officials' roles and responsibilities, a shortage of resources, and multistakeholder complications as the most common challenges. These findings correspond with the view that there is a limitation to the implementation of adaptation measures both in developed and developing countries (Adger et al., 2007) [82]. Making decisions is challenging when limited information is available (Lizarralde, 2012) [31]. In support, Adger et al. (2007) [82] elaborate that other community individuals or groups cannot adapt to climate change. A lack of resources may result in low-income groups having limited ability to afford proposed adaptation measures, such as risk insurance (Adger et al., 2007) [82]. For high-income countries, the funding sources can be private insurance and government subsidies (Lizarralde, 2012) [31]. In some countries, funding is through donors, development banks, and international agencies (Lizarralde, 2012) [31]. In South Africa, most of the budget comes from the government. The source means South Africa has solid central government control, since it finances most of the houses' reconstruction and infrastructure projects, though there is a backlog. Various strategies can tackle the challenges, provided all stakeholders work together. In the same breath, taking measures to prevent corruption and fraud is essential. The challenge might not be a lack of funding but a lack of implementation and spending (Mabaso, 2023) [15].

On the other hand, even though the relevant DM Act and policies are in place, some respondents believed that the DM Act and policy implementation are ineffective. One of the reasons is that stakeholders do not fully implement the DM Act, particularly during planning, response, and recovery. Similarly, internal challenges include ineffective organisational procedures and processes, undefined tasks, roles, and responsibilities, and staff resistance to change (Abdeen et al., 2021) [83]. One of the post-disaster psychological effects is fear. Specifically, Bauman (2013) [84] believes that in contemporary modern life, individuals do not know the dangers they face and are, thus, incapable of dealing with them if they occur. Disasters add fear because people might be unable to prevent or avoid them (Bauman, 2013) [84]. The presence of applicable policies and acts alone is inadequate; therefore, proper execution is equally significant in implementing effective post-disaster measures.

Some challenges that councillors identified were the continuous occurrence of disasters and inadequate resources and systems in place to assist disaster victims. These challenges can even hinder post-disaster consumption. Community meetings can assist in identifying community challenges, such as inaccessible facilities and required transport modes (Singh et al., 2023) [30]. Specifically, the NDMC (2018) [9] report indicates rising costs for implementing post-disaster activities in the 2017–18 fiscal year. For instance, for

the recent 2022 KZN floods, the National Government, Department of Cooperative and Traditional Affairs allocated about ZAR 1.2 billion specifically to eThekweni Metropolitan Municipality (Mabaso, 2023) [15]. These reported increases could be a result of the higher costs of contributions towards providing relief services, restoring livelihoods, and rebuilding infrastructure. The participants are seemingly not proactive in addressing the challenges; some are still reactive. There are also concerns about political interference, as per an allegation that some politicians used the post-disaster phase to manipulate the system for political gain. In South Africa, post-disaster activities must remain apolitical, impartial, and independent.

4.3. Identified Post-Disaster Projects

Post-disaster projects must focus on a participatory model involving the community (Fan, 2015) [74]. While it is necessary to prevent disasters, the international research community acknowledges that they can also be change catalysts, leading to the development of more resilient nations and societies (Birkmann et al., 2008) [85]. Table 4 shows that awareness campaigns were popular among disaster management officials. Some participants even mentioned that their public awareness campaigns were targeting schools. Some suggested approaching traditional foremen, known as *Izinduna*, as a target group for awareness campaigns. These findings are similar to those of Phaiju and Gautam (2013) [86], who focus on training Nepalese community members to monitor and track flood levels. Officials can disseminate awareness campaign information through radio, posters, calendars, pamphlets, art, songs, theatre, and essays (Phaiju and Gautam, 2013) [86]. Moreover, multistakeholder awareness campaigns can be critical for disseminating various information and reaching a large audience because DMCs usually conduct awareness campaigns unilaterally based on the higher level of information gathered. In contrast, in Egypt there was a lack of awareness campaigns in schools, institutions of learning, and media outlets, as the government undermined awareness campaign efforts (Abulnour, 2014) [87]. A community education programme on disaster management is necessary to understand disaster management (Kamil et al., 2019) [88]. Some of the participants did not have post-disaster management projects in place. As such, they inadequately prepare for post-disaster management activities. Implementing and monitoring the impact of these awareness campaigns, particularly post-disaster, will be crucial.

The research revealed that some organisations have projects designed to assist vulnerable groups, which is a move in the right direction. These participants indicated that they prioritise vulnerable groups when allocating houses. Shelter is essential for disaster victims since vulnerable groups sometimes cannot acquire basic needs. However, these implemented projects do not seem to have any significant positive impact on helping the affected vulnerable individuals. Another means of contributing towards sustainability is tourism, which leads to recovery tourism. This phenomenon is known as dark tourism and disaster-stricken communities are used as tourist attractions to assist in urban recovery (Gothan, 2017) [89]. Other benefits of such tours are that the affected areas gain empathy, people donate towards relief efforts, and some people even volunteer their time and labour to assist (Gothan, 2017) [89]. Such tours have not gained interest in South Africa, although, sometimes through media drives, there are post-disaster donations. There is a view that communities already implement different measures, such as irrigation, water management, insurance, disaster risk management, and crop diversification for adaptation to the impacts of climate change (Adger et al., 2007) [82]. Each country, including South Africa, faces unique challenges and needs. Understanding the community's history and needs in a diverse country such as South Africa is crucial to implementing the best post-disaster phase measures.

4.4. Research Participants' Recommended Long-Term Measures

Recent research studies advocate learning from disaster experiences to reduce future impacts (Raska and Bradzil, 2015) [90]. This question was posed to all participants who

played distinct roles post disaster. To categorise rehabilitation interventions for vulnerable groups, Sheikhbardsiri et al. (2017) [91] divided them into physical, social, psychological, and economic categories. Similarly, change can occur on a social, economic, political, and environmental level (Birkmann et al., 2010) [85]. Developing disaster resilience and adaptive capabilities for vulnerable groups requires long-term solutions. Thus, there should be long-term interventions (Fan, 2015) [74], as shown by the long-term measures recommended in Table 5. The most common suggestions from officials were education, training, and public awareness. These suggestions could have been because the results revealed that communities were not aware of, or even involved in, most post-disaster management activities.

Everyone could assist in addressing the challenges. Each person needs to understand their role post disaster to assist effectively. Conducting regular evacuation drills can guarantee an acceptable post-disaster phase level. The stakeholders will likely be in regular contact, which is encouraged post-disaster. The proposed documents included plans, policies, and SOPs. Therefore, the participants' suggestion that it was important to reconsider the existing institutional arrangements was expected. South Africa needs to fill the gap regarding the existing structures and documents. Constant communication can ensure prompt action. Additionally, there is a need to develop new documents and regulations to ensure the effective and efficient implementation of post-disaster measures. These can provide the framework to ensure post-disaster measures' quick and effective implementation.

Relocating from flooding-prone areas was another preferred suggested tangible measure. This strategy can reduce disaster damage, especially for vulnerable populations in high-risk areas. Other advantages of relocation include better service delivery and decreased poverty. As a result, more money would be available for other post-disaster activities since disaster incidents may be reduced. South Africa, however, rarely implements relocations. Subsequently, the disaster cycle never ends because people return to disaster-prone areas. Essentially, officials and communities need resources post disaster.

Another common suggestion from community members was the provision of shelter, particularly Reconstruction and Development Programme (RDP) houses provided by the government as social housing. The type of house influences the housing recovery, the extent of the effect on the house, the magnitude of the disaster, and access to resources, such as funding, labour, and materials (Lizarralde, 2012) [31]. The materials used to construct RDP houses result in stronger houses than those constructed by community members using their own materials. As much as there are positive aspects to the houses, the negative view is that the constructed standardised housing units sometimes cannot meet the individual needs and situations of families (Lizarralde, 2012) [31]. Hence, the house beneficiaries are usually unsatisfied with the housing reconstruction projects (Lizarralde, 2012) [31]. This situation is a case of wasteful and fruitless expenditure, a common occurrence in South Africa that needs to be avoided at all costs.

Other public service reconstruction infrastructures do not take priority because they receive less attention than post-disaster housing projects (Lizarralde, 2012) [31]. The participants also expressed the need to address service delivery concerns because they will likely disrupt post-disaster management activities. SDG 11 stipulates the importance of sustainable cities and communities to the road sector, whereby the public transport system should be safe, resilient, and sustainable (Singh et al., 2023) [30]. Similarly, the study of Dwivedi et al. (2023) [92] aimed to identify drivers to mitigate climate change in the manufacturing industry. The 21 drivers for climate change mitigation can assist the sector in mitigating climate change (Dwivedi et al., 2023) [92]. By implementing these strategies, disasters can improve community social relations (Korstange, 2011) [93]. The NDMC (2018) [9] report further indicates that officials from transport, agriculture, forestry, the environment, water and sanitation, education, and human settlements must actively participate in disaster management prevention measures to avert disasters and subsequent losses. Their involvement can contribute towards sustainable development in their sectors in the country.

5. Conclusions, Limitations, and Recommendations

The research confirmed that disaster management is multidisciplinary and multi-sectoral. The existing institutional arrangements in organisations do not currently assist in the efficient and effective implementation of post-disaster management measures because the frequency and intensity of floods are rising. Considering these realities, the paper identified the need for overhauling the institutional arrangements to improve South Africa's post-disaster management phase. Tangible and intangible challenges hinder the implementation of post-disaster interventions. A lack of funding and resources were the most mentioned challenges for post-disaster activities. Coordination and communication issues often arise between stakeholders and the affected communities. Unfortunately, the implemented projects do not contribute sufficiently to disaster resilience and adaptive capacity. Based on the above discussion, disaster management officials have a vision of ideal DMCs and disaster-resilient communities with adaptive capacity, but it is unclear whether they can capitalise on those existing projects to create opportunities. The study participants proposed long-term measures to assist vulnerable groups. These measures should be sustainable and disaster resilient. The study suggests a 'Floods Post-disaster Checklist' in Appendix A, given that it is non-existent in South Africa. The checklist can gauge disaster resilience and adaptability in vulnerable communities. Officials would have to rethink the value for money when implementing post-disaster activities. Moreover, community members must be involved when implementing post-disaster activities. As Appendix A illustrates, the proposed measures' success depends on collaboration with various stakeholders and role players. The proposed post-disaster management checklist can contribute to the effective and efficient implementation of post-disaster activities, leading to disaster-resilient and adaptive communities. Methodologically, the proposed checklist can apply to other disaster incidents besides floods. However, the existing literature review and specific disaster dynamics are the keys to its improvement and implementation.

The study had various limitations. Firstly, the study did not explore implemented projects comprehensively. One of the most basic post-disaster needs of disaster victims is shelter. When a disaster strikes, the victims often lose their homes and have nowhere to go. Thus, another study can concentrate on the relocation process, required resources, challenges, and advantages of ensuring an efficient and effective post-disaster process. Secondly, it was unclear whether storing post-disaster resources was advantageous or disadvantageous, considering that disaster management is a coordinating function. The uncertainty was because it was difficult to determine if the benefits of storing resources outweighed the costs associated with not keeping them. Thus, checking the sustainability of the DMCs by only coordinating post-disaster adaptive capacity and resilience resources can benefit disaster management centres, stakeholders, and role players.

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Appendix A Proposed Developed Post-Disaster Checklist/Model

Table A1. Proposed 'Floods Post-disaster Checklist'.

Item	Rating			Comment
	Low: 1–3	Medium: 4–7	High: 8–10	
Institutional Arrangements				
Establish or revive structures ¹				
Functional DMC				
Hazard Specific Policy				
Hazard Specific Plan				
Vulnerable Groups Policies				
Legislation synergy				
Updated legislation				
Prioritisation of vulnerable groups				
Funding Model				
DMC Placement				
Multi-sectoral approach				
Community participation				
Volunteers SOP				
Information Management SOP ²				
Signed MOUs ³				
Community Capitals				
Challenges				
Resources ⁴				
Political interference				
Working in silos				
Staff shortage				
Community members				
Delays in implementation				
Declaration process				
Service delivery concerns				
Affected sectors				
Post-disaster checklist—recommendations				
Capacitate vulnerable groups ⁵				
Early warning systems ⁶				
Information Management System				
Temporary/Evacuation shelters				
Relocation-permanent				
Funding arrangements				
Donations				
Coordinated activities/structures				
Search and rescue				
Medical attention				
Food security				
Burial arrangements				

Table A1. Cont.

Item	Rating			Comment
	Low: 1–3	Medium: 4–7	High: 8–10	
Psychological assistance				
Legal services				
Tree planting				
Implemented projects: Build Back Better				
Effective project management				

Legend: ¹ Advisory Forum Members, Technical Task Teams, temporal, and permanent post-disaster structures; ² Information dissemination, community meetings, media platforms, Information and Communications Technology, and Network coverage; ³ Neighbouring DMCs, Government Departments, Parastatals, Private Sector; ⁴ Resources shortage and duplication; ⁵ Awareness Campaigns approach: Legislations and policies, hazard knowledge, and drills; ⁶ The information should be in various platforms and language.

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