A Presidential Climate Commission Issue Brief

A Critical Analysis of the Impacts of and Responses to the April-May 2022 Floods in KwaZulu-Natal

About this issue brief

This issue brief was commissioned by the Presidential Climate Commission (PCC) to analyse the impacts of and responses to the April-May 2022 floods in KwaZulu-Natal.

The issue brief draws from the technical report "A Critical Analysis of the Impacts of and Responses to the April-May 2022 Floods in KwaZulu-Natal" and was commissioned and developed in coordination with the PCC Secretariat, PCC Commissioners and the PCC's Resilience and Adaptation Working Group.

PCC issue briefs are short and aimed at informing policymakers. Issue briefs focus on pertinent climate and just transition issues in South Africa (SA) and draw out the implications of existing evidence for decision makers.

About the Presidential Climate Commission

The PCC is a multi-stakeholder body established by the President of South Africa to advise on the country's climate change response and pathways to a low-carbon climate-resilient economy and society. The PCC facilitates dialogue between social partners on these issues, defining the type of society we want to achieve and detailed pathways for how to get there.

Background

This paper is an analysis of the April-May 2022 floods that struck the KwaZulu-Natal (KZN) province, centred in the City of eThekwini, which led to the loss of lives and livelihoods, displacement of people, extensive damage to infrastructure and disruption of services. The province has historically been subject to floods, is predicted to experience a variety of climate change scenarios and, given its socioeconomic and environmental features, is perceived to be vulnerable to a range of climate risks. The link between anthropogenic activities and climate change is well established but the extent to which human activity has increased the risk of high-impact weather events, such as the April-May 2022 floods, is still debated. The confidence with which climate events can be attributed to anthropogenic climate change influences decisions about rebuilding after a disaster, investing in building resilience/ ensuring preparedness and insurance pricing.

It is becoming increasingly evident that single-extreme weather and climate events are unique, i.e., they happen only once in the exact same manner making their probability strictly speaking infinitely small, which makes any attribution difficult, unless single events such as the April-May 2022 floods are seen as part of classes of events, e.g., regionally constrained exceedance of a geophysical variable over a specific threshold. The current global heating on the back of increasing GHG emissions has been responsible for a now 1.2°C increase compared to pre-industrial levels according to the IPCC WGII in the 6 Assessment Report (AR6). This has increased the frequency of high-energy storms, floods and droughts, wildfires, and sea-level rise. At the very least the April flood impact has been influenced by the continued and repeated high-energy storm events in the form of cyclones along the southern African eastern coastline. It appears that this phenomenon is likely to repeat itself, possibly with increased frequency, in the future.

The impacts of, and recovery from, an extreme weather event, like the April 2022 flood, depend on the relationships between the human socioeconomic and environmental context and climate resilience and adaptive capacity. These form the foci of this **Critical analysis of the impacts of and responses to the April-May 2022 floods in KZN.**

Methodological approach

There were obvious constraints that need to be acknowledged. These included the limited time to conduct the analysis, data limitations as well as the dearth of official reports that are publicly available. This meant that it was not possible to fully understand the full extent of the impacts and responses. The research team utilised a largely qualitative approach drawing on data from document analysis, stakeholder engagement and case study analysis to provide a multi-dimensional appreciation of these impacts and responses. This analysis has been conducted against the backdrop of a status quo analysis of the Greater eThekwini Metropolitan Area's (GeMA) broader climate resilience and adaptation capacity featured in an appendix to the main document. The study was challenged on many fronts by data limitations as well as limited information on/access to official reports on impacts, responses and learnings. This solution-orientated study seeks to contribute to climate-risk management efforts by various role-players within the Greater eThekwini Metropolitan Area, including those working in the humanitarian, urban planning, social services, health, and disaster risk reduction sectors.

What happened and why?

From 8 April to 12 April, record-breaking rain fell on the region with the port city of Durban as the epicentre, washing away infrastructure, land, and houses, and severely affecting lives and livelihoods. The eThekwini, iLembe, and Ugu municipalities were most severely affected. The strong low-pressure weather system that gave rise to the floods is now not uncommon off the east coast of southern Africa and has caused localised flooding and large wave events in the autumn previously.

In the case of the April 2022 floods, the low-pressure system was enhanced by an influx of low-level moist air feeding in from the southern Indian ocean. This airflow originated from a warmer sub-tropical climate, increasing the system's capacity to hold moisture. The combined effects of additional heat and moisture fed the system giving rise to more rainfall, far exceeding the expectations of the southern African meteorological community. The high existing high water table brought about by La Nina worsened the effects of this excessive rainfall. As the province was still recovering from the April floods, a second storm hit parts of the province resulting in significant damage to the King Cetshwayo, Ilembe and Zululand districts. It is true that Durban has experienced flooding events every year since 2016 but previous storms have typically dropped half this amount (100mm-150mm) in any 24-hour period. It must be stressed that poor infrastructure, urban sprawl and a lack of resources have also been identified as reasons for the severe effects of the floods, making attribution of the flood events, even if they are part of a class of events, to climate change exclusively difficult. Also, while it is clear that 18 river courses, including the Amanzimtoti, Umbilo and Umgeni, overflowed, causing widespread damage to informal settlements and other riverside communities, there is debate about how many of these would have overflowed had their natural flow patterns not been altered by human activities.

What were the impacts?

The impacts of the April-May floods were severe and wide-ranging. A total of 443 people are known to have died and at least 48 are missing or unaccounted for. A total of 19,113 households and 128,743 people have been negatively affected directly and many more indirectly through the pause in economic activity, limited mobility and the absence of basic services including water. The storm on 21 May led to further devastation mainly in districts in eThekwini, King Cetshwayo and Mkhanyakude resulting in flooding of roads, human settlements, and damage to properties. Some already displaced people were further displaced as their evacuation centres were flooded. Those within informal settlements (close to rivers, below flood lines, and rural areas especially on steep hillsides with little or no infrastructure to protect them from the elements) were the hardest hit. Six hundred schools and 84 health facilities were also affected. These matters were emphasised in the report that the South African Human Rights Commission offered to parliament.

The data shows the eThekwini Municipality to be the most severely affected in terms of the number of households (both completely and partially) destroyed and people affected. There was a total of 86 wards and 26,814 dwellings affected, with

26,367 of these totally damaged and 18 specific disaster zones at which varying levels of damage were noted. Sinkholes, mudslides, damage to asphalt and damage to transport infrastructure were common forms of additional damage. Fatalities were recorded in eight of the 11 municipalities, with eThekwini accounting for 404 of these. There were 31 fatalities in the ILembe Municipality. Damage to water and sanitation infrastructure was widespread. Notable examples include the complete failure of the Nagle Aqueducts, embankment failure, damage to access roads at water treatment works (e.g. Mzinto) and damage to mainlines (e.g. Sterkspruit). This damage to infrastructure has led to the interruption of services in a number of areas, most notably the town of Tongaat. It is also worth noting that dozens of suburbs and wards have been/are being subjected to water rationing since the floods.

Human health (both physical and mental) was gravely compromised, especially among those who are most vulnerable to flooding. The unfolding psychological trauma is highest among those directly impacted by the floods, especially people who have been displaced and/or lost loved ones. Dealing with the physical and emotional trauma was worsened by issues surrounding the care centres and shelters, the relocation/exit shelter strategy and the provision of temporary residential units. There is also an increase in susceptibility to waterborne and waste-linked diseases. Waste generation associated with the floods (including wastewater and solid waste) fostered unhygienic conditions with a related increase in waterborne and other diseases. It is also important to note that the destruction of health infrastructure reduced access to healthcare facilities.

The flood events had significant impacts on livelihoods with work-life generally being disrupted for days and longer for households and workplaces that experienced prolonged disruptions to water and energy provision. In some instances, livelihoods were lost due to damage to or total destruction of infrastructure, goods and services. However, an unintended consequence of floods (and disasters more generally) on livelihoods is job creation associated with flood clean-up and other responses. Additionally, there are investments in infrastructure (such as early warning systems and road improvement) and services (such as an increase in the number of water tanks) that improves wellbeing and livelihoods.

The April-May floods led to food insecurity, particularly among displaced people. This is partially due to the fact that many communities in the province are heavily dependent on rain-fed and irrigated agriculture, both of which were previously reported to be impacted negatively by climate and weather variability. Moreover, the major sources of food consumed in urban areas are imported and the April-May floods impacted food security across a number of low-income households based on the disruption of production and supply chains. These households are characterised by daily to weekly food purchasing and do not have food safety nets. While the impacts and responses to the food security threats brought about by the floods are yet to be quantified, what has emerged are predictions about how the disruption of food production and supply chains in the province during climate-related disasters could impact food security in other parts of the country. What is also noteworthy is that even though KZN is not the major producer of food domestically, it plays an essential role in connecting SA's food system with the international community through the Port of Durban. This implies that disruptions such as the April-May floods have had major negative impacts on agribusinesses and farmers and disrupted the import of food products.

The financial/economic challenges experienced due to climate change and extreme weather events in KZN in recent years are superimposed on the impacts of many other stressors which the KZN economy has had to contend with. These (stressors) include the July 2021 civil unrest, high poverty levels, as well as challenges that have bedevilled the broader South African economy, such as high unemployment levels, the COVID-19 pandemic, intense load shedding, and the rising cost of living. The economic impact of the April 2022 flood event has been high. It is estimated that, for the eThekwini Municipality, the manufacturing sector suffered damages running over R431m, agriculture R12.6m, construction R18m, wholesale and retail R46m, and warehousing and logistics R33m. Critical infrastructure such as major roads, transportation, water treatment and supply, communication, and electrical systems were all heavily affected by the floods – at an estimated cost of more than R10bn, with some decision makers putting this number much higher. The resulting damage to infrastructure impacted the provision of such key services as

potable water supply, electricity, stormwater management, sanitation and waste management, and housing provision, and the restoration of these services will involve huge financial costs to the province. It was estimated that the City of Durban lost 1.8% of the city's annual GDP due to the floods and it took about three months to get the city and its businesses back to where the economy was operating prior to the flood disaster. The KZN government estimated economic losses in the province amounting, overall, to about R17bn.

What was the level of preparedness and response?

The April 2022 floods can be viewed as a rapid onset event, and it is critical to consider what happened before, during and after this hazard in terms of governance. The flood disaster was governed largely by the "response and recovery" key performance area of South Africa's disaster management policy framework. This includes early warnings; assessment, classification, declaration and review of the disaster; integrated response and recovery; relief measures; rehabilitation and reconstruction; and the dissemination of guidelines and regulations.

The impacts of the flood, as a disaster, are diagnosed during the assessment, classification, declaration and review phase, which, in theory, should shape the subsequent response and recovery steps. In reality, these steps occurred concomitantly in the case of the April 2022 floods. The dissemination of early warnings is critical for eliciting proactive action before a hazard is experienced – as people can take action to reduce their level of exposure. The stakeholders engaged through a workshop convened by the research team and the reports that have emerged following the floods have highlighted the importance of early warnings in minimising the impacts of climate-related disasters. The various warnings issued by the South African Weather Service (SAWS), a critical public actor, prior to and during both floods were noted. Though there are no reports on whether the timing of the second set of early warnings was expedited following the lessons from the April floods, the importance placed on early warning systems by government was highlighted after the April 2022 floods and there is a pledge of R100m to SAWS over the next three years for weather and climate forecasting infrastructure upgrades. The purpose of this investment is to ensure more accurate and reliable forecasts, which will be achieved by obtaining new radar technology. However, the challenge at hand is how the reach of warning systems can be extended, particularly to those who are vulnerable and located in low-lying areas. This represented an important theme that emerged during the expert stakeholder workshop and was additionally reflected in public discourse on the flood. There were calls from various stakeholders for more education about alerts to increase the uptake and reach of early warning systems and improve people's responses. Our case study on the Community-Based Flood Early Warning System (CBFEWS), which is one of the activities of the Palmiet Catchment Rehabilitation Project (PCRP) used to ensure that highly vulnerable informal settlers in the lower reaches of the Palmiet Catchment did not succumb to flood waters lends support to these calls.

Though data on the gains made in terms of the efficacy of the response to date are limited, data from the eThekwini Municipality indicates that significant efforts have been made across the GeMA in terms of immediate (and in some cases extended) humanitarian relief and stabilisation and recovery. The Disaster Management and Emergency Control Unit reported that a total of 71 care centres have been established across multiple wards in townships, rural areas and informal settlements. As at 18 August 2022, these centres housed 5,811 people in community halls and churches providing them with variable combinations of the following:

- Hot meals, food packs/vouchers
- Blankets, mattresses
- Psychosocial support and hygiene packs
- Clothing
- Re-issuing ID documents that were lost during the floods.

The municipality has recognised that there are problematic shelters that still require additional security interventions due to identified risks but safeguarding and monitoring are provided by SANDF, internal security management and patrolling by Metro Police. Where necessary the shelters have also been provided with water supply utilising water tankers, water storage tanks and boreholes; ablution facilities and mobile toilets; electricity; security; and healthcare including psycho-social support. The

municipality has managed to achieve much of the above through sponsorships of space, food and supplies from government departments, businesses and civil society. However, the supply of the support and services described above is not adequate and not sustainable, and in some cases, such as the use of churches, is scheduled to end soon. The tender process for food parcels is already under way (with applications being screened) and plans for temporary residential units are at an advanced stage (with layouts for eight sites identified in eThekwini already in place). However, this will require significant financial resources to implement and the magnitude of the damages to and huge impact on infrastructure and businesses means that the provincial government, and municipalities, cannot carry the burden of rehabilitation and repair on their own.

On this note, when the national government declared the national state of disaster in the immediate aftermath of the floods, this came with a promise to ease the financial burden on local government vis-à-vis repair and rehabilitation of key infrastructure as well as to facilitate mobilisation of resources and technical expertise to assist affected businesses and the restoration of services in different sectors. The provincial government itself set aside substantial amounts of funds directed toward specific sectors of the economy. For example, the provincial Department of Economic Development, Tourism, and Environmental Affairs repurposed R67.5m towards the Small, Micro, and Medium Enterprise (SMME) and Co-ops Relief Fund, meant to assist various SMMEs affected by the floods. Building adaptive capacity, resilience and establishing adequate disaster management protocols are linked to the accessibility of resources. However, in the case of the April 2022 floods, the provision of aid was met with several administrative delays. For example, as of 24 August 2022, the eThekwini Municipality had not received any funds for rebuilding and recovery from national or provincial treasuries. The release of disaster funds is perhaps not in the ambit of local government and thus approvals or authorisations from higher levels were required. Expert stakeholders shared that some of the challenges in providing support and aid in the April 2022 flood events were not so much the lack of resources but instead the administrative delays experienced in the release of funds.

What did the stakeholders have to say?

There is an emerging consensus among stakeholders that the landscape of dealing with disasters in South Africa in general, and KZN in particular, is at a sub-optimal level. The province has been affected by multiple disasters, including the COVID-19 pandemic, social unrest, and natural hazards, which have shown how disasters can become threat multipliers and undermine previous development gains. In this regard, it is the vulnerable communities, of which there are many in KZN, that bear the disproportionate burden of the impacts.

Stakeholders stressed that the diverse socioeconomic and geographic landscapes that exist in the province require context-specific interventions and disaster response and preparedness plans.

There was also agreement that while technological advancements and effective early warning systems have the capacity to promote climate adaptation and overall resilience, their reach and uptake within the province are limited at present. Despite the diversity of the stakeholders that attended the stakeholder workshop, there was general consensus and affirmation in relation to the key factors contributing to the intensity of disasters experienced in the province, the complex interactions among the range of impacts, and the responses required to prepare societies for these types of disasters and what needs to be done when they occur. The document analysis and stakeholder engagement both highlighted issues about human settlements and compliance, which remain persistent challenges for the GeMA and are worsened by the establishment and uncontrolled growth of informal settlements in environmentally sensitive and high-risk areas.

The analysis also revealed the reduced integrity/functionality of the existing infrastructure. In particular, there was an emphasis on the need for climate-proof and resilient infrastructure. Poor planning on the location of human settlements and industries, inadequate solid waste management, a high prevalence of invasive plants (emphasis on alien plants, more so for terrestrial plants with shallow root systems, but aquatic alien vegetation is also prevalent) and flow alteration in rivers represent some of the major factors that contributed to the high impacts of the 2022 floods on human lives,

livelihoods, infrastructure and settlements.

The floods also exposed the fragility of food supply chains and the vulnerability of low-income households to food and water insecurity. The analysis revealed that these were alleviated to some extent by high levels of support/aid from civil society groups and different levels of government. From a social justice perspective this is likely to reduce the capacity of households to be resilient in the face of future disasters. The sustainability question remains.

Issues of climate governance were a prominent feature of the stakeholder discussions and arguments put forward by the authors of the various documents reviewed. The prominent government response can be characterised as disaster response, governed largely by the "response and recovery" key performance area of SA's disaster management policy framework. Stakeholders noted that while efforts to provide immediate support and relief have been substantial, these are largely short-term measures that are not sustainable. Rebuilding without financial support from the national government and large donors will be near impossible, given that the economic losses attributed to the floods are estimated to have amounted to over R17bn. Furthermore, stakeholders stressed that plans to relocate people from shelters to temporary residential units will not be implementable without funds being made available to the province. Most worrying is that where the rebuilding of infrastructure and social systems is taking place, the emphasis appears to be on restoring rather than improving by climate proofing. This does not bode well for building climate adaptive capacity and resilience within the province.

Recommendations

Climate change predictions for the KZN region indicate increasing rainfall variability and intensity of storms and flooding events. This will affect river flow and the recharge of major impoundments providing bulk water supply. Higher annual average temperatures and heatwaves mean higher evaporative losses and ironically lower levels of water security. If we tip into a now-due El Nino cycle, the possibility of drought episodes increases.

Institutionally, the province can be considered among the most proactive as far as creating adaptive capacity against climate impacts is concerned; examples include the Municipal Climate Protection Programme (MCCP) and subsequent Durban Climate Change Strategy and the Durban Climate Action Plan of the eThekwini Municipality, and the Central KwaZulu-Natal Climate Change Compact (Compact KZN). In addition, non-governmental organisations and civil society have also been active in the province in terms of empowering communities towards livelihood resilience to climate impacts, climate change awareness, climate-smart agriculture, as well as flood and drought relief. However, while the province has managed to set up fairly strong institutional platforms for climate change response, the province seems to lag behind in terms of the majority of other factors critical for resilience and adaptive capacity, such as equity and income disparities, the upgrading and maintenance of key infrastructure and technology.

While the study underscores the importance of support and disaster relief needed in the province, particularly in the short term to recover from the 2022 floods, stakeholder perceptions and lessons from elsewhere in the country and world indicate that the medium- to long-term focus must be to build resilience instead of creating and perpetuating state dependency. Irrespective of the interventions implemented to build climate adaptive capacity and resilience within the GeMA going forward, it is important to note that the province and the country as a whole are not operating in a business-as-usual environment – we are operating in a resource-limited environment in which climate change adaptation and resilience are dependent on how successfully we strike the compromise between sustainability and development challenges.

The specific recommendations are as follows:

Detailed research and analysis to advise the Rebuild Plan to a more climate resilient KZN in line with the Just Transition Framework

The JTF has been recently approved by the South African National Government through Cabinet. Several parallel investigations are already under way with the South African Human Rights Commission and CoGTA fulfilling their individual mandates. The DFFE has expressed a willingness to

commission a detailed investigation and will use this PCC paper to guide the terms of reference as well as have the PCC as a key partner in that project. A more detailed analysis of the climate risk and vulnerability of the region will advise the correct interventions.

Strengthen climate governance in eThekwini and KZN

Good, inclusive climate governance as enunciated by the JTF is key. Increasing the agency of both state and non-state actors through education, skilling, knowledge-sharing platforms and appropriate resourcing to participate are the means to ensuring a highly functional social compact that will better guide the planning and implementation of appropriate measures to enhance resilience.

Equally important is the enhancement of cooperative governance with both horizontal and vertical synergies and coordination. The inclusion of traditional leadership with appropriate mechanisms will be key in KZN.

Climate resilience is a necessary primary consideration in any municipality and provincial development plan

It is clear that while KZN has been able to recover from each of its flood events restoring a level of normality, it appears that the interventions post-flood have not noticeably increased the resilience index. As global heating increases from the already +1.2°C above preindustrial levels, the expectation of higher energy storms with more frequent flood and drought events is a reasonable one. Add to this the steady sea-level rise and increasing sea temperatures, this coastal province and its major metropolitan city must aspire to a much higher resilience index and build in higher levels of climate adaptation interventions.

The interventions must include, among others, the following:

- Climate smart spatial planning
- Updated climate-sensitive development and building regulations, codes and guidelines
- Climate resilient infrastructure at all levels and all scales
- Smart expression of climate sensitivity is such instruments as the catchment management plan and the water allocation plan
- Investments in further developing the ecological infrastructure of the major catchments and investing in nature-based solutions
- The further protection of sensitive ecologies and world heritage sites.

Smart and accessible early warning systems (EWS)

The national, provincial and local weather and climate forecasting infrastructure renewal and enhancement is a national priority in a highly climate-vulnerable country like South Africa and a province like KZN. A combination of remote sensing and ground truth infrastructure supported by the appropriate high-performance computing capacity to both sensibly analyse the data and get it rapidly to where the information is needed is key.

Community-based systems for informal settlements like the Quarry Road CFEWS is innovative and effective and should be rolled out and supported rapidly.

Improve responsiveness during and immediately post flood and other disaster category events

The EWS must be supported by a robust response system, comprising advisories, response protocols, dedicated disaster management units and personnel, and appropriate equipment and infrastructure to react rapidly to ensure minimal mortality and morbidity as well as damages and loss.

Long-term recovery has to be supported in KZN after the 2022 flood and such mechanisms as a dedicated disaster fund in the mould of the COVID-19 Solidarity Fund and better coordinated private and donor philanthropic donations and other forms of support should be considered. The recent report of the South African Human Rights Commission to Parliament in September is strongly indicative of the continued needs in KZN.

Adopt a regenerative sustainability approach to building climate change adaptive capacity and resilience

A regenerative sustainability approach to building climate change adaptive capacity and resilience should be considered as a possible framework. This should entail a holistic approach to building adaptive capacity and resilience by developing capacities in the human components of the GeMA in five specific areas:

- *Threshold capacity* – the capability to prevent damage by constructing a threshold against environmental variation.
- *Coping capacity* – the capability of a neighbourhood, city or country to deal with extreme weather conditions and reduce damage during such conditions.
- *Recovery capacity* – society's capability to bounce back to a state equal to, or even better than before the extreme event.
- *Adaptive capacity* – society's capability to anticipate uncertain future developments.
- *Transformative capacity* – the capability to create an enabling environment, strengthen stakeholder capacities, and identify and implement catalysing interventions to transition proactively to a climate-resilient society.

The KZN floods of 2022 have been devastating through multiple lenses. The loss of life and immediate damage to infrastructure have been monumental. The further economic losses continue to accumulate with a slower-than-needed recovery leading to further social and psychological harm. The slow rebuild of the school infrastructure is pointing to future harm that we should prevent as rapidly as possible.

But like all disasters, important lessons have been learned with very high fees. It is important that the recovery and rebuild plan is remembered as a turning point and transformative moment that accelerates us onto a path of higher climate resilience guided by the principles of the Just Transition Framework.

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