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



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The IPCC (Intergovernmental panel on climate change) working group 2 report on Adaptation and Vulnerability, launched on 28 February 2022, warned of the higher incidence of extreme weather events as a direct consequence of the Earth already having heated to 1.2°C on the back of higher Greenhouse Gas emissions. Two months later KwaZulu-Natal experienced a severe flood event centred in eThekweni leaving a devastating trail of death and destruction. The PCC assisted by a consortium of researchers from the Institute of Natural Resources, the University of KwaZulu-Natal and GroundTruth researched the flood event, critically analysing the responses to the flood and on the back of this short, early research is able to offer the following recommendations to be considered:

- Increased investing and resourcing of Disaster Risk Financing in the wake of increased intensity of climate related disasters is critical
- There is a need to strengthen Climate Governance in eThekweni and KZN as a model for South Africa,
- Climate resilience needs to be a primary consideration in any Municipality and Provincial Development plans,
- Immediate investment in smart, functional and accessible Early Warning Systems,
- Installation of protocols and infrastructure to improve responsiveness during and immediately post disaster events like this flood, and also droughts and wildfires,
- Adopt a Regenerative Sustainability approach to building climate change adaptive capacity and resilience, and,
- Invest in more detailed research to advise the Rebuild Plan to a more Climate Resilient KZN in line with the Just Transition Framework.

This PCC brief is supported by the full research report.

BACKGROUND

This PCC Brief contains a summary of the analysis of the April-May 2022 floods that struck the KwaZulu-Natal (KZN) province, centred in eThekweni, which led to loss of lives and livelihoods, displacement of people, extensive damage to infrastructure and disruption of services. The province, and generally the South African Eastern Seaboard, has historically been subject to high energy storms and flood events. It is a region predicted to experience higher frequencies of possibly higher intensity extreme weather events as the Earth rapidly warms on the back of primarily GHG emissions. The region's socio-economic, geophysical and environmental features render it vulnerable to a range of climate risks. This is a characteristic that is shared with many other parts of South Africa and the Southern African region.

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 as regards primary attribution. The confidence with which climate events can be attributed to anthropogenic climate change is an important factor as regards



decisions around rebuilding after a disaster, investing in building resilience and ensuring preparedness and insurance pricing. At the very least, the repeated barrage of high-energy cyclones on the Southern African East Coast in what has been labelled a 'triple La Nina' year by the WMO must have contributed significantly to the higher vulnerability to the storm event and would have had an impact on the level of impact and destruction.

Events such as the April-May 2022 floods can be 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 led to an increase in 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 into the future.

The impacts of and recovery from extreme weather events, like the April-May 2022 floods, depend on the relationships between the human socio-economic 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 at this point. The research team utilized a largely qualitative approach drawing on data from document analysis, stakeholder engagement, and case studies 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 eThekweni Metropolitan Area's (GeMA) broader climate resilience and adaptation capacity. The study was challenged by data limitations and limited information from 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 GeMA, including those working in the humanitarian, urban planning, social services, health, and disaster risk reduction sectors.

WHAT HAPPENED AND WHY?

Between 8 April to 12 April, record-breaking rains fell on the region with the port city of Durban as epi-centre, washing away infrastructure, land, and houses. This severely affected lives and livelihoods. The eThekweni, iLembe, and Ugu municipalities were most severely affected. The strong low pressure weather system that gave rise to the floods is not uncommon off the east coast of southern Africa and has caused localized 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 than expected. The high water table brought about by La Nina exacerbated 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 King Cetshwayo, Ilembe and Zululand districts.

While it is true that Durban has experienced flooding events every year since 2016, previous storms have typically had half this amount of rainfall (100-150 mm) in any 24-hour period. It must be stressed that poor infrastructure, urban sprawl, and a lack of resources have been identified as reasons for the severe impacts of the floods. It is clear that 18 river courses, including the Amanzimtoti, Umbilo, and Umgeni overflowed, causing widespread damage to informal settlements and other riverside communities. Key questions as to whether some of this can be attributed to the alteration of their natural flow pathways and the new human activities close to the modified riverbanks.

WHAT WERE THE IMPACTS?

The impacts of the April-May floods were severe and wide-ranging. 443 people are known to have lost their lives and at least 48 people are missing or unaccounted for. A total of 19,113 households and 128,743 people have been negatively affected directly and many more indirectly. This due to the pause in economic activity, limited mobility, and absence of basic services including water. The storm on 21 May led to further devastation mainly in districts in eThekweni, 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 centers 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. 600 schools and 84 health facilities were also affected. These matters were independently emphasised in the report that the South African Human Rights Commission offered to parliament.

The data indicated that the eThekweni Municipality was the most severely affected in terms of number of households destroyed and people affected. There were a total of 86 wards and 26 814 dwellings affected, and 18 specific disaster zones at which varying levels of damage were noted. Sinkholes, mudslides, damage to asphalt and transport infrastructure were common. Fatalities were recorded in eight of the eleven Municipalities, with eThekweni accounting for 404 of these. There were 31 fatalities in the Ilembe Municipality. Damage to water and sanitation infrastructure was widespread. This included 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 has led to longer term interruption of services in a number of areas, most notably Tongaat. 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. The unfolding psychological trauma is highest among those directly impacted by the floods, especially people who have been displaced and those who have lost loved ones. Dealing with the physical and emotional trauma was exacerbated by issues surrounding the care centers and shelters, the relocation/ exit shelter



strategy, and the provision of temporary residential units. There is also an increase in susceptibility to water-borne and waste-linked diseases. Waste generation associated with 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 at least days, and longer for most households and workplaces on the back of prolonged disruptions to water and energy provision. Livelihoods were lost due to damage to or total destruction of infrastructure, goods and services. It is unclear whether there will be a sufficient recovery.

The April-May 2022 floods led to food insecurity, particularly among displaced people but also in the many communities in the province directly dependent on agriculture. 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. Early predictions emerging suggest that there is potential for disruption of food production and supply chains in the province having a negative impact on 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 South Africa's food system with the international community through the Port of Durban. The April-May floods have had major negative impacts on agribusinesses and farmers and disrupted the import of food products.

The climate change related financial and economic challenges in KZN are superimposed on the impacts of many other stressors which the KZN economy has had to contend with. These include the July 2021 civil unrest, high poverty levels, as well as the broader challenges to the South African economy. These include high unemployment levels, the COVID-19 pandemic, energy insecurity with frequent and regular load-shedding, and the rising cost of living.

The direct economic impact of the April-May 2022 flood event has been high. It is estimated that in eThekweni, the manufacturing sector suffered damages of over R431 million, agriculture R12.6 million, construction R18 million, wholesale and retail R46 million, and warehousing and logistics R33 million. 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 R10 billion, with some decision-makers putting this number much higher. The resulting damage to infrastructure impacted the provision of key services such as potable water supply, electricity, stormwater management, sanitation and waste management, and housing provision. 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 3 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 around R17 billion.

WHAT WAS THE LEVEL OF PREPAREDNESS AND RESPONSE?

The 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) prior to and during the floods were noted. The importance placed on early warning systems by Government was highlighted after the floods with a pledge of R100 million to SAWS over the next three years for weather and climate forecasting infrastructure upgrades. The related challenge is how the reach of warning systems can be extended, particularly to those who are vulnerable and located in low-lying areas. There were calls from various stakeholders for more education around alerts to increase the uptake and reach of early warning systems and improve people's responses. The case study on a Community Based Flood Early Warning System (CBFEWS), as part of the Palmiet Catchment Rehabilitation Project (PCRP) demonstrated an effectiveness in ensuring that a vulnerable informal settlement in the lower reaches of the Palmiet Catchment did not succumb to flood waters lends support to these calls.

Data from eThekweni indicates that significant efforts have been made across the GeMA in terms of immediate humanitarian relief, stabilization 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 of 18 August 2022, these centres housed 5811 people in community halls and churches.

The government declared a national state of disaster in the immediate aftermath of the floods, with a promise to ease the financial burden on local government as regards repair and rehabilitation of key infrastructure. This will facilitate the mobilization of resources and technical expertise to help businesses and the restoration of services in different sectors. The provincial Department of Economic Development, Tourism, and Environmental Affairs repurposed R67,5 million toward a Small, Micro, and Medium Enterprises (SMME) and Co-Ops Relief Fund. The provision of aid was, however, met with administrative delays.

RECOMMENDATIONS:

Climate change predictions for the KZN region indicate increasing variability in rainfall and increasing 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 eThekweni Municipality, and the Central KwaZulu-Natal Climate Change Compact (Compact KZN). In addition, non-governmental organisations and civil society have also been very 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, whilst 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 in order to recover from the 2022 floods, stakeholder perceptions and learnings 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 that are 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 and adopted by the South African Government. Several parallel investigations are already underway with the SA Human Rights Commission and GOGTA fulfilling their individual mandates. The DFFE has begun a process 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 interventions in more detail. In addition, the Climate Adaptation Fund managed by SANBI is currently considering further investments in improving Climate Resilience with KZN as a possible case study.

Strengthen Climate Governance in eThekweni and KZN

Good, inclusive climate governance as enunciated by the Just Transition Framework is key. Increasing the agency of both state and non-state actors through education, skilling, knowledge-sharing platforms, and appropriate resourcing to participate. This will ensure a highly functional Social Compact around both Disaster Risk Reduction and effective reactions to such events. In the longer term, Climate Social Compact will be key to guiding and accelerating 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 must be a 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, however, the interventions post-flood event has 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, and this coastal province with its major metropolitan city needs to aspire to a much higher resilience index as well as 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 in 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 (NBS), and,
- The further protection of sensitive ecologies and world heritage sites.

Smart, functional and accessible Early Warning Systems

Regional, national, provincial and local weather and climate forecasting infrastructure renewal and enhancement is a priority for 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 capabilities to both sensibly analyze the data and get the forecasting products rapidly to where the information is needed.

Community-based systems for informal settlements like the Quarry Road Community Based Flood Early Warning System is highly innovative and clearly effective and should be rolled out rapidly and supported fully.

Improved responsiveness during and immediately post flood and other disaster events like droughts and wildfires

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

loss. It is important to examine whether competencies that are geared for emergency actions like the military could be part of this protocol as is done elsewhere in the world as standard practice as well as the primary mechanism for assistance from South Africa to neighbouring countries.

Long-term recovery has to be supported in KZN following the 2022 flood and such mechanisms as a dedicated disaster fund in the mould of the COVID-19 Solidarity Fund and better coordinate private and donor philanthropic donations and other forms of support should be considered. The recent report of the SA 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 entails a holistic approach to building adaptive capacity and resilience by investment in five areas:

- Threshold capacity – the capability to prevent damage by constructing a threshold against environmental variation.
- Coping capacity – the capability 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 damage to infrastructure has 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.

Like all disasters, important lessons have been learned. It is important that we engineer a suitable recovery and rebuild plan to be remembered as a turning point and transformative moment that accelerates us into a path of higher climate resilience guided by the principles of the Just Transition Framework.