FIRE AND RESCUE INTERNATIONAL

Interactive research and technical information at your fingertips!

We offer the following platforms:

- **Fire and Rescue International magazine: digital, 6 editions per annum**
- **FRI Newsletter: digital, weekly**
- **FRI Product News: digital, monthly**
- **Fire and Rescue International website**
- **Annual FRI Wall Planner**

FRI

PROUDLY SERVING THOSE WHO SERVE

DiSASTER MANAGEMENT

DMISA

Official Journal: Disaster Management Institute of Southern Africa

Contents

12

DMISA PRESIDENT'S MESSAGE

Owen Becker

The declaration of a state of disaster on 15 March 2020 heralded the start of a journey that no one could have imagined. Words like masks, social distancing, sanitising, Teams, Zoom and vaccine were woven into our everyday vocabulary.

Working from home, no bars and even no church services. Family gatherings were in front of the television and started with the words "My fellow South Africans".

There was an air of disbelief when 750 days later at 12h00 on 4 April 2022, President Cyril Ramaphosa ended the declaration with the following words, "We are hopeful that the worst is behind us and we are confident that there are only better days ahead. Now is the time to grow our economy and create jobs. Now is the time to get our country back on track. Now is the time to heal, to recover and to rebuild".

As we navigate the post COVID era, South Africa and the world have experienced unprecedented heat, storms, floods, human and animal disease, gas explosions and devastating fires.

War and civil conflict are causing death, injury, displaced persons and migration on a global scale.

Competition for scarce strategic resources is driving power, energy, food and water insecurity that threatens human existence, safety and poverty.

In these turbulent times we need to join hands and collaborate to address vulnerability and build resilient communities, households and livelihoods. Disaster risk management professionals must ensure that they have the knowledge, skills and capacity to drive the process from vulnerability to resilience.

The DMISA board resolved that communication with our professionals, members, political principles and stakeholders had to be renewed, so that the profession could move forward and fulfil its mandate. A dynamic EXCO was entrusted to organize the first post COVID in person conference, reinstate the DMISA journal and explore partnerships with the Southern African Development Community (SADC), South African Local Government Association (SALGA) and other likeminded organizations.

Disaster risk management is everybody's business; together we are able to make the words of President Ramaphosa a reality and "heal, recover and rebuild".

Owen Becker

FOREWORD:
HEAD, NATIONAL DISASTER MANAGEMENT CENTRE

By Dr Bongani Elias Sithole, Head of Centre

Dr Bongani Elias Sithole

In the face of an unpredictable and increasingly complex world, the importance of disaster management cannot be overstated. Whether we confront natural calamities, health crises or human-made emergencies, our ability to anticipate future disaster risks, adequately prepare, respond and recover is a critical measure of our society's strength and adaptability. Disasters, whether they be earthquakes, floods, pandemics or other catastrophic events, have the potential to disrupt lives, livelihoods, economies and ecosystems. They do not discriminate; they affect all corners of the globe and impact every segment of society.

To mitigate this global challenge, the focus of the Disaster Management Act, 2002 (Act 57 of 2002) is on disaster risk reduction and mitigation measures to improve resilience within communities. The Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) was also conceived and adopted by the international community as a visionary and strategic blueprint for disaster risk reduction. The SFDRR has set the global agenda for disaster management through its seven targets that challenge us to reduce disaster mortality, reduce the number of affected people, minimise economic losses, protect

critical infrastructure and increase the availability of early warning systems, among other goals.

The National Disaster Management Centre (NDMC), working together with the Provincial Disaster Management Centres (PDMCs), continues to execute its legislative obligations by facilitating the promotion of an integrated and coordinated system of disaster management among national, provincial and local government, statutory functionaries and other role-players involved in disaster management.

In our quest to implement the disaster management legislation, the NDMC strives to strengthen disaster preparedness for response, take action in collaboration with the South African Weather Service (SAWS) in anticipation of events by issuing early warning and promoting early action by all stakeholders, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels.

However, with the changing climate and limited resources, we find ourselves inundated with myriad of disasters every season as a country. This calls for decisive action in investing in disaster risk reduction action, collaborations among private, public and non-government organisations as well as international communities.

Countries need to collaborate, share resources, and provide support to one another in planning and in times of crisis. In advancing the international collaborations, South Africa hosted the BRICS (Brazil, Russia, India, China and South Africa) seminar on 7 to 8 September 2023 in eThekwini, Durban, under the theme "Strengthening post-pandemic socio-economic recovery and the

attainment of the 2030 Agenda on Sustainable Development".

The main objective of this seminar was to enhance the future growth and development of South Africa through its BRICS membership, to strengthen intra-BRICS relations and to develop mutually beneficial cooperation across the three pillars of cooperation.

In line with the National Development Plan, South Africa leverages its BRICS membership to address the triple challenges of inequality, poverty and unemployment through increased intra-BRICS trade, investment, tourism, capacity building, skills and technology transfers.

In conclusion, effective disaster management is not just a task; it is a collective responsibility. It requires proactive measures, continuous education, investment in early warning systems and the commitment of individuals, communities, governments and international organisations. By building resilience, we can mitigate the impact of disasters and protect the well-being of our communities and the sustainability of our planet.

Furthermore, I would like to commend the Disaster Management Institute of South Africa (DMISA) for continuing to provide learning and networking opportunities for the Disaster Management/Disaster Risk Reduction community of practice in Southern Africa and further commits to also further the course with a common goal to reduce the impact of disasters as well as build resilience within communities.

Let us work together, today and every day, to advance our understanding of disaster management and to take concrete actions to build resilience. By doing so, we can create a safer, more secure world for ourselves and for future generations. ◬

FOREWORD
DMISA EXCO MEMBER: JOURNAL PRODUCTION AND MARKETING

By Tshilidzi Nthambeleni, DMISA EXCO Member, Portfolio: Journal Production and Marketing

After almost three years the Disaster Management Institute of Southern Africa (DMISA) is hosting the 2023 Conference in partnership with Vhembe District Municipality at Kalahari Waterfront situated in Budeli Village next to Nandoni Dam.

The DMISA Conference is now back after a long wait since 2019 due to the outbreak of the Coronavirus in March 2020.

In previous years, we used to host our coveted conference where esteemed academics would present their research papers but unfortunately due to the COVID Pandemic, we were unable to host it.

All that we could achieve was conducting virtual conference.

In light of life getting back to normal, DMISA EXCO is excited to welcome back everyone who is part of it. It will again serve as a catalyst for us to share all the research and knowledge we have accumulated during this time.

We look forward to continue managing disasters better and hosting our yearly international Disaster Management Institute of Southern Africa in the coming years.

The main objective for this journal is to showcase activities achieved by disaster management officials and

Tshilidzi Nthambeleni

serve as a platform for learning best practices and information sharing.

The achievement of hosting this prestigious event is all the hard work of DMISA EXCO members. ◬

2023 GLOBAL SURVEY REPORT
ON PERSONS WITH DISABILITIES AND DISASTERS

The UN Office for Disaster Risk Reduction (UNDRR) has released the results of the 2023 Global Survey on Persons with Disabilities and Disasters, which is the first global look at how persons with disabilities perceive current national and local disaster risk reduction measures since 2013.

The survey aimed to identify if persons with disabilities are prepared for potential disasters, whether early warning and risk information is available and accessible, if persons with disabilities are aware of DRR plans at national and local levels and if persons with disabilities are participating in DRR decision-making and planning.

The survey was conducted between January and March 2023 and resulted in a total of 6,342 responses from 132 countries. For comparison, the 2013 survey resulted in 5 717 responses from 137 countries.

UNDRR
UN Office for Disaster Risk Reduction

2023
GLOBAL SURVEY REPORT
ON PERSONS WITH DISABILITIES AND DISASTERS

MINES AND MUNICIPALITIES NEED TO
COLLABORATE FOR EFFECTIVE EMERGENCY PREPAREDNESS

The GISTM requires a shared state of readiness among stakeholders, based on a site-specific tailings facility Emergency Preparedness and Response Plan

Deadlines to apply new safety standards to mine tailings dams are starting to kick in, but there still seems to be limited awareness among municipalities that this important issue requires their direct involvement.

The first deadlines for complying to the Global Industry Standards on Tailings Management (GISTM) were passed in August 2023. These applied to mines with tailings storage facilities (TSFs) classified as 'Extreme' or 'Very high' in terms of the potential consequences of failure. According to Andries Fourie, senior technologist in disaster and risk management at SRK Consulting, the GISTM continues to roll out across the industry. The recent deadline, therefore, is only the start of a long process of learning, discovery and implementation.

End of the beginning
"The mining industry is really only at the 'end of the beginning' in our understanding and application of the new TSF standards," said Fourie. "While there are many difficult technical questions still to answer, an important focus remains the necessary collaboration of stakeholders in this process, especially between mines and government at local and district municipality level."

Principles 13 and 14 of the GISTM relate to emergency preparedness and response planning, as well as long-term recovery, following a tailings dam failure.

He explained that government agencies will always play an important role in emergency responses and in communities' recovery from serious incidents. Indeed, this is a public service which local government is required to deliver to the communities they are mandated to serve.

Shared readiness
"The GISTM requires a 'shared state of readiness' among stakeholders, based on a site-specific tailings facility Emergency Preparedness and Response Plan (EPRP)," he said. "That means that there must be a relationship between the mine and the local and district municipality resulting in a shared state of readiness."

The legal responsibility of local government, as well as provincial and national government, is rooted in the country's Disaster Management Act and the Disaster Management Framework.

Herman Booysen, principal scientist at SRK Consulting, pointed out that the law requires local government to be aware of the risks and hazards within its area of jurisdiction and to have a disaster management plan in place.

Practical collaboration
"This creates an important overlap between the respective disaster management responsibilities of the mine and the municipality, as the tailings dam represents one of a range of local risks," said Booysen.

"As a starting point, there should be close alignment between the mine's EPRP and the local municipality's legally required Disaster Management Plan."

From that position, there is a foundation created for more effective practical collaboration in the event of a TSF failure. Fourie noted that the GISTM represented a significant raising of the bar in terms of safety standards for TSF management.

Municipalities therefore needed to stay abreast of the new requirements that mines were subscribing to, as these would undoubtedly contribute to community safety.

"Many municipalities are not yet fully aware of the GISTM and its implications but they would benefit from understanding how the mines' objectives are changing," he explained. "More collaboration would certainly be within the spirit of the GISTM and has very practical advantages in supporting municipalities' mandate to keep communities safe."

More attention to TSF risk
Booysen warned that many disaster management plans were prepared for municipalities by consultants, who often did not take sufficient account of TSFs on mines. He said that the implementation of the GISTM

Herman Booysen, principal scientist at SRK Consulting

Andries Fourie, senior technologist in disaster and risk management at SRK Consulting

should provide an opportunity for municipalities and their consultants to look more closely at TSF-related risks and responses.

"The GISTM also paves the way for more cooperation between mines and government at all levels," said Fourie. "On a practical level, mines could play a greater role as part of the disaster management advisory forums which are convened at district, provincial and national levels of government."

Mine Rescue Services
Another important resource that mines bring to this collaboration is Mine Rescue Services (MRS); The Mine Health and Safety Act, 1996, requires every underground mine to be part of a Mines Rescue Scheme. In the light of the GISTM, the MRS is taking its services further to include initiatives like a centrally housed disaster kit for TSF failures and other incidents. It also trains and supports proto-teams, who are dispatched in response to mine accidents.

"The equipment, testing and expertise of MRS members are world-class, and could be valuably put to use on surface mines as well as in the underground environment," he said.

He noted that the GISTM also contained longer-term responses which included humanitarian aid, a function normally associated with government involvement. Mines will have to engage with this issue in greater detail, he said and find ways to work with local government in achieving an optimal outcome.

"In their efforts to align with GISTM requirements, it may be that mines will have to take a more proactive role on this front," he said. "While government would normally lead strategies of a humanitarian nature, many municipalities now demonstrate low delivery capacity, meaning that mines would have to be realistic about what they could expect." ▲

WMO: 'EARLY WARNINGS FOR ALL'
INITIATIVE SCALED UP INTO ACTION ON THE GROUND

A global initiative to ensure that everyone on Earth is protected by early warnings by 2027 is being fast-tracked into action on the ground. A recent record-breaking tropical cyclone in Southeast Africa once again shows the paramount importance of these services to save lives and livelihoods from increasingly extreme weather and climate events.

To aid this work, the United Nations (UN) Secretary-General António Guterres has convened an Advisory Panel of leaders of UN agencies, multilateral development banks, humanitarian organisations, civil society, insurance and IT companies on 21 March 2023. The aim is to inject more political, technological and financial clout to ensure that Early Warnings for All becomes a reality for everyone, everywhere.

The months ahead will see stepped up coordinated action, initially in 30 particularly at-risk countries, including Small Island Developing States and Least Developed Countries. Additional countries are expected to be added as this vital work with partners gathers pace, scale and resourcing.

At the same time, the UN's existing actions and initiatives to save lives and livelihoods, and build resilience across a wide range of other countries will continue and be reinforced, ensuring the Early Warnings for All campaign turns its pledges into life-saving reality

on the ground for millions of the most vulnerable people. The aim is not to re-invent the wheel, but rather promote collaboration and synergies and to harness the power of mobile phones and mass communications.

"Now it is time for us to deliver results. Millions of lives are hanging in the balance. It is unacceptable that the countries and peoples that have contributed the least to creating the crisis are paying the heaviest prices," said UN Secretary-General António Guterres.

"People in Africa, South Asia, South and Central America, and small island states are 15 times more likely to die from climate disasters. These deaths are preventable. The evidence is clear: early warning systems are one of the most effective risk reduction and climate adaptation measures to reduce disaster mortality and economic losses," said Guterres.

The need is urgent.

In the past 50 years, the number of recorded disasters has increased by a factor of five, driven in part by human-induced climate change, which is super-charging our weather. This trend is expected to continue.

If no action is taken, the number of medium- or large-scale disaster events is projected to reach 560 a year or 1,5 each day, by 2030.

The occurrence of severe weather and the effects of climate change will increase the difficulty, uncertainty and complexity of emergency response efforts worldwide.

Preventable deaths
Half of countries globally do not have adequate early warning systems and even fewer have regulatory frameworks to link early warnings to emergency plans.

"The unprecedented flooding in Mozambique, Malawi and Madagascar from Tropical Cyclone Freddy highlights once again that our weather and precipitation is becoming more extreme and that water-related hazards are on the rise," said the World Meteorological Organisation (WMO) Secretary-General Prof Petteri Taalas. "The worst affected areas have received months' worth of rainfall in a matter of days and the socio-economic impacts are catastrophic."

"Accurate early warnings combined with coordinated disaster management on the ground prevented the casualty toll from rising even higher. But we can do even better and that is why the Early Warnings for All initiative is the top priority for WMO. Besides avoiding damages the weather, climate and hydrological services are economically beneficial for agriculture, air, marine and ground transportation, energy, health, tourism and various businesses," he said.

WMO and the United Nations Office for Disaster Risk Reduction (UNDRR) are spearheading the Early Warnings for All initiative, along with the International Telecommunication Union (ITU) and the International Federation of Red Cross and Red Crescent Societies (IFRC).

"The operationalisation of this initiative is a clear example of how the UN System and partners can work together to save lives and protect livelihoods from disasters. Inclusive and multi-hazard early warning systems that close the 'last mile' are among the best risk reduction methods in the face of climate-related hazards and geophysical hazards such as tsunamis. Achieving this is not only a clear target in the Sendai Framework for Disaster Risk Reduction but a moral imperative as well," said Mami Mizutori, Special Representative of the Secretary-General for Disaster Risk Reduction and Head of UNDRR.

Climate change adaptation
- Early warning systems are widely regarded as the "low-hanging fruit" for climate change adaptation because they are a relatively cheap and effective way of protecting people and assets from hazards, including storms, floods, heatwaves and tsunamis to name a few.
- Early warning systems provide more than a tenfold return on investment
- Just 24 hours' notice of an impending hazardous event can cut the ensuing damage by 30 percent.
- The Global Commission on Adaptation found that spending just US$800 million on such systems in developing countries would avoid losses of $3 to 16 billion per year.

"When disaster strikes, people and communities can turn to technology as a lifeline," said ITU Secretary-General Doreen Bogdan-Martin. "By leading the work of the UN Early Warnings for All initiative on 'Warning Dissemination and Communication,' ITU is helping ensure that those at risk can act in time to our increasingly climate-vulnerable world."

Alerts can be sent via radio and television channels, by social media and with sirens. ITU recommends an inclusive, people-centred approach using the Common Alerting Protocol (CAP), a standardised data format for public warnings, to keep messages coherent across different channels.

The four key Multi-Hazard Early Warning System (MHEWS) pillars

▶ "Early warnings that translate into preparedness and response save lives. As climate-related disasters are becoming more frequent, more intense and more deadly, they are essential for everyone but one in three people globally are still not covered. Early warning systems are the most effective and dignified way to prevent an extreme weather event from creating a humanitarian crisis, especially for the most vulnerable and remote communities who bear the brunt of it. No lives should be lost in a predictable disaster," said IFRC Secretary-General Jagan Chapagain.

Advisory panel

The Early Warnings for All initiative calls for initial new targeted investments between 2023 and 2027 of US\$ 3.1 billion, a sum which would be dwarfed by the benefits. This is a small fraction (about six percent) of the requested US\$ 50 billion in adaptation financing. It would cover strengthening disaster risk knowledge, observations and forecasting, preparedness and response, and communication of early warnings.

A range of new and pre-existing innovative financing solutions are required to implement the plan to protect every person on Earth. These include a scaling up of the Climate Risk Early Warning Systems (CREWS) Initiative, the Systematic Observations Financing Facility (SOFF) and accelerated investment programmes of climate funds, such as the Green Climate Fund (GCF) and the Adaptation Fund, and key Multilateral Development Banks (MDBs), as well as other innovative new financial instruments across all stakeholders of the early warning value chain.

The Advisory Panel meeting will consider advancing the four key Multi-Hazard Early Warning System (MHEWS) pillars:
- Disaster risk knowledge and management (US\$374 million): aims to collect data and undertake risk assessments to increase knowledge on hazards and vulnerabilities and trends. Led by UNDRR with support from WMO.

- Detection, observations, monitoring, analysis and forecasting of hazards (US\$1.18 billion). Develop hazard monitoring and early warning services. Led by WMO, with support from UN Development Programme (UNDP), UN Educational, Scientific and Cultural Organisation (UNESCO) and UN Environment Programme (UNEP).
- Dissemination and communication (US\$ 550 million). Communicate risk information so it reaches all those who need it and is understandable and usable. Led by ITU, with support from IFRC, UNDP and WMO.
- Preparedness and response (\$1 billion): Build national and community response capabilities.
- Led by IFRC, with support from Risk Informed Early Action Partnership (REAP), Office for the Coordination of Humanitarian Affairs (OCHA), Food and Agriculture Organisation (FAO) and World Food Programme (WFP).

The Early Warnings For All Initiative (EW4All) was formally launched by the UN Secretary-General in November 2022 at the COP27 meeting in Sharm El-Sheikh.

The Initiative calls for the whole world to be covered by an early warning system by the end of 2027.

Early Warnings for All is co-led by WMO and UNDRR and supported by pillar leads ITU and IFRC. Implementing partners are: FAO, OCHA, UNDP, UNEP, UNESCO, REAP and WFP.

The Advisory Panel will monitor and report on the progress against the achievement of the goal to the UN Secretary-General and has the following objectives:
- Assess progress of the Early Warnings for All initiative against its goals and targets
- Build political and overall momentum and support for the Early Warnings for All initiative
- Provide overall recommendations for the mobilisation of resources and
- Monitor scientific and technical development related to early warning systems ⚠

UNDRR PUBLISHES GAR SPECIAL REPORT 2023:
MAPPING RESILIENCE FOR THE SUSTAINABLE DEVELOPMENT GOALS

Growing disaster risks and a confluence of shocks are creating domino effects across economies and undermining sustainable development on all fronts, according to a new report by the United Nations.

A special edition of the Global Assessment Report (GAR 2023), released by the United Nations Office for Disaster Risk Reduction (UNDRR) during the UN High-level Political Forum on Sustainable Development, finds hard-won economic and development gains are in danger from the growing number of disasters with global warming the prime contributor.

The GAR 2023 presents a new analysis mapping how disasters like drought are dramatically rising with knock effects on global food security, employment and education. Droughts have already resulted in two billion people now living under water stress and an 80 percent increase in the risk of crop failure and hunger in sub-Saharan Africa and South East Asia.

The impacts cascade onto the labour market as temperatures rise and it simply becomes too hot to work. Labour productivity is halved at 34 degrees Celsius and the equivalent of an estimated 80 million full-time jobs will be lost if the world surpasses 1,5 degrees Celsius of warming, pushing ever greater numbers of people into poverty.

Heatwaves, often referred to as the 'silent killer of climate change,' are increasing and are among the most impactful of hazards, particularly in tropical and subtropical climates such as India. In 2020 UNICEF estimated that 820 million children were already exposed to heatwaves.

Climate impacts also led to 920 million children being exposed to water scarcity in 2020, a major hazard driving displacement. Last year, extreme weather events, such as the Pakistan floods and the Horn of

Africa drought, left 12 million children homeless, in countries with some of the world's lowest literacy rates.

"The findings are a devastating indictment of climate inaction which is leaving billions of people behind. We risk an unliveable future if we don't start seriously investing in resilience," said Mami Mizutori, the special representative of the UN Secretary-General for Disaster Risk Reduction and the head of UNDRR.

"This report demonstrates that action is possible in every region. Both to reduce risk and create positive feedback loops. But it shows that countries must transform how they measure, understand and act on risk. And invest in prevention, resilience and adaptation," said Amina Mohammed, the Deputy Secretary-General of the UN.

GAR2023 highlights how resilience can be strengthened so that communities can better withstand and respond to shocks. This includes investments in early warning systems where the benefits triple in vulnerable contexts because of their proven ability to reduce damage.

In East and North-East Asia, for instance, disaster losses would be reduced by an estimated US\$67 billion a year. The report also offers examples that countries can learn

from such as the Cidanau Watershed in Indonesia which introduced payments to farmers to conserve biodiversity and fresh water supplies.

"The increasing complexity of the world means that risks and measures of development cannot be siloed. If we want to prevent future disasters and crises, a holistic approach is needed to address connected risks and how they influence the outcomes that we care about. This report shows how we do this across a number of areas from food and energy security to alleviating poverty," said Loretta Hieber Girardet, Chief of UNDRR's Risk Knowledge, Monitoring and Capacity-Development Branch, whose team led the development of the report.

The report, Mapping Resilience for the Sustainable Development Goals, was developed over two years with the involvement of over 90 authors and experts from the UN, research institutions and government agencies, including the UN Development Programme (UNDP) and the US National Aeronautics and Space Administration (NASA). It calls for resilience to be the bedrock of efforts to achieve the Sustainable Development Goals. The report comes ahead of the September SDG Summit where countries will assess progress to date and set out commitments to accelerate action. ⚠

THE NEED FOR PROFESSIONALISATION
IN DISASTER RISK MANAGEMENT

By Owen Becker, president, Disaster Management Institute of Southern Africa (DMISA)

Flooding has occurred in all nine of South Africa's provinces during 2022 and 2023

Globally, disasters are demonstrating an increase in frequency and severity. EM-DAT reports that 387 natural hazards and disasters occurred worldwide in 2022, resulting in the loss of 30 704 lives and affecting 185 million individuals.

According to statista.com, the impact of natural disasters worldwide, cost an estimated $313 billion in 2022. Only $132 billion of which was covered by insurance, leaving a shortfall of $181 billion. This does not include disasters and consequences resulting from fires, aviation, maritime, terrorism or war.

South Africa barely features in these global disaster statistics but this does not mean that South Africa is not prone to disasters. The information provided below are disasters that have occurred in the past or are currently occurring.

Hydrometeorological
Flooding: Flooding has occurred in all nine provinces during 2022 and 2023 culminating in the declaration of a state of disaster in seven of the provinces in February 2023.

Heat: Temperatures in southern Africa have demonstrated an increase in recent years. South Africa has experienced heatwave conditions, where temperatures exceed five degrees Celsius above mean for more than three consecutive days, several times during recent summers.

Cold: Cold conditions where temperatures reaching below zero degrees Celsius often occur in the interior during the winter months. These spells are usually associated with cold fronts and normally do not last for more than a week.

Snow: Snowfalls often occur on the high lying areas and mountain peaks during the winter months. These falls are usually associated with cold fronts. Periodic, widespread snow falls occur over larger areas of the country, resulting in widespread road closures and traffic disruption.

Frost: Frost occurs over most of the inland regions of South Africa on cloudless winter nights with dry air conditions. Icicles form in plants causing them to be damaged or even killed.

High Discomfort Index: The combination of temperature and humidity results in the condition known as humidex. The human body experiences discomfort as the humidity and temperature increase. Serious health threats can arise where the humidex exceeds 40 degrees Celsius; this is known as a high discomfort index. A high discomfort index often occurs during the summer months, particularly in the sub-tropical coastal areas.

Drought: South Africa is a water scarce country with the mean annual rainfall is less than 750 millimetres for 91 percent of the country. Various parts of the country have experienced water stress or a state of drought between 2009 and August 2023.

Cyclones: The northern and eastern provinces of South Africa experience the impact of tropical cyclones several times a year. Cyclones cause strong winds, high seas levels and heavy rainfall. The impact of Cyclone Freddy that extended from Australasia to Africa over a period of 32 days in February/March 2023, resulted in the deaths of more than 1 400 people. Fortunately, no deaths were recorded in South Africa.

Tornadoes have occurred in many South African provinces and are associated with severe thunderstorms and result in extremely strong wind, heavy rain and hail.

Hail often accompanies severe thunderstorms, where hailstones can range from the size of marbles to larger than hen's eggs. They cause millions of Rands of damage to buildings, vehicles, crops, livestock and even humans.

Lightning: South Africa experiences more than 25 million lightning strikes a year. These cause extensive damage to property and result in the loss of more than 100 lives a year.

Gales: Gale force winds occur several times a year along the South African coastline. They cause structural damage, road accidents, uproot trees, cause coastal flooding and have been the cause of many shipwrecks around the coast.

Sea surge results in coastal flooding and damage to coastal property and usually occur after prolonged gale force winds or tropical cyclones. High risk is associated with seasonal full moons in March, June, September and December.

Biological
Foot and Mouth Disease: South Africa experiences regular outbreaks of this highly contagious viral disease that affects cloven hoof animals. Outbreaks have a significant impact on the export of animal products.

Avian Flu: There are several strains of avian flu. Transmission often occurs from wild birds to poultry. Human infection can occur and may result in fatalities. An outbreak in September 2023 has had a significant impact on egg production.

Swine Fever: Outbreaks of swine fever decimate pig populations due to the high mortality rate of the disease in pigs. Swine fever is not zoonotic and must not be confused with swine flu. The major impact of Swine fever is the loss of pork production.

COVID-19: Up to the end of September 2023, South Africa had recorded 4 072 533 cases and 102 595 deaths. Cases are still being reported and the long-term socio-economic impact will continue for many years to come.

Cholera: A cholera outbreak occurred in South Africa between February and July 2023 and resulted in 198 confirmed cases and 47 deaths.

Rabies: The Eastern Cape, Kwa-Zulu Natal and Limpopo have the most infections. In 2022, 13 cases were recorded in animals and seven human cases were confirmed. Human infection normally results in fatality.

Polyphagous Shot Hole Borer: This pest is known to attack 130 species of trees including grapevines, apple, citrus, prune, peach and olive trees. Widespread infestation can have a serious impact on fruit production.

Fall Army Worm: Rapid infestation can occur due to the large number of eggs laid by the female moth. The worm attacks maize and other food crops including sorghum, sweet corn and potatoes. The impact is a reduced crop yield.

Locusts: Intensive locust infestations occur periodically in South Africa. In 2022, 23 million hectares were damaged in the Northern, Western and Eastern Cape provinces.

Alien invasive species like blue gum, wattle and lantana absorb large quantities of our scarce water resources and increase the risk of wildfires due to the high fire load that they create.

Urban and informal fires: Fires in industrial and commercial areas can result in extensive economic loss. 73 people died in a building fire in Johannesburg in August 2023. Large urban areas and cities have informal settlements that are prone to fires that cause extensive damage and often result in injury and death.

Wildfires can be divided into forest and veld fires.
Forest fires: These are more likely to occur in plantations but may spread to natural forest areas as well. They cover large areas and result in extensive economic loss. The Knysna fires of 2017 provide an example.

Veld fires: The Western Cape experiences veld fires in the summer while the rest of the country experiences them in winter. They cause extensive damage to grazing and result in crop and livestock losses as well as damage to buildings and infrastructure.

Technological
Dam failures: South Africa has experienced dam burst floods following the failure of the Merriespruit Dam - 1994, Jagersfontein Dam - 2022 and the Paardekraal Dam -2022. Dam bursts can cause loss of life and property damage within the dam burst flood lines.

Explosions: LP gas tanker Boksburg - 2022, N1 tanker explosion - 2023.

Hazmat incidents: 16 deaths from nitric oxide in Boksburg - 2023.

Transport accidents
Road accidents: Bus and tanker accident near East London - 2022. Multi-vehicle accident N3 - April 2023.

Rail accidents: Four killed and 600 injured in rail crash near Pretoria - January 2019.

Aircraft accidents: Rietbok, 25 fatalities near East London – 1967; President Samora Michel and 33 other fatalities, Mubuzini - October 1986; Helderberg, 159 fatalities, Indian Ocean - November 1987; various light aircraft crashes or incidents around the country.

Shipping Incidents: More than 2 500 shipwrecks have occurred around the South African coastline since 1500.

Geological
Earthquakes: The 6.3 magnitude earthquake Tulbagh - 1969 is the worst on record. Gauteng experiences regular earthquakes and tremors. Other parts of South Africa including the Eastern Cape and KwaZulu-Natal also experience tremors and quakes but less frequently.

Landslides: South Africa experiences landslides from time to time. These are usually associated with flooding.

Dolomitic sinkholes: Dolomite bedrock is found in many parts of South Africa. More than 200 cases of ▶

Wildfires are a frequent occurrence in South Africa

▶ subsidence and sink holes have been recorded across Gauteng between 2017 and 2022, with Centurion recording the most. At least 38 people have died as the result of sink holes in the past 50 years.

Anthropogenic
Event disasters: Ellis Park Stadium, 43 fatalities - April 2001. Oppenheimer Stadium Orkney, 42 fatalities - January 1991. Lincoln Park concert Cape Town 20 injuries and one fatality when scaffolding was blown over by wind. Throb Nightclub 13 killed and 100 injured in Durban - March 2000. Enyobeni Tavern East London 21 dead - June 2022.
Xenophobia has become more prevalent since 2000, with attacks on foreign nationals in different geographic areas. A peak in violence was reached in 2008, with large scale xenophobic attacks. Xenowatch: 2018, reports that between 1994 and 2018, 529 incidents resulting in 309 deaths and over 100 000 displaced persons occurred.
Protests: Service delivery protests occur throughout South Africa daily. They include demands for sewerage infrastructure, proper toilets, water, electricity and housing. There is an increase in the frequency and intensity of protests in the periods building up to national and local elections. Protests are becoming more violent with burning of tyres, blocking of roads, stoning of vehicles and other acts of violence.
Strikes: Strikes are an impasse between employers and workers. They can result in serious economic disruption and lead to service delivery failure especially when they involve municipalities, health services, Eskom and the transport sector. They can extend beyond the workplace and become violent with blockages of roads, looting, arson and attacks on non-strikers and members of the public.
Civil unrest: The unrest that occurred mainly in the Gauteng and KwaZulu-Natal provinces, in July 2021, with widespread demonstrations, civil disobedience, arson, looting and racial tensions. The cost of the eight days was 354 lives and R50 billion (almost 1% of GDP).
War: South Africa provides military personnel to the United Nations and African Union peacekeeping forces. There are currently more than 35 armed conflicts and wars on the African continent. This results in unstable populations and migration of refugees.
Migration: War and civil conflict on the African continent, as well as socioeconomic hardship from disasters, results in refugees and migrants coming to South Africa to seek refuge and economic opportunities. The additional socioeconomic stress created by these migrants contributes to Xenophobia.

Strategic resources
Food, water, power and energy are critical resources for the survival of individuals, households, communities and countries. These resources are inter-dependent and inter-competitive and their failure will cause widespread loss and suffering and increase the risk of civil conflict.
Electricity is essential for communications, cyber technology, water and food production and distribution and waste disposal. Load shedding has a major impact on all sectors.
Fuel is essential for the operation of plant and vehicles required for transport and production. Raising fuel costs add to input costs and inflation.
Food security is access to good quality, nutritious and affordable food sources. High food costs are a threat to food security.
Water security is essential for human consumption, hygiene, food and industrial processing and waste disposal. Poor water quality, service failures and drought or threats to water security.
Cyber security/4IR: Digital communication is essential for food, water and energy production and supply. It is deeply entrenched in our financial and supply chain systems. The opportunities presented by the 4th industrial revolution (4IR) especially artificial intelligence (AI) must be explored to the benefit of society but must also be secured to reduce the risk of exploitation, abuse and failure.

Compound impact of multiple disasters/incidents occurring simultaneously or shortly after each other
Many of the incidents and disasters discussed above may appear minor or insignificant but their cumulative consequences place a burden on the limited resources that are available in the affected community. Resources must be reprioritized and redirected to address the incident or disaster. This will have a negative impact on other projects and development from which the resources are redirected. Projects that are delayed by reprioritisation or that cannot be effectively addressed due to insufficient resources, will have long term social, economic and environmental consequences.

Everybody's responsibility towards resilient households and communities.
The management of disaster risk is complex and requires multi sectoral and multidisciplinary stakeholders to cooperate in an integrated and coordinated manner, to identify and analyse disaster risk.

Risk informed development well ensure resilient lives and livelihoods of individuals, households and communities, through appropriate prevention, mitigation and preparedness measures. The disaster risk analysis must also inform response, recovery and rehabilitation to ensure that the 'Build Back Better' principle can be applied to overcome vulnerability and build resilience following disasters.

The fact that these incidents and disasters have occurred means that they could or will reoccur, therefore it is prudent to assess the potential impact of each one, when undertaking the risk assessments for projects, so that risk informed development can take place.

The importance of role clarification
Disaster risk management can only be achieved when each stakeholder fully understands their roles and responsibilities, so that they can effectively perform their own tasks and understand the support that they can rely on from others, as well as the support needed by others. The following address the key roles and responsibilities:

Political (national, provincial and local)
Politicians must create any enabling environment and ensure accountability for the roles and responsibilities delegated by them, by:
- Providing enabling legislation and policy
- Providing budgets
- Providing oversight
- Ensuring accountability for delegated roles and responsibilities.

Sectors
Sectors include organs of state, parastatals, the private sector, non-governmental organisations (NGOs) and community-based organisations, who have a common goal or objective in the field of disaster risk management.
- Sector hazard and/or consequence management
- Understand sector risk
- Undertake sector risk reduction
- Ensure risk informed development that is based on sound scientific facts and underpinned by indigenous knowledge and that is sustained through focused and effective operational and maintenance programmes
- Undertake sector preparedness and continuity planning
- Ensure integrated and coordinated response, rehabilitation and reconstruction.

Disaster (risk) management
Disaster risk managers are disaster risk specialists and must provide direction, coordination and facilitation as assigned by the Disaster Management Act, by:
- Specialising in issues concerning disasters and disaster risk management
- Ensuring stakeholder integration and coordination
- Focusing on prevention and mitigation
- Providing a disaster information repository and conduit
- Advising and consulting on disaster risk matters
- Advocating for and managing disaster risk funding
- Providing comment and input on disaster risk related legislation and policy
- Facilitating volunteer engagement
- Ensuring ongoing disaster risk management education, training and awareness
- Promoting and undertaking disaster research.

Managing the consequences of disaster risk
Disaster risk management is not about hazard ownership but must focus on the assignment of roles and responsibilities for the management of the consequences arising from disasters. A consequence is the result of a decision, action or situation (this can be positive or negative). It applies equally to the outcome of indecision or incorrect decisions, actions and situations. Good decisions informed by disaster risk assessments, will eliminate or reduce negative consequences and build resilience.

Disaster risk management professionalism

Professional registration
It is abundantly clear that professional disaster risk managers are required to drive the process towards risk informed resilient communities. A professional is someone who is licensed to perform specific functions and tasks within industry standards and international best practice. This requires perspective professionals to provide a portfolio of evidence that demonstrates that they have the knowledge, skills and experience to perform these functions and tasks at the required level. An assessment will confirm the appropriate level of registration that can be awarded.

Continuing Professional Development (CPD), also referred to as "lifelong learning", ensures that the professional stays abreast with new developments and trends by gaining new and refreshing existing knowledge and skills. A registrant must obtain the required number of credits in a specified time frame (20 CPD points in a two-year cycle in South Africa) by attending courses, conferences, seminars and workshops, conducting research and documenting practices and lessons learned in articles, reports and other publications. Development and presentation of training and mentoring.

A Code of Practice (CoP) determines the level of complexity and authority that the professional has to perform disaster risk management functions and tasks.
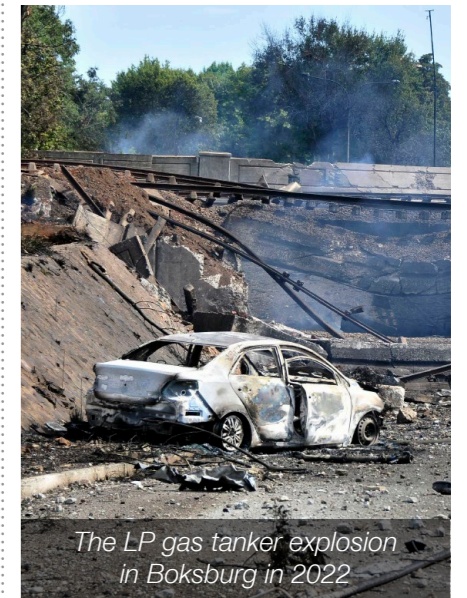
The LP gas tanker explosion in Boksburg in 2022

This can be linked to a competency framework such as the Disaster Management Competency Framework contained in the Local Government: Municipal Staff Regulations published under the Local Government: Municipal Systems Act on 20 September 2021.

Code of conduct A professional must also commit to a code of conduct, that underpins the integrity, transparency, nondiscrimination, advocacy, honesty and professional and ethical practice required to protect the vulnerable that are served and the profession.

Conclusion
The ability to manage the increasing frequency and intensity of disasters worldwide and in South Africa, requires competent disaster risk management professionals, who can ensure that development is disaster risk informed and that all stakeholders collaborate to build communities, households and individuals that are resilient and safe from the consequences of disasters.

Sources:
Source 1
Source 2
Source 3
Source 4
Source 5
Source 6
Source 7
Source 8
Source 9
Source 10 ♨

JOINT EMERGENCY SERVICES INTEROPERABILITY PROGRAMME (JESIP): WORKING TOGETHER SAVING LIVES

By John Spencer, MA, M.Syl, F.ISRM, Protective Security and Attack Response Programme regional coordinator, Sub Saharan Africa, British High Commission, Nairobi

JESIP
Working Together – Saving Lives

On 7 July 2005, four suicide bombers carried out a coordinated attack targeting commuters travelling on London's public transport networks during the morning rush hour. Each carried a home-made explosive device in a rucksack.

At 08h50hrs three of the terrorists travelling on separate underground railway lines detonated their device in an enclosed carriage whilst an hour later, the fourth detonated his device on a double decker bus. In addition to the four bombers, 52 people from 18 different nationalities were killed and more than 700 were injured in the attacks.
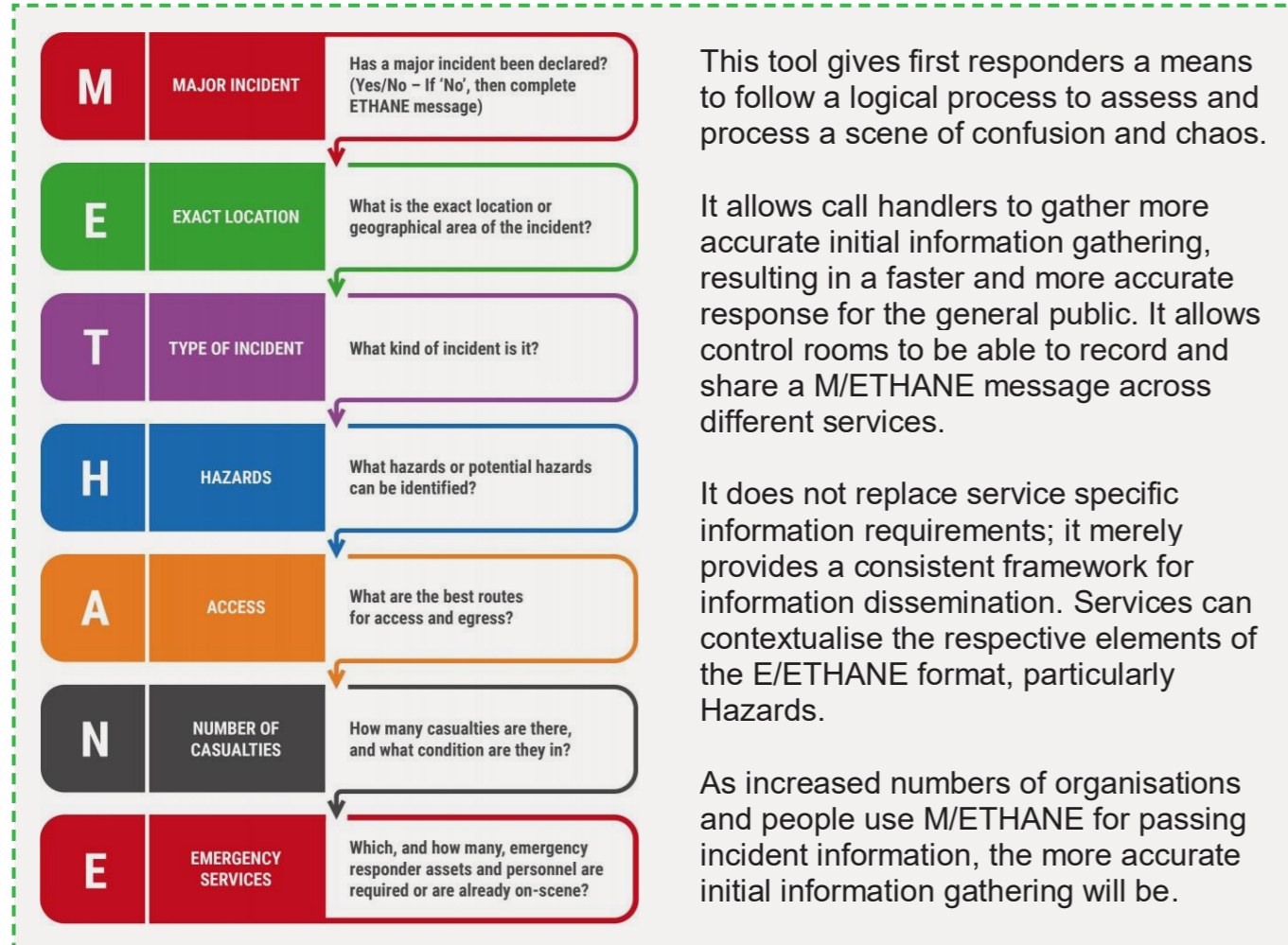
The response to this incident was of a huge scale and faced significant challenges. The Coroner's inquiry into this incident highlighted a number of areas that needed improving including multiagency interoperability and mechanisms. Addressing these recommendations led to the development of the Joint Emergency Services Interoperability Programme (JESIP).

Early in the programme, JESIP commissioned the Cabinet Office

M	**MAJOR INCIDENT**	Has a major incident been declared? (Yes/No – If 'No', then complete ETHANE message)
E	**EXACT LOCATION**	What is the exact location or geographical area of the incident?
T	**TYPE OF INCIDENT**	What kind of incident is it?
H	**HAZARDS**	What hazards or potential hazards can be identified?
A	**ACCESS**	What are the best routes for access and egress?
N	**NUMBER OF CASUALTIES**	How many casualties are there, and what condition are they in?
E	**EMERGENCY SERVICES**	Which, and how many, emergency responder assets and personnel are required or are already on-scene?

This tool gives first responders a means to follow a logical process to assess and process a scene of confusion and chaos.

It allows call handlers to gather more accurate initial information gathering, resulting in a faster and more accurate response for the general public. It allows control rooms to be able to record and share a M/ETHANE message across different services.

It does not replace service specific information requirements; it merely provides a consistent framework for information dissemination. Services can contextualise the respective elements of the E/ETHANE format, particularly Hazards.

As increased numbers of organisations and people use M/ETHANE for passing incident information, the more accurate initial information gathering will be.

Emergency Planning College to research the persistent lessons identified relating to interoperability to gain an understanding of the issues. Dr Keith Pollock looked at 32 major incidents and disasters that occurred in the UK between 1986 and 2010. The outcome of this research was the Pollock Report 2013, which provided the evidence base as to why JESIP was needed.

Consequently, a series of models and principles were developed to address these identified issues. These form the Joint Emergency Service Interoperability Principles and have become the standard for interoperability in the UK.

JESIP sets out a standard approach to multi-agency working, along with training and awareness products for responding organisations to train their staff.

At this point, so some may wonder why is this article in the DMISA Journal?

The UK has been engaging with the Western Cape Provincial Government and Cape Town Municipal Government on sharing lessons learnt in keeping tourists, visitors and emergency responders safe in an ever-challenging world. Effective disaster response is a critical element in minimising loss of life of responders and the public and so mitigating the impact of a disaster. As has been highlighted above, the UK does not always get it right but it does learn from hard won and painful lessons.

Recently a group of highly experienced representatives from a wide range of emergency services and response agencies attended a delivery of the one day JESIP course to look at the utility of the core elements of JESIP from the South African disaster risk management context. The main elements of JESIP consist of the following:
- The five principles of joint working ie co-locate, communicate, coordinate, joint understanding of risk and shared situational awareness
- the joint decision making model
- Joint organisation learning

There are a number of ways in building shared situational awareness. What proved to be of particular interest to the delegates was the use of a standardised way to share incident information in a common manner across all agencies to build shared situational awareness. This is achieved by using the M/ETHANE model as outlined below.

The outcome from this initial delivery has been extremely positive. The principles for enhancing multiagency working are sound and applicable to the South African context. M/ETHANE was recognised as a vital tool for incident response.

What was needed was a means to share JESIP more widely and to adopt the core elements. To that end, City of Cape Town Disaster Risk Management Centre has taken on the challenge of leading multi-agency interoperability in Cape Town. In November, we will deliver a train the trainer course to create a multi-agency team who can roll out JESIP across the emergency service community.

We will also be working on developing supporting material such as pocket size aide memoires to enhance the training.

Irrespective of what we do and where we are from, all those engaged in disaster management, incident response and emergency service provision share a common goal and one that is the central mantra of JESIP: "Working together to save lives and reducing harm "

Further information about JESIP can be found at: www.jesip.org.uk

UNIVERSITY OF THE FREE STATE
DISASTER MANAGEMENT TRAINING AND EDUCATION CENTRE FOR AFRICA
Building disaster resilient communities through education, training and research

Postgraduate Diploma in Disaster Management
PGDipDM, 120 credits, NQF level 8, minimum 1 year, maximum 2 years, entry-level of NQF 7 I Closing date is end of September

Master of Disaster Management
MDM, 180 credits, NQF level 9, minimum 1 year, maximum 2 years, entry-level of NQF 8, Closing date is end of September

Phd in Disaster Management
PhDDM, 360 credits, NQF level 10, minimum 2 year, maximum 5 years, entry-level of NQF 9. Closing date, first time application is anytime during the academic year

**Short Learning Programmes (SLP)**
UFS-DiMTEC offers six SLPs.
Most of them are registered with SAQA and pegged at NQF level 5

ENQUIRIES
Dr A Ncube Programme Director/Applications ncubea@ufs.ac.za
Dr T Raphela Short Learning Programmes raphelatd@ufs.ac.za

WWW.UFS.AC.ZA

A CONSEQUENCE MANAGEMENT APPROACH
TO DISASTER MANAGEMENT: JOINT RESPONSE MANAGEMENT STRUCTURES:

PART 10

By Dr Johan Minnie PrDM and Schalk Carstens PrDM
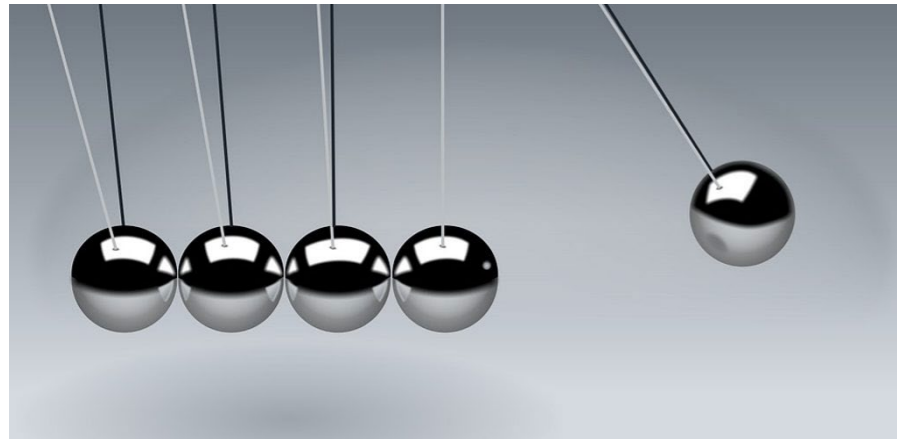
This article is the tenth article within this series of articles on consequence management. In the previous article, Part 9, we discussed the mechanics of joint response management and looked at the nine key elements or steps of a joint response management procedure. We also touched on the discussion of coordinated emergency organisation in Part 8 where more background was given on joint response management.

In this article, Part 10, we consider joint response management structures, while the next article, Part 11, will focus on incident site layout.

Developing joint response management structures
An effective response management structure or organisation is dynamic and adapts to circumstances. The Incident Command System (ICS system) and the Major Incident Medical Management and Support (MIMMS) system are two examples of a response management structure that is adaptable and can grow or shrink as required.

In the initial response to an impact, the response structure may comprise only an individual or limited resources. Once the initial response has been effected and services arrive on the scene, the process for the implementing of the secondary response must be initiated as soon as possible. This response must be based on the needs received from the scene as a result of the rapid assessment. This response must build on existing response levels and strengthen the deployments and actions on scene.

Structures to coordinate response
The establishment of a structure to manage, co-ordinate and integrate response actions at the scene of an incident is imperative and a priority for all services involved at an incident. Such a basic structure should be contained in a "Standardised Incident Management Plan" agreed to beforehand by all role-players.

There are a number of essential elements to the structure and principles, which should be observed at all times:
- Safety: Safety is an absolute essential necessity during all activities and must be considered at all times;

- Flexible organisation: The composition of the organisation must be adapted to the size, magnitude and nature of the incident. The organisation must be adapted (increased or decreased) as circumstances dictate;
- Standardised Terminology: All services must be informed and be familiar with the organisation and terms used by services, which may be involved in an incident;

Tactical incident management facilities/structures:
As part of the management structure, there are a number of essential facilities/structures, which may need to be established at the scene of an incident, these can include:
- Outer perimeter/cordon/public exclusion zone
- Inner perimeter
- Establishing a landing zone
- Staging area
- Incident command post
- Casualty clearing post
- Information point/media liaison
- Communications hub and network
- Access control to incident site and emergency infrastructure.

On-site incident coordination point: This is an on-scene facility where tactical decision-making and control of inter-disciplinary coordination takes place. Also known as incident command post (ICP), on-site JOC/forward control or Command Post (FCP). This is the single point of command for all on-site operations during the response phase of an emergency and will be located at an appropriate location at or near the scene of the emergency, normally within the outer perimeter.

The incident commanders/managers from key response agencies will operate under unified command to coordinate incident operations.

Joint incident management team/unified command: One of the main objectives to ensure effective on-scene management of services is to establish a "Unified Incident Management" system. This system allows for a structure whereby overall incident objectives and strategies can be formulated. In incidents involving multiple jurisdictions, a single jurisdiction with multi-agency involvement or multiple jurisdictions with multi-agency involvement, unified command allows agencies with different legal, geographic and functional authorities and responsibilities to work together effectively without affecting individual agency authority, responsibility or accountability.

In this regard it is important that the representatives be suitably mandated and take full responsibility and charge of its service at that level. It will ensure that the agreed upon operational plan and integrated tactical strategies are implemented by making optimum use of available resources.

A joint incident management team or unified command is normally structured to facilitate activities in five major functional areas:
- Command
- Operations
- Planning
- Logistics and
- Finances.

Note: Although international practice is to indicate a finance functional area at incident level, this is not always the reality in all countries, even if a JIMT/UC is formed at the incident site. Finances may be dealt with at a more strategic level, such as an emergency operations centre or disaster operations centre.

This organisation should also include the following elements depending on the situation;
- Safety
- Media/public liaison – information
- Liaison – supporting agency/jurisdiction liaison; in South Africa, Disaster Management is normally well-placed for this role.

Depending on the situation, the estimated duration of the incident must be established in order to plan the need for the rotation of staff and to plan meals, etc.

Strategic response management structure
A strategic response management structure can be established if the magnitude and severity of the incident requires higher-level decision-making powers or wider coordination. This relates to the concept of multi-agency coordination.

Disaster operations centre/joint operations centre
The Disaster Operations Centre is an off-site, centralised facility, which is provided by the metropolitan/district structures, where multi-disciplinary coordination and strategic decision-making takes place. It is a fully equipped dedicated facility within the structure of a Disaster Management Centre.

For the purpose of multidisciplinary strategic management of response and recovery operations, this facility must be capable of accommodating any combination of emergency and essential services representatives, including all relevant role players and stakeholders identified in various response and recovery plans.

This facility must be activated when a local, provincial or national disaster occurs or is threatening to occur, and can be activated for major incidents, events and operations.

The Disaster Operations Centre may be activated immediately upon receipt of information of a specific type of incident or threatening incident, or may be activated upon request or advice of the joint incident management team(s) at the scene of the incident(s).

The activities of a strategic response management structure
Once the strategic response structure is in place, it will conduct an initial strategic situation analysis working though the following processes:
- Convene meeting of the structure
- Review situation on available information
- All possible role-players must be identified and mobilised if not yet present
- Identify and appoint incident coordinator
- Ensure all services required have been activated and are responding to their areas of responsibility
- Compile initial situation report for distribution to all stakeholders, internal and external
- Determine objectives and strategies
- Establish public notification needs
- Establish public safety advisory needs
- Generate media release for public communication
- Monitor, assess and support services on-scene
- Establish possible resource needs
- Evaluate resources available vs. resources possibly required
- Establish availability of resources, consult database
- Establish possible need for invoking mutual aid agreements and do initial notifications of possible support required and
- Monitor, re-assess and adapt strategy.

Structures to provide relief
Additional off-site structures may need to be established to provide relief, these could include:
- Mass care centres
- Victim information centres
- Reconciliation areas, where victims and their friends / family can be reunited
- Data processing centres
- Media briefing facilities
- Counselling facilities
- Temporary mortuary facilities
- Temporary warehousing and
- Animal welfare provision.

Strategic process
The strategic response structure would need to consider the same functions and components as at the incident level, but with a more strategic coordination and integration perspective.

Being part of the any-hazard response management procedure, it would follow its own iterations of the same process steps already indicated for the any-hazard response management procedure in part 9, excluding the step dealing with the establishment of the strategic response structure.

▶ The following flowchart illustrates how decision-making may evolve regarding the establishment of coordination structures.

Conclusion
This concludes this tenth article in this series of articles about the wider consequence management

practice. This article described joint response management structures and in the next article we will be considering incident site layout. 🌋
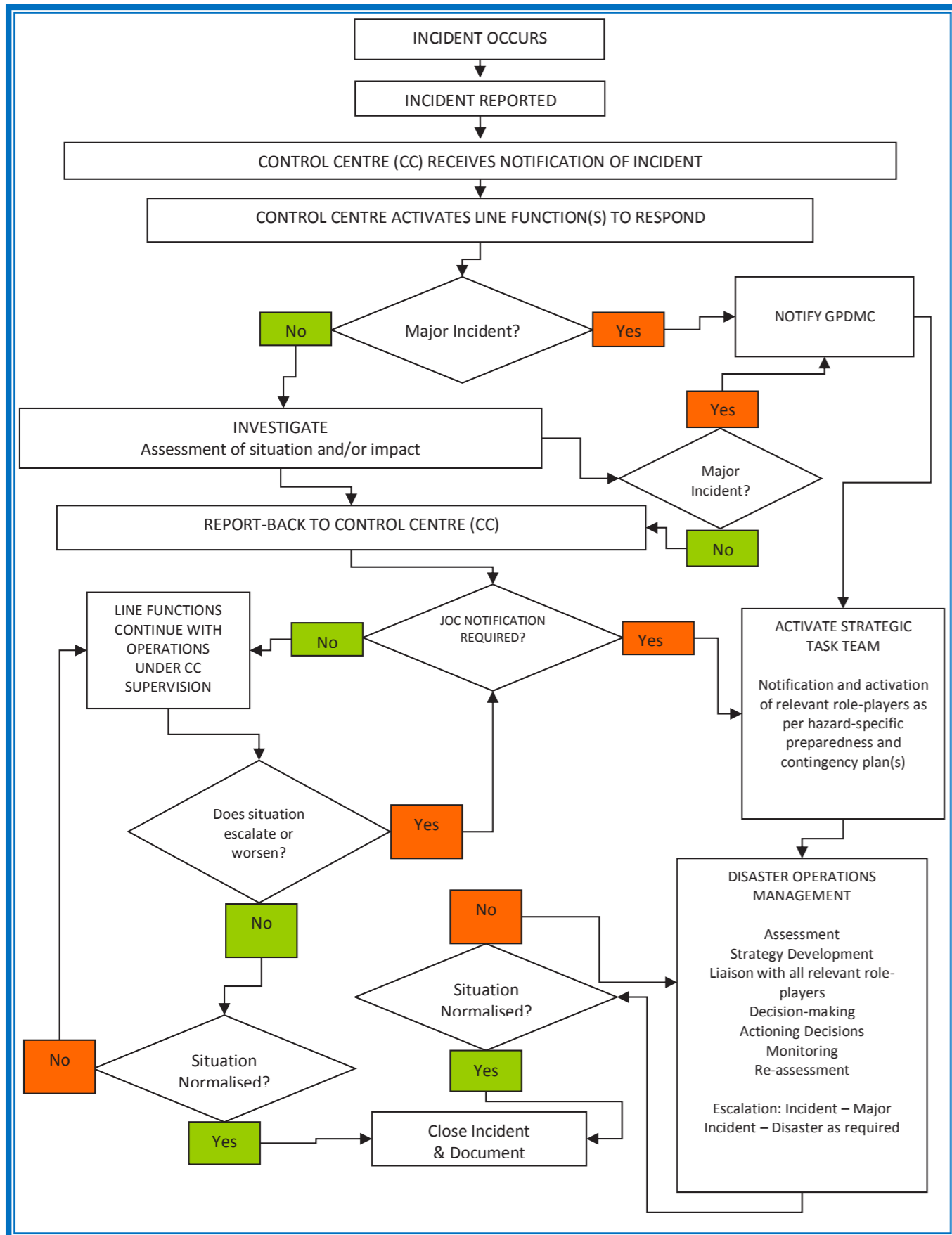
ONE SYSTEM FOR CITY OF CAPE TOWN
AND WESTERN CAPE PROVINCE, AS THEY WORK TOGETHER

By Andrew Mortimer, manager: EPIC, City of Cape Town and Suretha Visser, manager: Public Emergency Call Centre, City of Cape Town

In Cape Town, the Public Emergency Call Centre (PECC), in conjunction with Western Cape Government Health: Emergency Medical Services (EMS) has made a significant improvement to the manner in which emergency medical incidents are shared amongst the two entities.

For many years the City of Cape Town's PECC has received telephone calls from citizens in need of emergency medical services. As the City does not deliver ambulance type services, as this is a provincial function, the incident details still had to be transferred to the Western Government EMS call centres, via 10177.
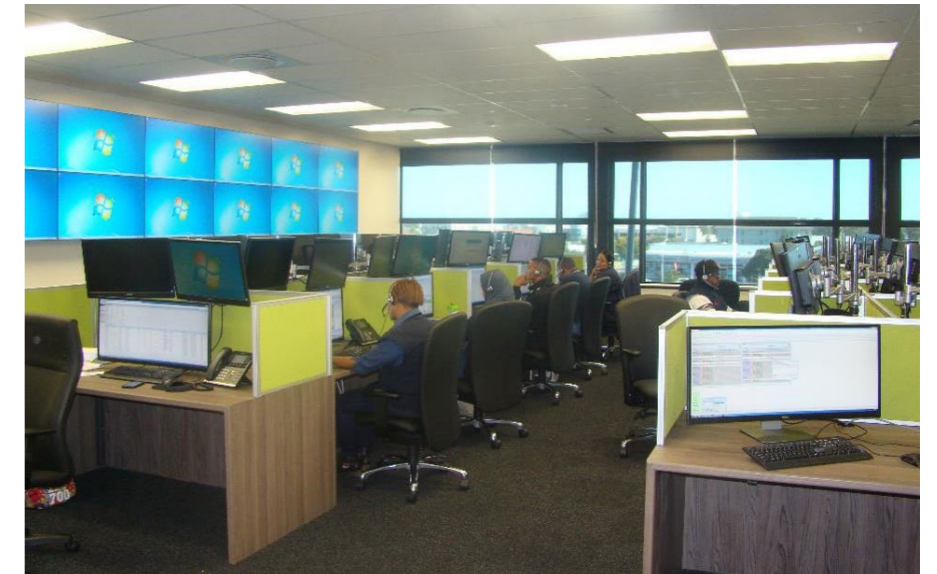
The PECC currently answers over 500 000 calls per annum, of which 50 percent are medically related. Often these calls have to be redirected but telling the caller to dial 10177 themselves, especially whilst they are in a stressful and possibly life threatening situation, is not the most efficient solution.

The PECC and the City have adopted a strategy whereby the PECC operator registers the incident details from the caller in a calm and professional manner and then traditionally, the operator would then either 1) hand the details over to the EMS Call Centre or 2) conference the call to the EMS Call Centre depending on the specific situation.

Both the City of Cape Town and the Western Cape Government: EMS have advanced computer aided dispatch (CAD) technology solutions but they are different systems and required a dedicated to project to integrate the two systems from both a technical perspective but also from a process and data structure perspective.

The City of Cape Town and Western Cape Province have made a decision to embark on the integration project

in order to leverage the technology in order to improve the registration and sharing of emergency medical incidents in the city. The purpose of the project was to ensure that when a service request was logged on the City's Emergency Policing Incident Command (EPIC) system that at the touch of a button, the details could be shared instantly and accurately.

This cuts out the requirement to 'recapture' the details and allows for the service request to be immediately viewed and entered into the priority queuing process within the EMS system.

Additionally the systems continue to communicate so that the status of the EMS response can be seen by the City PECC 107 operator.

This saves an additional call to 10177 in order to enquire about the status of the ambulance.

The benefit of this integration is as follows:
• PECC 107 operators are released from the medical calls more quickly in order to attend to additional incoming calls
• EMS 10177 call-takers no longer

need to answer the 107-initiated calls, recapture the details and create the request on their system
• Time efficiencies are created when they are needed the most
• Human recapturing errors are minimised
• Status enquiry calls to 10177 are minimised thereby further minimising the time 107 operators spend on the phone with 10177.

Overall, this project offers a significant improvement to the communication between the two emergency call centres and not only makes each individual citizen's emergency call for help faster and more efficient but creates more overall capacity to respond to emergencies through efficiencies for both organisations.

This project was originally completed during 2021 and went live on 9 November 2021. As far as we know, this was the first integration between the SAP EPIC of the City of Cape Town and the Caremonx (Department of Health) in the world.

How it is working today, after almost two years?
The past two years saw many calls being taken successfully. As expected ▶

PLANNING AND AWARENESS
IS KEY TO DISASTER RISK REDUCTION

As part of various activities to celebrate the United Nations International Day for Disaster Risk Reduction, the City of Cape Town's Disaster Risk Management Centre (DRMC) hosted a seminar today at the Civic Centre, Cape Town to increase awareness and share knowledge that will improve risk reduction planning.

This year, the theme of International Day for Disaster Risk Reduction is fighting inequality for a resilient future with the focus on the reciprocal relationship between disasters and inequality.

Using the COVID-19 pandemic as a case study, discussions focused on how the impacts of the world-wide pandemic has pushed impoverished communities into deeper need, leaving them more exposed to the impact of food security and poverty.

The seminar was well attended by representatives from the Western Cape Provincial Government, City officials, NGOs, private sector and humanitarian partners.

The seminar focused on the following key components:

- Cape Town in context, a socio-economic overview
- Importance of food security
- Epidemiological perspective and how poverty and urban health play an important role in thinking about risk, poverty and food
- Importance of neighbourhood resilience assessment and building cohesion
- Enhancing community preparedness which included disaster planning, community base risk assessments and humanitarian efforts

In addition to the above, participants discussed the ever increasing impact of climate change as it is likely to make weather events more frequent and more extreme.

Food insecurity and inequality often creates conditions of increased exposure to disasters, which then affect the most vulnerable groups in communities. For this reason there should be awareness and knowledge shared on the above issues.

As part of the activities to celebrate the International Day for Disaster Risk Reduction, the DRMC also hosted a Youth Climate Change programme with a NGO in Mitchells Plain called L&C Community Outreach Programme. The event took place at the Rondevlei Nature Reserve on Saturday, 14 October 2023.
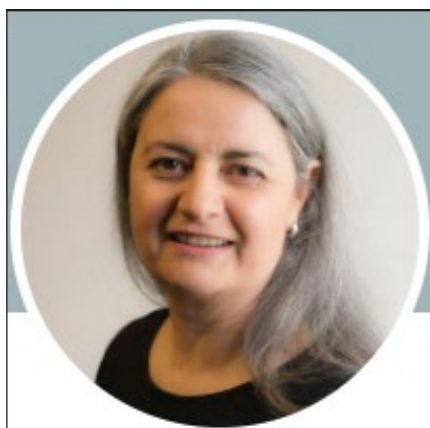
"Our Disaster Risk Management Centre plays an important role in planning to reduce the risk of disasters and facilitating humanitarian assistance during disasters and extreme weather conditions. It is important to have systems in place to assist those in need. Climate change has shown to increase the unpredictability of severe and life threatening storms. We need to be prepared to deal with such extreme weather conditions. Reducing the risk of disasters is everybody's business and we should all work together to assist the most vulnerable in our communities," said the City's Mayoral Committee Member for Safety and Security, Alderman JP Smith. ▲

▶ the biggest benefit is the saving of time by eliminating the recapturing of the call on the EMS side. The benefit is directly transferred to the reaction

times of the ambulance services so the caller is benefiting from this directly. The working relationship between the PECC and EMS has

always been very good and this relation was strengthened through continuous training that took place during the past two years. In the beginning only a small number of PECC staff was trained but as time went on, more and more staff was trained. Today, updates in training takes place as needed and as the changes to the two systems are made. There are by now small interventions and are dealt with by updating SOPs.

As with any electronic system there is room for improvement. This will be addressed as the technology allows it. New technologies are always investigated and possibilities looked into for possible future developments to enhance the current systems and to even provide a better system to the public. ▲

Suretha Visser, manager: Public Emergency Call Centre, City of Cape Town

Andrew Mortimer, manager: EPIC, City of Cape Town

CITY OF TSHWANE EMBRACES
INTERNATIONAL DAY FOR DISASTER RISK REDUCTION 2023

The City of Tshwane Disaster Management Centre is proud to join the global community in celebrating the International Day for Disaster Risk Reduction (IDDR) on 13 October 2023. This United Nations International Strategy for Disaster Reduction initiative promotes awareness and action on disaster risk reduction, aligning with this year's theme, 'Fighting inequality for a resilient future'.

The world is facing unprecedented challenges due to a growing population, climate change and a dynamic environment that has resulted in natural and man-made disasters causing economic and environmental losses. Disaster risk management is an essential aspect of mitigating these losses and building resilient communities.

The IDDR is an annual event celebrated on the second Wednesday of October to recognise the importance of disaster risk reduction and to highlight the progress made by people and communities in reducing their vulnerability to disasters.

In the lead-up to IDDR 2023, the City of Tshwane has been actively engaged in various disaster risk reduction efforts. This includes conducting seven disaster risk assessments in informal settlements throughout Tshwane and developing community response strategies. Additionally, the City has carried out 11 awareness campaigns in formal settlements and schools, including early childhood development centres.

The 2023 theme, 'Fighting inequality for a resilient future', underscores the interrelationship between disasters and inequality. Inequality and disaster vulnerability are intertwined, as unequal access to essential services, like finance and insurance, often leaves the most vulnerable exposed to disaster risks. Furthermore,

disaster impacts can exacerbate existing inequalities, pushing marginalised communities further into poverty.

This theme aligns with the Sendai Framework for Disaster Risk Reduction 2015–2030 and it coincides with the Midterm Review of the Framework, where a political declaration was adopted to accelerate actions aimed at strengthening disaster resilience. The Sendai Framework is an international agreement designed to prevent and reduce losses in lives, livelihoods, economies and essential infrastructure.

The City of Tshwane will actively participate in the Gauteng Provincial IDDR event scheduled for this month, demonstrating

its commitment to disaster risk reduction and the pursuit of a more resilient and equitable future for all.

Over the years, the City of Tshwane Disaster Management Centre has been a steadfast supporter of IDDR campaigns, aligning its projects with the annual themes. These projects have included school safety initiatives, hospital emergency planning and community engagement efforts.

This year's IDDR celebrations build upon this legacy of commitment and action in disaster risk reduction. The City of Tshwane remains dedicated to working collaboratively with local communities and stakeholders to create a more resilient and equal future for all Tshwane residents. ▲

WESTERN CAPE PROVINCE DEALS WITH
SEVERE WEATHER EVENTS: 24 TO 26 SEPTEMBER 2023

By Colin Deiner, chief director, Disaster Management and Fire Brigade Services, Western Cape Government

The Western Cape Province experienced a weather event from 24 to 26 September 2023, which left a trail of destruction across the province. The City of Cape Town, the Cape Winelands and Overberg District Municipalities incurred extensive damages with Garden Route experiencing moderate damages and West Coast and Central Karoo District Municipalities incurring minor damages.

On Thursday, 21 September 2023, the South African Weather Services (SAWS) issued an impact-based warning for parts of the province ie City of Cape Town, Cape Winelands, Overberg and Garden Route. After consultation with the Western Cape: Provincial Disaster Management Centre (WC:PDMC) and the affected Heads of Centres on Sunday, 24 September 2023, SAWS upgraded the weather warning as follows: An Orange Level 9 for Disruptive Rain causing isolated severe thundershowers leading to widespread flooding/ flash flooding, mudslides and major travel disruptions in the Overberg and southern Cape Winelands from Sunday afternoon, 24 September 2023 and spreading to the Garden Route coastal areas into Monday, 25 September 2023. A Yellow Level 4 for Disruptive Rain leading to localised flooding/flash flooding and disruptions to municipal essential services over the Central Karoo, northern Cape Winelands, southern West Coast and the City of Cape Town from Sunday afternoon, 24 September 2023 into Monday, 25 September 2023.

It came to light after the incident that the Yellow Level 4 for the City of Cape Town should have also been upgraded to Level 6 taking into consideration the strong winds experienced.

Proactive measures implemented
On Friday, 22 September 2023 as well as Sunday, 24 September 2023, the WC:PDMC convened severe weather briefings to plan for the cut-off low system with SAWS, the Heads of Centres and the Department of Health and Wellness. Thereafter, due to the upgrade of the weather warning, the WC: PDMC immediately activated a Joint Operations Committee (JOC) with the first meeting commencing on Sunday, 24 September 2023 at 13h00. The role-players included: Heads of Centre, National Disaster Management Centre representative, National Department of Water and Sanitation (DWS), National and Provincial Human Settlements, Department of Social Development (DSD), South African Security Agency, Eskom, Western Cape Education Department (WCED), Department of Health and Wellness, Department of Mobility (Traffic), Department of Infrastructure (Roads),Department of Agriculture, Department of Local Government, Department of the Premier, South African Police Services (SAPS), South African National Defence Force (SANDF), SANRAL, South African Search and Rescue (SARZA) and the National Sea Rescue Institute.

WC:PDMC activation was as follows:
- Activated 24/7 from 24 to 26 September 2023;
- Lower activation (07h30 to 18h00) from 27 September 2023;
- At a lower level of activation (working hours) from 28 September 2023;
- Daily JOC meetings took place from 24 September 2023 to 3 October 2023. The Final JOC meeting took place on 5 October 2023.

Coordination of provincial disaster management activities included:
- Engagements with SAWS for any weather updates
- Continuous monitoring of Dam Levels (National Department of Water and Sanitation)
- Request for SANDF aerial, water purification and engineering corps support
- Pre-release of water from Wemmershoek dam
- Road closure updates
- Social relief stream
- Facilitation of water tankers for Overstrand
- Facilitation of Vodacom's response to access areas in Overberg
- Facilitation of Eskom response to access areas in Overberg
- Facilitation of loadshedding exemption (Overstrand and Theewaterskloof)
- Option of alternative transport (Transnet) Theewaterskloof region and
- Media releases.

The relevant district centres as well as the City of Cape Town activated their centres accordingly with ongoing updates and situation reports submitted to the WC:PDMC. The WC:PDMC in turn compiled situation reports which were duly disseminated.

Impacts recorded
All areas experienced the uprooting of trees, roof damage and flooding of roads with various levels of severity. The major impacts are summarised below.

City of Cape Town

Communities affected
Both formal and informal settlements were impacted by the flooding with the following areas experiencing the brunt of the storm:

Informal settlement flooding
Shuku-Shukma and Sir Lowry's Pass Village, Rasta Camp, Riemvasmaak, 7de Laan Sandvlei Macassar, Old Faure Driftsands, Mfuleni, Bellville South, NY111 Gugulethu, Barcelona IFS Gugulethu, Greepark IFS Mfuleni, Thabo Mbeki IFS Philippi East, RR Section PJS Section TRA Section in Khayelitsha, Taiwan IFS Site C Khayelitsha, Paul Avenue Macaza IFS Khayelitsha, Morkel Cottages IFS Strand, Ekuphumleni IFS Du Noon. DM Section, France IFS, QQ Section, Green Point, Qandu Qandu IFS and SST IFS, Khayelitsha, 8ste Laan IFS Valhalla Park.

Flooding of formal dwellings
Durbanville, Bo-Kaap, Schaapkraal, Bellville South, Belhar, Sandvlei in Macassar, Strand, Gordons Bay, Knorhoek, Scottsdene and Hout Bay Sir Lowrys Pass Village.

Evacuations
- Emergency services assisted six children trapped in three different houses in Strand and evacuated them to Strand Fire station
- Residents were evacuated from Stormhaven Retirement Village, Somerset West
- One hundred and seventy people were evacuated to a hall in Sir Lowry's Pass
- Emergency teams assisted with evacuations from Faure and Sandvlei in Macassar
- A group of people were rescued in the Kogel Bay resort.

Electricity
Power outages were reported in various areas such as Eastridge, Mitchells Plain.

Major road closures
- R44 Clarence Drive (between Gordons Bay and Rooi Els) (remains closed)
- Sir Lowry's Pass (Gordons Bay) closed (reopened).

Fatalities
Four children died in Phillipi.

Approximately 21 000 people were affected by the storms and extensive humanitarian relief was provided.

Overberg District Municipality

Communities affected
Theewaterskloof Municipality: 11 persons evacuated at Nagwag
Greyton/Genadendal: over 200 people at Madiba Park required blankets, shelter and food
Riviersonderend: Around 150 families (approximately 600 people) in the informal settlement and backyard dwellers that required blankets and food parcels
Grabouw: 50 people were displaced and temporarily sheltered in Thusong Centre and 40 at Soul Food Hall. 300 Families were left without shelter required blankets and food
Villiersdorp: 250 families affected: Required shelter, blankets, raincoats mattresses, water, food parcels
Botriver: 145 families affected, required blankets, food and toiletries
Caledon: approximately 500 families affected, required food and blankets and Myddleton and Tessies the figure is approximately 400 people;
Helderstroom Prison was cut off.

Cape Agulhas Municipality
- 60 percent of Bredasdorp flooded due to storm water system inundated
- Houses in the lower eastern part of Bredasdorp were flooded
- Surface flooding in Struisbaai and Napier

- Struisbaai and Arniston were cut off
- 10 people rescued in Struisbaai
- 700 households affected in Cape Agulhas.

Overstrand Municipality
- People rescued in Stanford
- Rooi Els, Kleinmond, Bettys Bay communities were cut off from 25 to 27 September 2023
- Water provided to communities in need (ongoing)
- Provision of sandbags to informal settlements.

Road closures
- N2 collapse at Bot River Bridge
- Roads to Hermanus closed
- Palmiet Bridge closed (reopened with stop and go)
- R62 from Ladismith towards Barrydale closed due to flooding
- Low water bridge at Buffelsjachs River (Swellendam) closed.

Electricity disruption
Electricity disruption to the Overstrand Municipality as well as electricity disruption in Napier and Bredasdorp.

Water supply disruption
Water supply line between De Bos Dam and Overstrand Water Works supplying Hermanus, Onrus, Vermont, Hawston and Kleinmond.

Fatalities
One fatality occurred in Villiersdorp, one fatality at Bot River and one person missing and one fatality at Vyeboom, Oudehoop.

▶ ## Cape Winelands District Municipality

Communities affected
Breede Valley Municipality
- People were trapped in house in Doring River area
- De Wet farming area flooded
- Nine people evacuated from De Doorns (accommodated with relatives)
- GG Camp at De Doorns was cut off
- Aan De Doorns and Troebodor Farm cut off: 17 houses affected (75 people) and
- Moddergat Farm: 40 families (200 people).

Langeberg Municipality
- 80 people were cut off at McGregor. Detour Accessible via 4x4
- 221 people evacuated to local guest house and community hall in Ashton
- Nine people were trapped at Gelukshoop Farm in Bonnievale
- Two groups of hikers from Greyton sheltered in McGregor Community Hall and
- De Hoek Farm, Vergenoed Farm, Good Hope Farm and Mountain View Farm cut off (81 people).

Stellenbosch Municipality
- 22 Residents evacuated from Riverside Informal Settlement, Mooi Water (housed at the church hall)
- 23 households 87 people affected at Riverside in Franschhoek
- Plankenberg Industrial Area flooded
- 60 students trapped at a camp site on the top of Franschhoek Pass due to the road being closed
- Family evacuated at Mandela City in Klapmuts
- 106 people (22 households) affected at Croydon (evacuated and accommodated at Pentecostal Church) and
- Three people were rescued from Cabriere Street, Franschhoek.

Drakenstein Municipality
116 families were accommodated from Drommedaris Street, Mbekweni and 38 families were affected at PA Camp in Paarl.

Road closures
- N1 at De Doorns was closed
- N1 at Sandhills and Orchards
- Franschhoek Pass closed
- R60 road was closed at Nuy (between Robertson and Worcester)

- Low water bridges flooded (Robertson, McGregor)
- Other district and residential roads were closed.

Electricity outages
- Drakenstein Municipality: Paarl East and Roggeland/Vlakkeland;
- Stellenbosch Municipality: La Motte Bosbou, Maasdorp, Uitkyk Street, Franschhoek, Dassenberg, Franschhoek CBD and
- Langeberg Municipality: Agterkliphoogte farming area.

Water supply disruption
Franschhoek communities were affected.

Health care
Two clinics were temporarily closed.

Fatalities
One

Garden Route District Municipality

Communities affected
- Nine houses were drenched in Thembalethu in George
- Roof of a house blown off in Dysselsdorp
- 88 people (72 scholars and 16 adults) were stranded at Bergoord Mountain Resort. Humanitarian aid provided by helicopter. People were rescued after the Le Roux River subsided.

Road closures
- Meiringspoort Pass was closed (reopened on 29/9)
- Swartberg Pass closed
- Low water bridges in Oudtshoorn closed (Reopened after water subsided, on 29/9 three (3) remained closed)
- Karatara low water bridge was flooded and
- Northern part of Prince Alfred Pass (R399) is closed.

Fatalities
One, an elderly man's car was washed away while crossing the Prins River.

Preparedness and response

Annually, the WC:PDMC communicates with organs of state to ensure that their winter readiness and preparedness plans are in place for effective response to emergency incidents during the winter season. The WC:PDMC ensures the coordination of such plans and the response to incidents.

Furthermore, it is imperative for the Western Cape Province's risks, such as the prolonged drought in parts of the province, informal settlements and wildland fires, floods and mudslides associated with wet weather, drownings, load-shedding and the possibility of complex humanitarian emergencies are considered in the winter readiness plans.

With the activation of the Centre, the WC:PDMC, City of Cape Town Metro and the District Municipalities have fostered even closer partnerships with stakeholders to ensure integrated response activities.

The following intervention measures are in place across the province to deal with flooding:
- The City of Cape Town Metro Municipality has an established Flood Task Team, which meets regularly before the winter commences, to ensure mechanisms are in place to prevent and mitigate the impacts of severe weather. The WC:PDMC is also represented on the Flood Task Team
- The City of Cape Town Metro Municipality and District Municipalities have 24/7 operational centres
- The municipalities provide sandbags and milling to reduce the impact of floods
- The Provincial risk profile, together with the Districts and City of Cape Town Metro Municipality risk profiles, identifies flooding as a high risk; therefore, the municipalities have the necessary flood contingency plans in place

- Centres are always in a state of readiness which includes GIS and software systems
- All centres have standard operating procedures in place for any activation and response
- These procedures include the request for any humanitarian relief
- Officials are on 24/7 standby
- Open communication channels exist with South African Weather Services;
- Procedures in place for the utilisation of the South African National Defence Force helicopter and
- Communication and engagement with the Department of Water and Sanitation in terms of providing dam and river flow levels.

Preliminary damage assessments
The WC:PDMC has requested municipalities to commence with damage assessments however due to the enormity of the incident, most municipalities are still mopping up, with a few municipalities coordinating humanitarian relief, provision of water and reconnection of electricity as well as communication networks.

The Department of Agriculture has indicated that at least R1,4bil (and increasing) damages are recorded. The Department of Education indicated at least 150 schools were damaged. 🔺

Municipality/ Department	Total Preliminary Damages
Theewaterskloof	R 93 710 000
Overstrand	R 23 135 000
Langeberg	R 19 595 000
Drakenstein	R 391 000
Stellenbosch	R 85 347 824
City of Cape Town	R 14 795 353
Total Amount	**R 236 974 177**

Preliminary damage assessments

UNLOCKING COMMUNITY DISASTER RESILIENCE:
CASE STUDY: INANDA COMMUNITY

By Dr Mal Reddy, Durban University of Technology

Disasters, whether natural or human-made, have become an increasingly frequent and severe threat to communities worldwide. The impact of such events transcends mere statistics, causing not only loss of lives and property but also long-term socio-economic and environmental consequences. In the face of this growing challenge, building community disaster resilience has emerged as a fundamental approach to mitigate the adverse effects of disasters. This research paper delves into the strategies and practices that empower communities to withstand, adapt to and recover from these challenges effectively.

Background and significance
Disasters have the potential to disrupt entire societies, causing immeasurable suffering and setbacks to sustainable development. With global climate change trends and increasing urbanisation, the risk of disasters has become a defining feature of the 21st Century. The significance of building community disaster resilience lies not only in safeguarding the immediate well-being of individuals and their environments but also in ensuring long-term social and economic stability.

Disasters often strike indiscriminately but their impact is not borne equally by all. Vulnerable populations, particularly those with lower socioeconomic status and fewer resources, are disproportionately affected. To address these disparities and strengthen society's overall ability to withstand shocks, communities must be at the forefront of disaster resilience efforts.

Research objectives and scope
This research paper seeks to identify and analyse the strategies and practices that enhance community disaster resilience.

The primary objectives of this study are to:
- Investigate the theoretical foundations of disaster resilience, including key concepts and models.
- Examine the factors that influence community disaster resilience, including socioeconomic, environmental and governance factors.
- Explore successful case studies and best practices in building community resilience.

The scope of this study encompasses the community of Inanda- eThekwini Metropolitan Municipality in KwaZulu-Natal.

Justification for the study
The necessity for this research is underscored by the increasing severity and frequency of disasters worldwide. In recent years, communities have been confronted with a myriad of challenges, from floods and hurricanes to earthquakes and pandemics. In an era where uncertainty is the only constant, it is paramount to equip communities with the knowledge, tools, and resources to confront these challenges head-on.

This research contributes to the wider body of knowledge in disaster risk reduction, providing insights into the strategies and practices that empower communities to become more resilient. By identifying what works and what doesn't, this research seeks to inform policymakers, practitioners and communities themselves on how to prioritise and implement resilience-building efforts effectively.

As we embark on this journey through the landscape of community disaster resilience, it is crucial to underscore the resilience, adaptability and strength that communities inherently possess. This strength can be further nurtured and amplified through well-informed strategies, ultimately helping communities face adversity with unwavering determination.

2. Literature review
2.1 Theoretical foundations of disaster resilience
Disaster resilience is a complex and multifaceted concept that draws from various theoretical underpinnings. Central to the understanding of resilience are concepts such as adaptive capacity, vulnerability and social capital. These concepts form the basis for evaluating and enhancing community disaster resilience.

One of the key theoretical frameworks in this area is the concept of adaptive capacity. It emphasises the ability of communities to adapt to changing circumstances and to recover after a disaster. In the work of Cutter et al. (2008), a place-based model for understanding community resilience to natural disasters is presented. This model highlights the importance of community-specific factors in building resilience. Another foundational concept is vulnerability. Paton and Johnston (2001) in their work on "Disasters and communities: Vulnerability, resilience, and preparedness" stress the importance of recognising vulnerabilities in communities. Vulnerability assessments are crucial for identifying the specific challenges that communities face and for developing targeted resilience strategies.

The concept of social capital is also integral to understanding community resilience. Manyena (2006) explores the concept of social capital in the context of disaster resilience. Social capital refers to the relationships, networks, and trust within a community that facilitate cooperation and support during and after disasters. It is a fundamental element of resilience, as it enables communities to work together in times of crisis.

2.2 Key concepts, definitions and models
Defining key concepts is essential for establishing a common understanding of the terminology used in the disaster resilience field. Risk reduction, for example, involves a range of measures aimed at minimising the impact of disasters. Preparedness encompasses activities and initiatives that communities undertake to ensure they are ready to respond effectively to disasters. Recovery focuses on the restoration of community functions and the return to a state of normalcy following a disaster. These definitions serve as the foundation for further discussions in this paper and ensure clarity in the discourse.

2.3 Factors influencing community disaster resilience
Community disaster resilience is influenced by a multitude of factors, which can be categorised into three broad areas: socioeconomic, ▶

environmental and governance-related factors. Socioeconomic factors include income, education, healthcare access and employment opportunities. Communities with higher socioeconomic resources are often better equipped to invest in disaster preparedness and recovery efforts.

Environmental factors include the physical characteristics of a community's location, such as its proximity to coastlines, fault lines or flood-prone areas. Environmental vulnerabilities can increase the risk of disasters, making it necessary for communities to adopt mitigation and adaptation strategies tailored to their specific context.

Governance-related factors encompass the policies, regulations and institutional structures that impact disaster risk reduction and resilience-building efforts. Effective governance is critical for coordinating disaster management, developing and enforcing building codes and implementing risk reduction initiatives.

Understanding the interplay between these factors is essential for resilience planning, as it allows for targeted and context-specific strategies that address the unique challenges faced by each community.

2.4 Literature on successful case studies and best practices
Case studies of communities that have successfully built resilience provide valuable insights into practical strategies and best practices. For instance, communities in earthquake-prone regions have developed seismic retrofitting programmes for vulnerable buildings and infrastructure, significantly reducing the risk of structural damage during earthquakes. Similarly, communities in flood-prone areas have implemented land-use planning and floodplain management strategies, including the establishment of early warning systems and flood-resistant infrastructure.

Analysing these case studies allows us to extract best practices and draw lessons from their experiences. It is through these real-world

examples that communities, policymakers and practitioners can gain a deeper understanding of what works in disaster resilience, enabling the replication of effective strategies in various contexts. Hence, the selected case study on the Inanda community.

3. Research methodology
3.1 Qualitative research approach
The qualitative research approach chosen for the study in Inanda, was driven by the need to gain a deep and nuanced understanding of the community's resilience, challenges and practices. Qualitative research is a methodological approach that allows researchers to explore the lived experiences, perceptions and motivations of individuals and communities. In Inanda, this approach was particularly valuable for several reasons:

- Rich contextual insight: Inanda is a community with a complex history and a rich cultural heritage. Qualitative research allowed us to gain a holistic understanding of the context, taking into account the community's cultural traditions, historical significance and diverse population.
- In-depth narratives: Qualitative methods, such as in-depth interviews and focus groups, enabled us to capture the narratives and stories of community members. These narratives provided insights into their experiences, beliefs and decision-making processes.
- Flexibility and adaptability: Qualitative research is highly adaptable, making it suitable for exploring unanticipated themes and issues as they emerged during data collection. This flexibility allowed us to respond to the unique dynamics and evolving challenges within the community.

Data collection methods
- In-depth interviews: These one-on-one interviews were conducted with community members, leaders and relevant stakeholders. Inanda residents, including those who have experienced disasters and adversity, shared their personal experiences, perspectives

and insights. These interviews formed the core of the data collection process.
- Focus groups: Focus group discussions were organised to facilitate group interactions and shared perspectives. They were particularly valuable for capturing a range of opinions and experiences, especially on topics like community engagement and cultural practices.
- Document analysis: Existing documents, reports and records related to Inanda's resilience efforts were also analysed. This included community initiatives, policy documents and local development plans. Document analysis helped to corroborate and contextualise the information gathered from interviews and focus groups.

3.3 Data analysis
The data analysis process for the Inanda community resilience study was a critical step in transforming the rich qualitative data gathered through interviews, focus groups and document analysis into meaningful insights and findings. Data analysis aimed to identify patterns, themes and narratives that would shed light on the community's resilience strategies and practices.

Thematic analysis
Thematic analysis was the primary method used to analyse the qualitative data. This approach involves the systematic identification and interpretation of recurring themes, patterns and narratives within the dataset. In essence, an overview of the data analysis process, entailed the following:

i) Data organisation: The first step was to organise and manage the collected data. This involved transcribing interviews, organising focus group notes and collating documents. A structured and easily accessible database was created to store all data.

ii) Familiarisation: Researchers familiarised themselves with the data by reading and re-reading the transcripts and documents. This process allowed them to immerse themselves in the content and gain

a comprehensive understanding of the dataset.

iii) Initial coding: Initial coding was a crucial step where researchers assigned codes to segments of text, phrases or paragraphs that were relevant to the research questions. This process involved generating open codes without imposing preconceived categories.

iv) Developing themes: Codes were then grouped into categories based on their commonalities, leading to the development of themes. These themes captured key concepts, issues and recurring ideas within the data.

v) Review and refinement: The emerging themes were continually reviewed and refined. Researchers discussed and cross-validated their interpretations to ensure the themes accurately represented the content of the data.

vi) Sub-themes: Themes were further broken down into sub-themes to provide a more detailed understanding of the data. Sub-themes allowed for a deeper exploration of specific aspects of community resilience.

vii) Data triangulation: To enhance the credibility of the findings, data triangulation was employed

by comparing and contrasting information from different sources, such as interviews, focus groups and documents. This approach ensured that the findings were well-supported and robust.

viii) Interpretation: Finally, the themes and sub-themes were interpreted in the context of the research questions. Researchers drew conclusions, identified patterns and highlighted noteworthy insights related to Inanda's community resilience, its strategies, challenges and practices.

Report and presentation
The findings from the data analysis were compiled into a comprehensive report and presentation that captured the essence of Inanda's community resilience. The report highlighted key themes, sub-themes and illustrative quotes, providing a clear and compelling narrative of the community's journey.

The data analysis process, grounded in thematic analysis, was instrumental in uncovering the richness of Inanda's resilience strategies and practices. It allowed for a nuanced understanding of the community's experiences and the factors that contribute to their resilience in the face of disasters and adversity.

3.4 Ethical considerations
Ethical considerations were at the forefront of the research approach. Informed consent was obtained from all participants and their confidentiality and anonymity were rigorously maintained. The study adhered to ethical guidelines for research involving human subjects, ensuring the well-being and respect of the community members.

The qualitative research approach in Inanda was instrumental in uncovering the community's resilience principles, challenges and practices. By delving into the qualitative aspects of their experiences, this approach provided a comprehensive understanding of how the community navigates adversity, empowers itself and crafts a resilient future.

4. Research findings
Community understanding and awareness in Inanda
In the pursuit of building community disaster resilience, understanding and awareness of disaster risks play a pivotal role. In the case study conducted in Inanda, a township located in the eThekwini Metropolitan Municipality of South Africa, several key findings emerged that shed light on the level of understanding and awareness within the community.

- **Varying levels of disaster risk perception:** The study revealed that the perception of disaster risks within the Inanda community varies significantly. While some residents showed a heightened awareness of potential hazards, particularly those related to flooding and waterborne diseases, others demonstrated a lack of awareness or a tendency to downplay the risks. This variation in risk perception can be attributed to factors such as previous disaster experiences, community education initiatives and socioeconomic disparities.
- **Importance of local knowledge and indigenous wisdom:** The findings highlighted the value of local knowledge and indigenous wisdom in understanding and coping with disaster risks. Many community members relied on traditional practices and local ecological indicators to predict natural events such as floods and droughts. This traditional knowledge, passed down through generations, served as an essential component of their disaster resilience.
- **Challenges in communicating risk information:** Communication challenges were evident in the dissemination of risk information. While some residents had access

to information through local radio programmes, community workshops and pamphlets, language barriers and limited access to technology hindered effective communication. In particular, there was a need for information to be accessible in multiple languages to cater to Inanda's diverse population.
- **Community initiatives and mobilisation:** A positive aspect of the findings was the existence of community-driven initiatives and mobilisation efforts. Inanda residents had formed neighbourhood committees and informal networks to share information and support one another during disasters. These grassroots initiatives contributed to a collective sense of responsibility and resilience.
- **Influence of socioeconomic factors:** Socioeconomic factors played a significant role in shaping community understanding and awareness. Residents with higher incomes and better access to education generally demonstrated greater disaster risk awareness. They were more likely to take proactive measures, such as investing in flood-resistant housing.
- **Education and preparedness gaps:** The findings underscored the need for more

comprehensive education and preparedness programs. Many residents, especially those in informal settlements, lacked access to formal education and, consequently, missed out on valuable disaster risk information. Furthermore, there was a noticeable gap in disaster preparedness, particularly in vulnerable areas with inadequate housing and sanitation.
- **Historical experiences and trauma:** Historical experiences of past disasters had a lasting impact on the community's understanding of risks. The memory of severe floods and their devastating consequences still resonated with many, driving them to seek ways to mitigate future risks and prepare for disaster events.

Inanda case study highlighted a mixed landscape of understanding and awareness in the community. While some residents demonstrated commendable levels of disaster risk perception and proactive engagement, others faced significant barriers due to socioeconomic disparities, limited access to education and communication challenges. The role of local knowledge and community initiatives was paramount, serving as essential building blocks for disaster resilience.

The findings from the Inanda case study underscore the importance of tailored and culturally sensitive disaster risk communication and education programs. Such programmes should consider the community's linguistic diversity and build upon the existing social networks and traditional knowledge. Additionally, addressing disparities in access to resources and education remains a priority in enhancing community understanding and awareness to bolster disaster resilience.

Overall, the findings from Inanda provide valuable insights into the context-specific challenges and opportunities in building community disaster resilience through improved understanding and awareness of disaster risks. These findings contribute to a broader understanding of the dynamics of disaster resilience in diverse communities and offer a foundation for informed and targeted interventions.

Vulnerabilities and risk factors in the Inanda community
In the Inanda community, situated within the eThekwini Metropolitan Municipality of South Africa, a complex web of vulnerabilities and risk factors has woven its fabric, significantly challenging the community's resilience to disasters and adversities. Among the multifaceted vulnerabilities are high levels of pollution, pervasive poverty, a contaminated river, children's precarious activities, blocked culverts and makeshift bridges that pose safety hazards.

High pollution levels: a looming threat
One of the most conspicuous vulnerabilities in the Inanda community is the alarming level of pollution. The environment is marred by contamination from various sources, including illegal waste disposal and inadequate waste management. The pollution extends to both land and water, compromising air quality and potable water sources. As a result, community members face heightened health risks, including illnesses and waterborne diseases, which are further exacerbated in disaster situations.

Permeating poverty: a persistent challenge
Poverty looms large over Inanda, casting a long shadow of vulnerability. High levels of unemployment, inadequate housing, and limited access to essential services create a dire socio-economic landscape. Poverty perpetuates disparities, making it exceedingly difficult for marginalised communities to prepare for, cope with or recover from disasters. The absence of resources and financial security amplifies the community's vulnerability to environmental and climate-related hazards.

Contaminated river: a peril
The river that flows within the Inanda community, once a vital source of life and livelihood, has now become a peril. Its waters, polluted with sewerage and litter, not only pose immediate health risks but also undermine the community's long-term well-being. The pollution of the river further compounds the vulnerability to water-related disasters, such as flooding and waterborne diseases.

Children at risk: a vulnerable generation
One of the most heart-rending aspects of vulnerability in Inanda is the sight of children playing in the contaminated river. While their resilience and adaptability are commendable, their exposure to contaminated water puts them at

considerable risk of waterborne diseases and other health issues. The lack of safe recreational spaces and the absence of educational opportunities to raise awareness about the hazards they face adds to their vulnerability.

Blocked culverts: impediments to drainage
Inanda's susceptibility to flooding is heightened by the presence of blocked culverts. The obstruction of these vital drainage pathways exacerbates the severity of floods during heavy rainfall or storm events. Blocked culverts not only contribute to property damage but also pose a threat to lives, making disaster response and recovery more challenging.

Unsafe makeshift bridges: a precarious crossing
Makeshift bridges, constructed with limited resources and often informally, are prevalent in the community. These bridges, though essential for connectivity, are often unsafe and fragile, particularly during adverse weather conditions. The risk of injuries associated with these makeshift structures further compromises the community's resilience.

In essence, Inanda's vulnerabilities and risk factors form a complex and interconnected web that challenges the community's capacity to withstand and recover from disasters. The prevalence of

pollution, coupled with high poverty levels, contamination of the river, children's precarious activities, blocked culverts and unsafe makeshift bridges, underscores the urgent need for comprehensive resilience-building efforts. Addressing these vulnerabilities demands multi-sectoral, community-driven initiatives, with a strong emphasis on environmental restoration, poverty alleviation and disaster risk reduction.

Resilience in Inanda is not only about disaster preparedness but also about addressing the root causes of vulnerabilities. Effective solutions must be context-specific, community-participatory and considerate of local knowledge and traditional practices. By addressing these interconnected vulnerabilities, the Inanda community can embark on a path towards greater resilience and sustainable development.

Community engagement and capacity building: promoting disaster resilience in Inanda
In the Inanda community, where the challenges of pollution, poverty and vulnerable infrastructure loom large, the journey toward disaster resilience necessitates a profound transformation. Central to this transformation are community engagement and capacity building,

which are fundamental pillars in the endeavour to build a resilient and self-reliant community.

Empowering the community through engagement
Community engagement serves as the cornerstone for fostering a culture of shared responsibility, knowledge exchange and collective action. It entails active participation and collaboration among community members, local authorities, NGOs and relevant stakeholders. In Inanda, it is essential for several key reasons:
- **Localised knowledge and wisdom:** The Inanda community possesses a wealth of localised knowledge and indigenous wisdom, which has historically played a crucial role in coping with environmental and climate-related challenges. Through community engagement, this traditional knowledge can be harnessed and integrated with modern disaster risk reduction strategies to enhance resilience.
- **Enhancing awareness:** Engagement initiatives can be tailored to raise awareness of disaster risks and preparedness measures. By facilitating open dialogues and information sharing, community members can better understand the risks they face and the actions they can take to protect themselves

and their neighbours.
- **Promoting social cohesion:** Building strong social networks and fostering trust within the community is integral to disaster resilience. Community engagement activities, such as workshops, meetings and cultural events, can contribute to a sense of belonging and solidarity, enabling residents to support one another in times of crisis.
- **Ownership and participation:** Engaging community members in decision-making processes ensures that disaster resilience strategies are aligned with their needs and priorities. Ownership of resilience initiatives fosters a sense of responsibility and commitment, increasing the likelihood of successful implementation.

Capacity building for sustainable resilience
Capacity building in Inanda is a multifaceted process that equips community members with the skills, knowledge and resources needed to prepare for, respond to and recover from disasters effectively. To promote capacity building within the community:
- Training and workshops: Training sessions on disaster preparedness, first aid, search and rescue techniques and sustainable farming practices

can empower community members with practical skills. Workshops can also focus on raising awareness about environmental conservation and waste management.
- Early warning systems: Implementing early warning systems, such as flood alerts and severe weather notifications, is essential for keeping the community informed. These systems can be coupled with education on how to respond to early warnings and evacuate if necessary.
- Community-based disaster management committees: Establishing local disaster management committees with representatives from the community can facilitate a coordinated response during disasters. These committees can be responsible for disaster planning, resource allocation and communication.
- Access to resources: Capacity building efforts should aim to improve access to essential resources, such as clean water, sanitation and healthcare. By enhancing access to these resources, the community's resilience can be significantly strengthened.

After-all, community engagement and capacity building are integral components of building resilience in the Inanda community. By harnessing local knowledge, raising awareness and empowering community members with skills and resources, Inanda can transform its vulnerabilities into strengths. This transformation is not only about being prepared for disasters but also about achieving long-term sustainability, fostering self-reliance and improving the overall well-being of the community.

In the face of pollution, poverty and infrastructure challenges, Inanda's journey toward disaster resilience is a testament to the resilience of its people. Through community engagement and capacity building, Inanda stands poised to navigate the path towards a safer, stronger and more self-sufficient community, capable of withstanding and recovering

from the challenges that lie ahead.

Good practices and lessons learned in promoting community disaster resilience
Promoting community disaster resilience is a multifaceted endeavour that involves a range of stakeholders, from local communities to governments and non-governmental organisations. Here are some good practices and valuable lessons learned from various initiatives worldwide that can inform the efforts to build resilience in the Inanda community:

i) Localised knowledge and indigenous practices
Good practice: Recognising and harnessing the local knowledge and indigenous practices of communities can greatly enhance disaster resilience. Local communities often possess invaluable insights into their environments and traditional coping strategies.
Lesson learned: Encourage the preservation and integration of traditional knowledge into modern disaster risk reduction efforts. In Inanda, local practices such as traditional weather forecasting and crop management can be integrated into resilience strategies.

ii) Community engagement and ownership
Good practice: Engaging communities in the decision-making process fosters a sense of ownership and responsibility for resilience-building efforts. Local disaster management committees and community-led initiatives play a vital role in this regard.
Lesson learned: Empower Inanda residents to actively participate in the development, implementation and monitoring of disaster resilience policies. Ensure that their input is valued and decisions reflect their needs and priorities.

iii) Education and training
Good practice: Education programmes that focus on disaster awareness, preparedness and response are effective tools in building community resilience. Schools, community workshops and awareness campaigns are platforms for such education.
Lesson learned: Develop tailored

educational materials and programmes that consider the linguistic and cultural diversity of the Inanda community. Multilingual and culturally sensitive approaches are essential to reach all residents effectively.

iv) Early warning systems
Good practice: Effective early warning systems that deliver timely, accurate and understandable information are critical for disaster preparedness. These systems should be integrated into the community's communication channels.
Lesson learned: Ensure that early warning messages are easily accessible to all, including vulnerable groups. Use a combination of communication channels, including mobile phones, community meetings and local radio programmes, to reach the widest audience.

v) Sustainable livelihoods
Good practice: Enhancing economic resilience is an essential aspect of community disaster resilience. Economic opportunities, job creation and livelihood diversification reduce vulnerability.
Lesson learned: Encourage local economic development through initiatives like small business support, microfinance and vocational training. Sustainable livelihoods can help community members better withstand and recover from disasters.

vi) Ecosystem conservation and restoration
Good practice: Preserving and restoring ecosystems, such as wetlands and forests, is vital for disaster risk reduction. Healthy ecosystems act as natural buffers against hazards.
Lesson learned: Promote conservation efforts and sustainable land management practices to protect natural resources. These strategies can significantly reduce the impacts of flooding, landslides and waterborne diseases.

vii) Resilient infrastructure
Good practice: Developing resilient infrastructure, including safe housing and robust public utilities, is a cornerstone of disaster resilience.

▶ Lesson learned: Prioritise the improvement of housing and the construction of safe infrastructure, especially in informal settlements. Resilient infrastructure is not just about disaster response but also long-term sustainability.

viii) Interagency collaboration
Good practice: Collaboration among government departments, NGOs and international agencies enhances the effectiveness of disaster resilience efforts. Coordinated action and resource-sharing improve overall outcomes. Lesson learned: In Inanda, facilitate interagency collaboration to ensure a holistic approach to disaster resilience. Encourage information exchange, resource mobilisation and unified goals.

ix) Preparedness drills and simulation
Good practice: Regular drills and simulations are essential for testing early warning systems and community response. These exercises help identify weaknesses and areas for improvement. Lesson learned: Conduct regular preparedness drills in Inanda to ensure that community members are well-prepared to respond to disasters. Learn from these drills and update response plans accordingly.

x) Long-term planning and adaptation
Good practice: Disaster resilience efforts should incorporate long-term planning and adaptation to address the evolving challenges of climate change and other dynamic factors. Lesson learned: Develop flexible and adaptive resilience strategies that account for shifting disaster risks. In Inanda, integrating climate adaptation into resilience policies is essential.

Promoting community disaster resilience is an ongoing process that requires commitment, community participation and adaptability. By learning from these good practices and lessons learned, the Inanda community can develop a tailored and sustainable approach to building resilience, considering its unique challenges and strengths. Developing adaptive and flexible resilience strategies is essential in addressing the evolving challenges

of disasters and climate change. These strategies are designed to anticipate, absorb and recover from shocks while also adjusting to changing conditions.

Adaptative and flexible resilience strategies may be promoted through:
i) Comprehensive risk assessment
• Begin by conducting a comprehensive risk assessment that identifies current and future hazards, vulnerabilities and exposure within the community. This assessment should consider a wide range of potential disasters, including floods, storms, droughts and the impacts of climate change.

ii) Multi-hazard approach
• Embrace a multi-hazard approach that accounts for various disaster scenarios. By considering a spectrum of risks, your community can develop strategies that are adaptable to different types of disasters.

iii) Scenario planning
• Scenario planning involves creating "what if" scenarios to model potential future disasters and their impacts. This helps the community prepare for different disaster scenarios and adapt as needed.

iv) Early warning systems
• Develop and improve early warning systems to provide timely and accurate information about impending disasters. Ensure these systems are adaptable to changing technologies and communication channels.

v) Community engagement
• Engage the community in resilience planning and decision-making. Include diverse perspectives and consider local knowledge when developing strategies. Engaged communities are more likely to embrace and adapt to resilience measures.

vi) Flexibility in infrastructure
• Invest in resilient infrastructure that can withstand various hazards and adapt to changing

conditions. For example, construct buildings that can be easily modified for different uses during and after disasters.

vii) Diversification of livelihoods
• Promote economic resilience by encouraging livelihood diversification. Support community members in developing skills and income sources that are adaptable to changing economic conditions and disasters.

viii) Climate adaptation
• Incorporate climate adaptation strategies into resilience plans. Recognise that climate change will continue to alter weather patterns and disaster risks and plan accordingly.

ix) Monitoring and evaluation
• Establish a robust monitoring and evaluation system to track the effectiveness of resilience strategies. Regularly assess whether the strategies are achieving their intended outcomes and adapt them as needed.

x) Collaborative networks
• Establish networks and partnerships with other communities, local authorities, NGOs and government agencies. These partnerships can facilitate the exchange of knowledge and resources, making it easier to adapt and respond to changing conditions.

xi) Knowledge sharing
• Promote knowledge sharing within the community. Encourage residents to share information about local hazards, disaster response and adaptation strategies. Use digital platforms and community meetings for information exchange.

xii) Capacity building
• Invest in capacity building for community members and local authorities. This includes training in disaster risk reduction, response protocols and the use of technology for early warning and response.

xiii) Resource mobilisation
• Explore funding opportunities for resilience initiatives. Seek

grants, donations and support from local and international organisations to implement adaptive strategies effectively.

xiv) Local governance
• Enhance local governance structures and policies to support adaptive resilience strategies. Ensure that disaster resilience is integrated into local development plans and policies.

xv) Learning from disasters
• Continuously learn from previous disaster experiences. After each event, conduct a thorough review to understand what worked and what didn't. Use this information to refine and adapt resilience strategies.

Developing adaptive and flexible resilience strategies is an ongoing and iterative process. It involves a commitment to learning, a willingness to adapt and a recognition that resilience is not a one-size-fits-all solution. By embracing this approach, the Inanda community can build a foundation for long-term resilience that responds to both current and future challenges.

6. Concluding remarks
In drawing this study to a close, it is important to emphasise the significance of prioritised actions for unlocking community resilience in Inanda. These actions provide a roadmap for building resilience and ensuring a safer and more prosperous future for all residents. By addressing challenges like illegal electrical connections, poverty, inadequate access to clean water and sanitation, pollution and vulnerability, Inanda is poised to unlock disaster resilience and overcome adversity.

Inanda serves as an inspiration not only for South Africa but for communities worldwide that grapple with similar multifaceted challenges. The lessons learned and practices uncovered in this journey exemplify the strength, determination and adaptability of communities when they come together to build resilience. In the face of adversity, Inanda's story is a testament to the power of community-driven efforts, reflecting a brighter, more resilient path forward.

Key references consulted

Australian Institute for Disaster Resilience (AIDR), 2020. Australian Disaster Resilience Handbook Collection: Community Engagement for Disaster Resilience. Australia: Commonwealth of Australia
Awotona, A (Ed) , 2018. Planning for Community-based Disaster Resilience Worldwide: Learning from Case Studies in Six Continents. New York: Routledge
Bello, O.; Bustamante, A and Pizarro, A. 2021. "Planning for disaster risk reduction within the framework of the 2030 Agenda for Sustainable Development", Project Documents (LC/TS.2020/108), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
Cutter, S. L. 2008. A place-based model for understanding community resilience to natural disasters. Global Environmental Change, 18(4), 598-606
Laursen, M.R. 2015, "CBDRM in Nepal: a matter of risk perceptions", International Journal of Disaster Resilience in the Built Environment, Vol. 6 No. 1, pp. 73-85. Link
Manyena, S. B. 2006. The concept of resilience revisited. Disasters, 30(4), 434-450.
Nifa, F.A.A. ; Abbas, S.R.; Lin, C.K.; Othman, S.N. 2017. Developing a disaster education program for community safety and resilience: The preliminary phase. AIP Conf. Proc. 1891, 020005 (2017) Link
Nifa, F. A. A.; Lin, C.K.; Nawi, M.N.M.; Othman, S,; Kawawaki, Y. and Rahim, S.A. 2023. Integrating community resilience plan for flood disaster in the district of Yan, Kedah. AIP Conf. Proc. 2827, 040005 (2023) Link
Pandey, C.L. 2019. "Making communities disaster resilient: Challenges and prospects for community engagement in Nepal", Disaster Prevention and Management, Vol. 28 No. 1, pp. 106-118. Link
Paton, D. and Johnston, D. 2001. Disasters and communities: Vulnerability, resilience and preparedness. Disaster Prevention and Management: An International Journal, 10(4), 270-277.
Taylor, M, Johnston, K and Ryan, B 2019, Monitoring, Evaluation and Learning Toolkit – Mapping approaches to community engagement for preparedness in Australia, Bushfire and Natural Hazards CRC, Link
Tuhkanen, H., Johnson, K. and Ensor, J. (2020). Guidelines for planning equitable disaster resilient development. SEI report. Stockholm Environment Institute (SEI), Asia Center, Bangkok.
United Nations Office for Disaster Risk Reduction 2015, Sendai Framework for Disaster Risk Reduction 2015 – 2030, Link

WATER MANAGEMENT PUBLIC AWARENESS:
A SOCIAL CAPITAL APPROACH IN A SOUTH AFRICAN SEMI-INFORMAL SETTLEMENT

Authors: Mojatsohle Patronella Kumang; Dr Alice Ncube and Dr Olivia Kunguma, University of the Free State, Disaster Management Training and Education Centre for Africa, (DiMTEC)

Abstract
Public awareness campaigns are imperative in explaining and disseminating information about sustainable water use and management. The study explored social capital factors and community building theory variables to assess the community's social cohesion and knowledge of water conservation. Furthermore, the study investigated whether public awareness could help reduce water scarcity. Empowering the community with scientific information and exchanging knowledge can influence better public behaviour change towards water management. A mixed-method approach assisted in answering the study research questions. During a transect walk through the community, the researchers randomly collected data through a semi-structured questionnaire from 108 participants that were available in each household.

The study uncovered a steady degree of water supply disruptions in the settlement. During such periods, they were unable to afford to buy water. The results also indicated that the community lacked sustainable water use and management knowledge, further exacerbated by poor social ties that can assist in resolving water problems. Sanitation and hygiene issues were a problem for the community, such as blocked sewer systems translating into waterborne infectious diseases. The increase in population in the informal settlement meant that the water demand exceeded the water supply. The study recommended transparency and accessibility of the municipality by the community to create trust. Local authorities must facilitate public awareness programmes to educate the community about minimising water losses and promote effective water management. Another recommendation was rainwater harvesting for domestic use.

Key terms: social capital; community building, water scarcity risk reduction, public awareness; informal settlements

Introduction
South Africa is one of the countries facing water scarcity globally. It, therefore, becomes imperative to prioritise sustainable water provision and management. The inequalities embedded in the South African society have seen the uneven distribution of most natural resources such as minerals, land and water (Movik, 2014). Nonetheless, after the change of the majority rule government in 1994, South Africa has been creating strategies and enactments to address the fairness of land, minerals and water designation acquired from politically sanctioned racial segregation times (Republic of South Africa, 2015).

While clause 27 of the Constitution of the Republic of South Africa (1996) underscores that it is the right of each resident to have access to adequate nourishment and water, this is not the case in informal settlements in urban areas. Citizens use water for domestic, agricultural and industrial purposes and it is the municipality's constitutional obligation to supply water to all South African citizens. According to the Water Services Act, (Act 108 of 1997), every citizen must access a minimum water supply, even for future generations.

To address fairness after apartheid, South Africa become a signatory to the Millennium Development Goals (MGDs) as one of its strategies. The goals were agreed upon by 191 countries in 2000 and aimed for achievement in 2015. South Africa focused on MDG 7 to decrease the number of residents without access to drinking water and essential sanitation (Republic of South Africa, 2011). Later in 2015, the United Nations continued from where the MDGs had left off and developed 17 worldwide objectives known as Sustainable Development Goals (SDGs). The United Nations expects all signatories to the SDGs to reach the goals by 2030. SDG 6 spotlights the openness of perfect, safe water and essential sanitation to every one of the citizens and South Africa is in pursuit of this goal. For countries to have the option to quantify their exhibition and accomplishment on the SDG 6 edge, they should decide if, to date, there is improved access to water and sanitation by communities (Gasson 2017). Objective 6 of the 17 SDGs centres around clean water and sanitation; therefore, all nations must pursue the SDG mandate in guaranteeing water availability to all residents. The pursuit can only be achieved if there is continuous coordination and a comprehensive approach by both government and organisations over the years. SDG 6 relates to the objective of this study as it emphasises a substantial increase in water use efficiency, ensuring the sustainable supply of safe potable water and decreasing the number of individuals experiencing water deficiencies by 2030 (Rosche, 2016). The South African government has approaches and frameworks set up to guarantee water access, notwithstanding that this is not the situation for certain communities in certain areas of the country. In line with the international baselines, the government of South Africa put down a National Framework for Municipal Indigent Policies in 2001 to provide Free Basic Services to the indigent (South Africa, 2005). The guidelines apply specifically to the Free Basic Services programme within municipalities, which is free basic water, sanitation, energy, or electricity and refuse removal, to name a few.

The study area
Freedom Square informal settlement is within the city of Bloemfontein, in the Mangaung Metropolitan Municipality (MMM), Free State Province, South Africa. The informal settlement consists of an estimated population of about 25 033 with 7 605 households (Mangaung Metropolitan Municipality, 2016). Mangaung Metropolitan Municipality partially formalised the Freedom Square informal settlement after receiving funds in the 1992-1993 municipal financial year. The municipality numbered the settlements as per the spatial planning procedures (Mangaung Metropolitan Municipality, 2018/2019). Furthermore, MMM provided potable water to each formalised household with standpipe taps. In areas illegally occupied, the municipality installed communal water taps (Marais and Ntema, 2013). However, frequent interruptions are experienced due to high water demand, broken pipes, municipal water rationing and illegal supply connections.

When Mangaung Metropolitan Municipality Formalised Freedom Square, they preserved a small number of open spaces within the area for future development of basic facilities and recreational purposes such as a community hall, schools and clinics. Due to the delay in development and the rapid urbanisation pressures experienced in South Africa (Mudau, N., Mhangara, P. and Gebreslasie, M. (2014), the community started to occupy those spaces illegally. Therefore, there has been an increase in the existing informal settlements in different locations within the formalised Freedom Square settlement. Despite MMM's efforts to provide an adequate water supply for the settlement, the community still faces recurring water supply interruptions and water cuts.

The unceasing water supply interruptions in Freedom Square informal settlement indicated that there might be a lack of knowledge on water use management by the community. Many households in Freedom Square informal settlement are already vulnerable due to significant impacts caused by water shortages. This study aimed to investigate the community's water status, social cohesion and knowledge of water conservation and to determine whether consumer water education can be of help as an enhancement for the water scarcity risk reduction.

Freshwater status in South Africa
Lack of sufficient water and inadequate accessibility of freshwater supply by communities are pressing issues of the twenty-first century (Smiley, 2013). More than one billion individuals in developing countries do not have access to clean water. Massive numbers of youngsters younger than five are dying each year because consuming water of low-quality prompts waterborne infections, such as diarrhoea and cholera (World Health Organisation and UNICEF, 2010). White (2012) attested that access to the minimal water volume for human and natural use and not approaching safe water provision is a water shortage. Anand (2007) further cautioned that to state that the earth is a water-scarce planet, it unmistakably relies upon the environment as individuals' needs. For instance, in certain nations like Brazil, they have organised measures to guarantee powerful water access, compared to the Democratic Republic of the Congo, which has enormous water assets. However, they do not have excellent water management and money to guarantee the accessibility of new water supply to its residents (Grafton, 2017). Grafton (2017) further demonstrated that Asia is the continent affected mainly by water shortage, while the United States of America is the least affected.

The challenge of water access in South Africa has been debated repeatedly by different scholars (Anand, 2007; Ercin and Hoekstra, 2014; Mehta, 2014; Movik, 2014). Sustainable water availability has been a concern over the decades as various nations seek freshwater resources (Ercin and Hoekstra, 2014). This concern is because of the high development pace of the population and monetary exercises in countries. Water scarcity and unsustainable water supply are real problems confronting human survival in developing countries (Mehta, 2014). There is no accord in characterising the water shortage as many researchers interpret it differently (White, 2012). According to Ercin and Hoekstra (2014), Hedden and Cilliers (2014) and the United Nations (2013), water shortage is an absence of water availability because of physical shortage, failure in standard arrangement or because of the lack of adequate mass water infrastructure. In some countries, water infrastructure might be available in every household. Still, if they have unreliable access to water supply, contaminated water or the water not being affordable, there is a serious challenge of water accessibility (Smiley, 2013). Various literature attests that the water access challenge is not just a worldwide occurrence but an individual incident in most countries, including South Africa (Gasson, 2017; Hemson, 2016; Kenney et al., 2016).

To sustain life, the most critical aspect to consider is maintaining water accessibility and reliability (Muzondi, 2014). Sustainable water access has been defined as the acceptable quality of water in adequate quantities for viable human well-being, sustaining livelihoods and socio-economic development (Naik, 2017). According to Howard and Bartram (2003), there might be accessible water sources where the community can acquire water. Yet, on the off chance that it is not accessible and individuals need ▶

to walk long distances and remain in long queues waiting to gather that water, there is restricted or no access to such water for them.

Access to water in its broadest sense involves factors, for example, quality, amount, unwavering quantity and water cost rates (Smiley, 2013). However, in providing basic services, for example, water supply, the South African government charges its residents to pay for the expense of operation (water cost rates) and maintenance of water infrastructure (RSA DWS, 2017). The accessibility of water depends, for the most part, on the accessibility and type of the water source or utility (Gasson, 2017).

The challenge in water accessibility is diverse and differs from country to country due to droughts, poor governance, effective water use, water wastage or losses, inadequate bulk water infrastructure and poor policies guiding water distribution (Algotsson et al., 2009). South Africa is one of the water stress countries where several issues influence water resources. These are environmental change, water assets being abused, acid mine drainage pollution is a concern, continuous growth of the population and poor agricultural land-use practices, which contribute to water shortages (Anand, 2007). Big industries such as mining and manufacturing turn to avail water for services or to use for production because they pay huge amounts to the water authorities. However, this is not the situation for hindered communities that cannot bear to pay for water administration in informal settlements and rural areas.

Water management public awareness
Risk reduction and prevention start with a widespread understanding of the risks and vulnerabilities that communities are exposed to and encourage community participation. Understanding community challenges can be done through continuous public awareness, a primary element of risk reduction and the government's responsibility . Several international

agreements, starting in 1990 with the Global Water Conference, endorsed community participation as the guiding principle in water management (United Nations, 2003). This decision was part of the reaction to the continuous failures in maintaining community water schemes of the 1980s. Communities must always be consulted and get involved in the inception of water projects to accept sole responsibility for and ownership of the whole life circle of the project entrusted to them (RSA DWA, 2013). Involvement of the community in projects promotes an integrated approach to addressing different challenges facing developing countries. Involvement of communities brings changes to the attitude and behaviour of the community towards the programme and further encourages the use of appropriate sound financial management in the project . Community networks should assume a leading role in water provision and the management of water projects (Schouten and Moriarty, 2003).

In 1994, the Yokohama Strategy and Plan of Action for Safer World emphasised that public awareness in vulnerable communities must be improved. In 2015, the 2030 Agenda for Sustainable Development member states adopted 17 Sustainable Development Goals. In pursuit of achieving these goals and holding governments accountable, transparent and influencing the political will of decision-makers, public awareness campaigns became topical. Goal 16 focuses on access to information and participatory decision-making, "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" . Of significance to this study is Goal 6, which aims to "ensure availability and sustainable management of water and sanitation for all". In South Africa, the Disaster Management Act, Act 57 of 2002, prescribes the implementation of risk reduction initiatives that aim to cultivate a widespread culture of risk avoidance (Republic of

South Africa, 2002). The National Disaster Management Framework of 2005 has an enabler (Enabler 2) that addresses disaster risk management priorities in education, training, public awareness and research . The recognition of public awareness in international agreements and national legislation is of paramount importance.

Among other issues, this study investigates the knowledge of water conservation and determines whether consumer water education can assist in enhancing water scarcity risk reduction. One of the best methods of providing water management education to the public is 'public awareness'. Public awareness is a process of inculcating a culture of risk avoidance through programmes informed by scientific research, indigenous knowledge and relevant international trends. According to UNISDR (2004), public awareness aims to familiarise vulnerable societies with their risks and inform them of the various actions that could be taken to minimise these risks. In the case of this study, the risk of facing water shortages due to poor water management. Other authors define public awareness campaigns as ways of harnessing a collective will and effort as an engine of change in a specific period for public benefit through media, messaging and an organised set of communication activities (Joyce, et al., 2013; Kunguma, et al., 2021).

Several countries in Africa lack basic water services, such as Mozambique (52.7%), Niger (54.2%), Chad (57.5%), Democratic Republic of Congo (58.2), Angola (59%), Somalia (60%), Ethiopia (60.9%) to name a few. South Africa Cape Town had its fair share of the water crisis, especially in the year 2018 when the city nearly faced 'day zero'. Day zero would mean that the dam levels would be so low that the city would turn off the taps and start collecting water from communal water collection points. Fortunately, Cape Town did not experience day-zero, attributed to the successful water-saving campaign and the community's willingness to participate.

The campaign included the following activities:
- Daily water rations of 25ltrs per person
- Steep tariffs were implemented to penalise heavy water users
- Watering of lawns was prohibited
- New water pressure systems were installed
- Electronic signs were used for advertising the campaign throughout the city
- People traded water tips on social media and those using less water were recognised online by name by the municipality.

Cape Town served as a testimony of how water management public awareness campaigns coupled with the willingness of the people to participate in implementing the strategies the campaign is promoting can be successful. The following section discusses the study research design and methodology that guided the research development.

Materials and method
The study applied a parallel mixed research approach whereby a semi-structured questionnaire was utilised to explore the 's community's involvement in water use and management in Freedom Square (Creswell and Clark (2007); Cresswell, 2013). Furthermore, the approach assisted in gathering in-depth knowledge of the community's involvement and the degree of knowledge about water use and management. The study further depended on the data, points of view and perspectives on the Freedom Square informal settlement concerning their endless water supply difficulties.

The settlement consisted of a population of about 25 033 with 7 605 households (Stats SA, 2011; De Vos et al. 2011). The study used the following sample size formula to identify the total number of respondents for the study from households:

$$\text{Sample size} = \frac{\dfrac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\dfrac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Based on the total household population of N = 7 605, a confidence level of 95% and a margin of error of 5%, a sample of 366 was targeted. From this sample, households were randomly selected. At the end of the data collection and cleaning, 108 respondents were obtained. This sample was considered to be satisfactory because the population was homogenous concerning the variables, namely the type of housing (informal) and water access (communal taps), Maree et al (2007:178) concurred with this approach that it is proper for smaller samples to adequately represent the research population in homogenous situations, where participants have similar variables that are crucial to the study.

Ethical clearance was obtained from the University of the Free State, in the Natural and Agricultural Science ethics committee portfolio. All the ethical considerations were assured to the participants. The participation was voluntary and was for those above 18 years who had to sign the consent form that was explained to them before the survey could start. Anonymity was also assured to the participants as no personal details were required to participate. Door-to-door visits were conducted in the community. Each questionnaire was completed by one member from each selected household as the willing participant, where household heads were unavailable. Permission to survey the community was solicited from the municipality and the local ward councillors who accompanied the researchers to approach the community.

The questionnaire contained questions such as demographic information of the households, basic information on water accessibility, level of water conservation awareness, the impact of social networks in water management and social impact on constant water supply interruptions. For triangulation purposes, informal observations were carried out and recorded in a journal for use during data

interpretation, analysis and discussion. This approach is reinforced by Maree (2007), who reiterates that observation is the efficient procedure of recording members' behavioural patterns of conduct, articles and events without essentially addressing or legitimately speaking with the participants.

Empirical results and discussions
Table 1 (next page) illustrates the demographic data obtained from the survey.

As portrayed in Table 1(next page), 63% (N=68) and 37%(N=40) of the respondents were females and males, respectively and their ages were 31–40 years (46.3% (N=50); above 40 years (43.3% (N=37) 18-30 years is 19.4%(N=21). In terms of the respondents' education levels, 61.1%(N=68) had secondary school training, while 16.7% (18) had completed primary school, 7.4% (N=8) had tertiary education as compared with 14.7% (N=16) who had no formal schooling. Since 76 of the 108 respondents indicated that they completed post-primary education, it is a sign of medium to high literacy levels among the community. The good literacy levels also indicate the communities' ability to comprehend the water management public education.

The majority of the households, as indicated by the 58.3% (N= 63), had a family size of between 3-5 people. Sixty-three per cent (N=68) of the respondents' households were considered indigent, while 37% (N=40) were considered otherwise by the municipality. According to Pan, Armitage and Van Ryneveld (2018), the South African government is committed to providing a baseline level of 'free basic services (water, sanitation, refuse removal and electricity) to all indigent households.

With high unemployment levels in the area, as indicated in Table 1, 55.6% (N=60) were unemployed, 18.5% (N=20) were pensioners and 17.6% (N=19) were formally employed. And 7.4% (N=8) and ▶

Table 1. Demographic characteristics of the respondents

Demographic	Category	Number of respondents (n=108)	Percentage
Age (years)	18-30	21	19.4
	31-40	50	46.3
	>40	37	34.3
Gender	Male	40	37
	Female	68	63
Occupation	Employed	19	17.6
	Unemployed	60	55.6
	Informal entrepreneur	8	7.4
	Business owner	1	0.9
	Pensioner	20	18.5
Education level	Primary	18	16.7
	High school	68	61.1
	Tertiary	8	7.4
	No Education	16	14.8
Household size	< 3 people	34	31.5
	4–5 people	63	58.3
	6–8 people	8	7.4
	> 8 people	3	2.8
Duration of stay in the settlement	0–5 years	17	15.7
	6–10 years	16	14.8
	11–20 years	29	26.9
	>20 years	46	42.6
Indigent status	Indigent	68	63
	Non-indigent	40	37
Household water accessibility	Communal tap	37	34
	Tap in the yard	71	66

0.9% (N=1) were into informal entrepreneurship or owned their own business, respectively. A total of 46 (42.6%)of household respondents indicated they had lived in the settlement for more than twenty years. About 26.9% (N=29) lived in the area for between 11-20 years, 14.8% (N=16) between 5-11 years and 15.7% (N=17) between 0-5 years. The results of this study showed that the respondents had enough experience living in the settlement and therefore were very knowledgeable about the settlement and the resources, particularly water resources. Moreover, when people reside in a settlement for longer, they are empowered and they take ownership of development programmes like public awareness

Basic information on water accessibility and usage
The respondents were solicited to show the potable water sources utilised in their family units. As indicated in Table 1, the majority of the sampled respondents (66% N=71) had standpipes (taps) in their yards, while 34% (N=37) used communal taps for their water supply. On further probing it was discovered that others were utilising communanl standpipes to augment their water supply indicating the commitment of the local municipality to fulfill the country's Bill of Rights and Section 27 of the National Water Services Act which states that "everyone has the right to sufficient water access" (RSA, 1997). The researchers observed that there were several standpipes within this community. This could be attributed to the Freedom Square informal settlement being mostly overhauled as there are new residential sites inside the settlement that occupants wrongfully occupied. The new areas occupied are open spaces that the Mangaung Metropolitan Municipality earmarked for recreational purposes and basic facilities such as a community hall, schools and clinic. The researcher also informally observed many illegal water connections to households. A high number of informal settlement dwellers in South Africa lack clean potable water resources (such as taps) and sanitation (such as toilet and drainage systems) (Muller et al., 2008).

The Department of Water and Sanitation assumed a key role in ensuring access to quality drinking water for all South African residents, as mentioned in Sections 139 and 154 of Chapter 2 of the Constitution (RSA, 1996).

The respondents were asked to rate their knowledge of water management efficiency (Kuhumba, 2018). From the observations and further probing, it was interesting to note that many community members knew that the country was attempting to spare water because of the dry season and water scarcity. As indicated in Table 2, 30.6% (33) of the respondents indicated that their knowledge of water efficiency was high; 35.2% (N=38)

Table 2. Water conservation methods in this community

Water conservation methods	Category	Number of respondents (n=108)	Percentage
Knowledge of waterefficiency	Good	33	30.6
	Moderate	38	35.2
	Poor	37	34.3
Workshops attended on water conservation	Did attend	4	3.7
	Never attended	104	96.3
Water conservation techniques	Domestic rainwater harvesting	Yes 63	17.6
		No 37	
	Grey water usage	56/44	55.6
	Water leak repairs	43/57	7.4
	Closing of leaking pipes	70/30	0.9

of the respondents indicated moderate knowledge of water efficiency, while 34.3% (N=37) indicated that their knowledge of water efficiency was poor. This indicated that the researchers' informal observations and informal discussions with the community members are different. This could be due to the fact that when particiapants are answering survey questions they tend to mention what they feel the researchers need (reference??). Since the results indicated high to moderate water efficiency levels, the study further sought to establish if there is any form of awareness campaigns conducted by the municipality to this particular community in terms of the above. As indicated in Table 2, the results show that 96.3% (N=104) of the respondents had never attended a workshop on water conservation. Only 3.7% (N=4) of the respondents have attended such a workshop. In that case, knowledge of formal water efficiency usage is lacking in this community as awareness and training help society understand that water resources are scarce and depleting (Neerachand, 2014).

Potable water conservation is crucial to water management globally and in South Africa for human security (Molobela and Sinha, 2011). Water conservation becomes the responsibility of the government and all stakeholders involved in water consumption, including communities like Freedom Square. Several water leakages were observed in this community, indicating that the community was now playing their role in water conservation. However, this is a perception; hence, the study sought further to evaluate the community's knowledge on this aspect.

Rainwater harvesting and water conservation

A majority of the residents, 63% (N=68), indicated that they conserve water though they do not have jojo tanks because they are expensive. They resort to using open drums. The remaining 37% (N=40) indicated that they do not conserve water. Water can be harvested from natural rainfall, which can be done during the rainy season. According to Kahinda et al. (2010) and Neerachand (2014), rainwater harvesting provides an additional water source and acts as a buffer to water shortages in most South African communities. The main method for harvesting water in South Africa is rooftop rainwater harvesting using jojo tanks, for instance.

The informal observations noted that some of the contributing factors for the people not harvesting water was the poor structures of their dwellings.

Informal or semi-formal structures are weak to sustain any structure like a jojo tank.

Besides water harvesting, the communities can utilise other water efficiency methods such as grey water usage and repairing and closing leaking pipes in their neighbourhood. Sixty (55.6%) of the respondents indicated that they utilise grey water in their gardens and flushing toilets to conserve water. Sixty-three per cent (68) of the respondents indicated that they usually repair leaks from taps and pipes by either closing the tapes or calling on authorities when they notice a leak. Thirty-seven per cent (N=40) of the respondents indicated that they did not participate in the water leak management. Water leaking and flow were observed in the streets of Freedom Square.

Impact of social networks on water management
As indicated in Figure 1, the settlement is united in dealing with constant water cuts and is working together to ensure water efficiency. More than half of the respondents, 66.7% (72) and 28.7%, indicated strong and moderate ties within the community, yet only 4.6% had minimum ties regarding water management. These ties are directly linked to the social networks that prevail in the communities similar to this one.
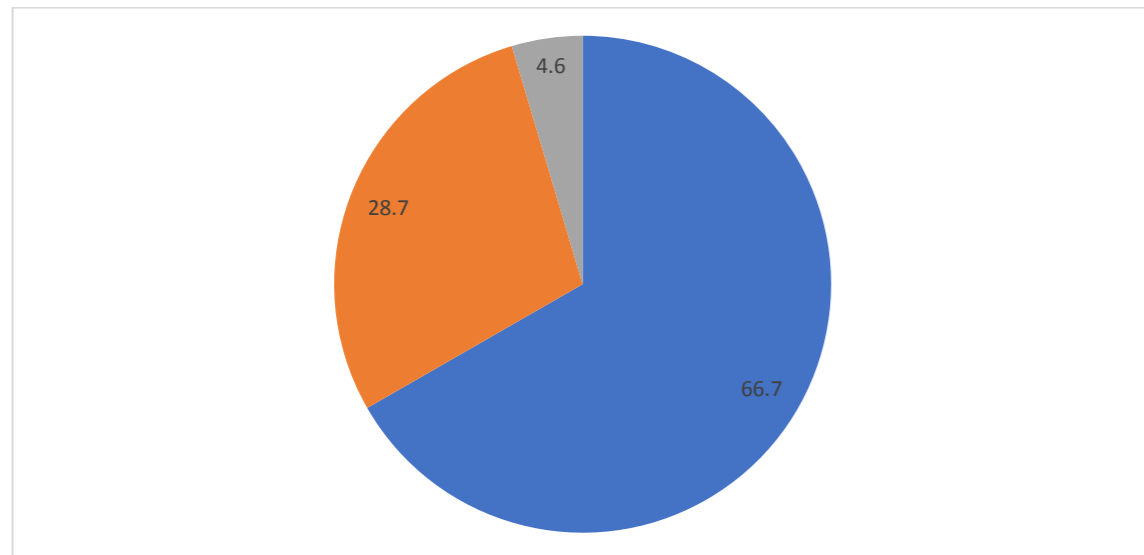
Figure 1: Ties among community members of Freedom Square informal settlement

Water is a very important resource critical for the survival and cultural, social, spiritual and political well-being of any society. Over time, managing water resources has become very important because of depleting freshwater resources, population increase, food demand and lifestyle changes (Walker, Loucks and Carr, 2015).

The results in Figure 2 indicated that the community of Freedom Square informal settlement lacked a formal community-based organisational structure to coordinate and manage the water resources in their community. A total of 38.9% (42) respondents indicated that there was no established community structure or were unsure if such a network existed.
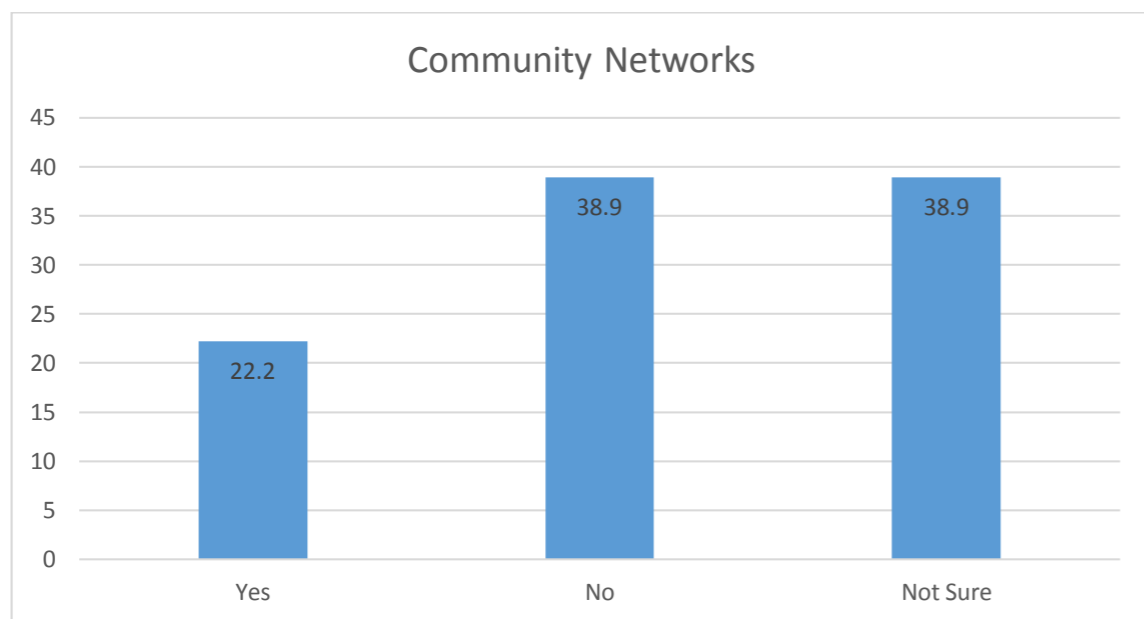

Figure 2: Community networks existing within the settlement

Upon probing, it was established that informal structures existed that the community decided to form to manage water issues in their community. Helping out in community networks. Some were assisting as individuals who would sometimes backfire, as confirmed by Ramirez and Sanudo-Fontaneda, (2018) that there are different social reactions from various groups of dwellers and stakeholders. Social networks are useful in instances such as water management. However, in this instance, 63 % of the respondents indicated that they did not participate in community water management committees.
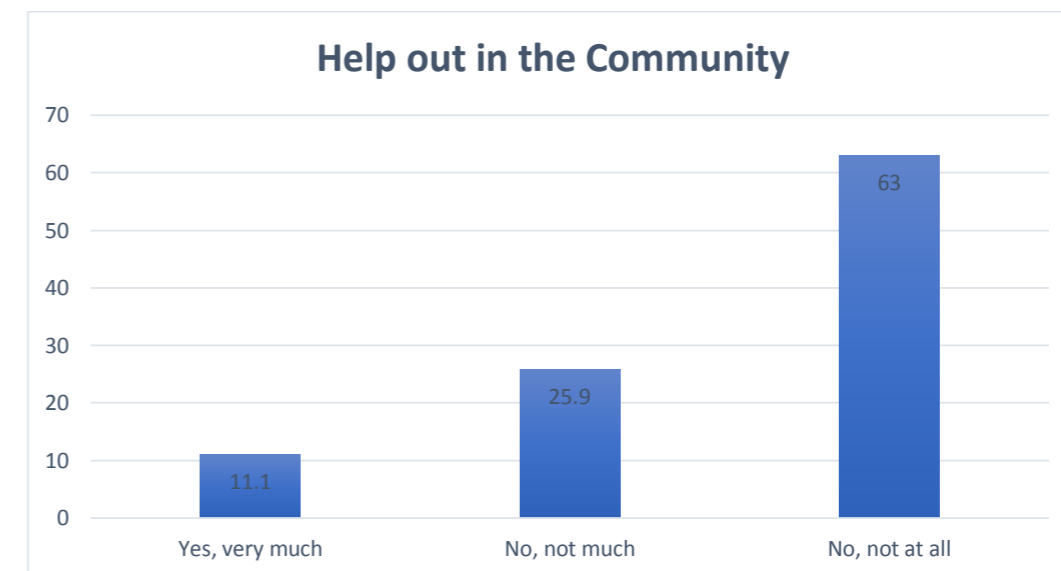

Figure 3: Helping out in the community water conservation structures

Due to the inconsistency and resurrection of water disruptions and supply in Freedom Square, people have started not trusting the local institutions, the government and themselves as the community. One respondent indicated that he was a plumber "I am a plumber working for MMM but not here in Freedom Square. I am not in a position to help out with our water problems because people here are not united".

Within the settlement, there were an existing group of plumbers, although many residents still did not know about this structure or could not trust them. This indicates a lack of cohesion in this community and, therefore lack of trust. A total of 41.7% (45) respondents indicated that they trusted their communities concerning water issues, whereas the rest did not trust community members who were unsure if they could trust them.
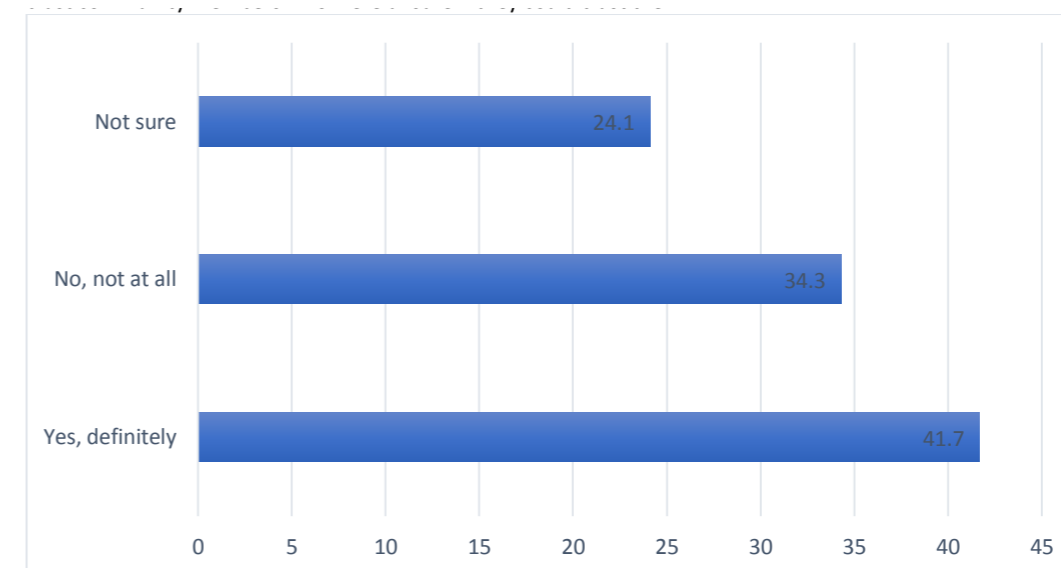

Figure 4: Trust among participants in dealing with community members

Participants were asked to indicate the various social media sites they use to collaborate on water conservation. WhatsApp was the most-used channel as indicated by 26.9%(29) and other media are not used at all in this community as indicated by respondents (84.3% or 91) and 94.4% (102) respondents who do not use Facebook and Twitter, respectively. It is evident from the empirical data that dwellers are being informed about water challenges and conservation measures through social networking sites. However, it should be noted that not everyone has access to or is interested in using social networks. The results support the view of Wright et al. (2012), who mentioned that social networks are important as a means to ensure that information is distributed in time to avoid disasters. With the problem of lack of trust, the alternative way of reaching out to people is through social media sites. their communities concerning water issues, whereas the rest did not trust community members who were unsure if they could trust them. ▶

▶ **Table: Social network sites for communication**

Type	Response	Number of Respondents (n=108)	Percentage
Facebook	Yes	17	15.7
	No	91	84.3
WhatsApp	Yes	29	26.9
	No	79	73.1
Twitter	Yes	6	5.6
	No	102	94.4
Total		108	100

Conclusions and recommendations

The study explored knowledge of water conversation and social cohesion toward water management. The core of this investigation was the effectiveness of public awareness as a community empowering tool in reducing water scarcity through behaviour change.

For water management strategies such as public awareness campaigns to be effective, they need the support of legislation and policies.

This paper highlighted legislation and policy support for water access and management. In South Africa, it is every citizen's right to have access to water according to the Constitution and the Water Services Act. International agreements like Sustainable Development Goals (SDG 6) pursue clean water and sanitation.

A National Framework for Municipal Indigent Policy was developed to cater to the indigents (those lacking the necessities of life).

The study also highlighted legislation and policies that support public education. Such as Sustainable Development Goals (SDG 16). The South African Disaster Management Act, Act 57 of 2002 and the National Disaster Management Framework of 2005 mandate the cultivation of risk avoidance through public education.

The study found that there is high to mediun literacy levels in the community. Therefore, such literacy levels in a community are significant for determining the acceptance and comprehanion of water management pubic education. Significant to the impact of development programmes on a community, is the length of the communities stay in the area. Most of the residents had lived in the study area for more than 11 years, implying that they are well informed of the development programmes like public awareness campaigns and will be able to take ownership of the developments.

Regarding access to water, the study found that a majority of the residence had taps in the yard or access to communal taps.

The existence of tap water is an indication of the governments efforts to develop the informal settlements and in turn reduce the effects of bacterial diseases like cholera.

The majority of residence knowledge of water management efficiency was good but this was despite the fact that they have never attended water conseration workshops, in that case, they are able to preserve the water points in their community.

There was also a good number of residents who indicated that they preserve water by harvesting rain water, grey water, reparing water leaks and closing leaking

pipes. The challenge with some of these water conservation methods was the lack of resources such as tanks to store the water and poor structures of their homes that do not. On assessing the impact of social networks on water management. A majority of the respondents indicated that they worked together.

While there was some social cohesion present in this community, there was no formal community-based organisational structure to coordinate and manage the water resources in their community.

Such type of structures assist with the enforcement and policing of water conservation methods. Nonetheless, social networks such as Facebook, WhatsApp and Twitter were used as a structure that the community use to share information about water issues.

Social media sites provide a platform for a group of people to team up and work on water issues and water conservation strategies.

It is fundamental to regard water services forums for water users as a major aspect of a community-based water assets management plan.

These forums will be liable for representing the community in overseeing water and sanitation structures and decision-making at the local scale (Williams, 2004).

Complete reference list:
Download PDF

ABSENCE OF FIRST RESPONDERS AND
SUDDEN DEATHS OF AMATEUR FOOTBALLERS IN CAPE TOWN

By Moegamat Rashied Isaacs, Disaster Management Practitioner DMPc001, City of Cape Town Disaster Risk Management

The following is an abstract of recent research done on the absence of first responders and sudden deaths of amateur footballers in Cape Town in the Western Cape, South Africa.

Background
The absence of first responders and appropriate medical equipment propel amateur football into a high-risk category. This comes at the back of the FIFA eleven steps and the medical emergency bag (FMEB) to prevent sudden cardiac deaths (SCD).

These recommendations by the Fédération Internationale de Football Association (FIFA) were introduced as a global standard in 2013 to which the 211 member associations should comply with.

In South Africa, 14 footballers in the Cape Town amateur leagues lost their lives due to insufficient medical preparedness between 2007 and 2023. Out of the 14 deaths, 12 were caused by suspected cardiac arrest (CA).

Looking at these numbers of football deaths over a 16-year period, it shows that the local football associations under the auspices of the South African Football Association (SAFA), Cape Town remains vulnerable unless an emergency action plan (EAP) is introduced for the region.

Aim
Therefore, this study sought to determine the measures that are in place to prevent the sudden deaths of footballers in the amateur football leagues in Cape Town.

Methods
Qualitative research approach was used to address the aim. Data collection was conducted using semi-structured interviews. Eight football coaches from the Cape

Town branch of the South African Football Association (SAFA) were interviewed. Thematic analyses were used to analyse the data collected.

Results
The results of the thematic analysis allowed the study to generate four themes:
1. Inadequate preparedness for medical emergencies; lack of first aid and equipment hampering effective response to injuries on the field of play.
2. The adequate knowledge of first responders by football coaches; coaches being cognisant of first responders providing first aid to the injured player before the arrival of professional help.
3. Lack of knowledge of the FIFA medical emergency bag; the lack of knowledge on the FIFA emergency medical bag including the eleven steps to prevent sudden cardiac deaths by the coaches and administrators.
4. Lack of reporting of sudden deaths to the FIFA registry; the lack

of knowledge on the concept by the participants have prevented the reporting of the deaths to FIFA for research purposes.

Conclusion
There is a dire need for trained first aiders next to the field of play at the Cape Town local football associations. This should be complemented with clear guidelines on the implementation of the FIFA 11 steps and the medical emergency bag to prevent sudden cardiac deaths by SAFA Cape Town.

Managerial Implications
The results have shown the gap in communication between the local football associations and SAFA Cape Town to implement the FIFA recommendations as a global standard to mitigate sudden deaths.

Lack of direction by the football administrator in Cape Town on emergency preparedness has raised the ire among the coaches and administrators interviewed. 🔺

THE AFRICAN CENTRE FOR DISASTER STUDIES (ACDS)

The African Centre for Disaster Studies (ACDS) aims to address complex disaster risk and resilience building challenges in the African context, and internationally. Addressing these challenges requires an all-systems approach. The ACDS focuses on research, training, education and community outreach in disaster risk reduction through a multi-disciplinary approach.

Since 2002 the Centre has embarked on various research, training and consultancy projects at local, provincial, national as well as international level.

What we offer
The ACDS offers a Postgraduate Diploma in Disaster Risk Management, Masters in Environmental Sciences with Disaster Risk Science and the Doctor of Philosophy Disaster Risk Science. Aside from the qualifications that the ACDS offer as part of the School for Geo and Special Sciences, the centre offers accredited short in disaster risk management, including basic and advanced training in disaster risk reduction, disaster risk assessments and planning and incident command system at basic, intermediate and advanced levels.

The ACDS also offers professional consultancy services that have included: the development of

disaster management plans, prevention and preparedness plans, sustainable livelihoods and disaster risk assessments, evaluation of institutional capacity for disaster risk reduction, evaluation of drought relief programmes, analysis of vulnerability within the Southern African Development Community (SADC) region, development of curriculum and materials for disaster risk reduction training and education.

What we do
The ACDS has a wide network including stakeholders in the southern African region, the African continent and internationally. In its capacity ACDS has been directly involved with drafting and review of directly involved in the drafting and review of the Africa Regional Disaster Risk Reduction Strategy and its Plan of Action, as well as several national-level policies and legislation eg South Africa, Namibia, Botswana and Uganda. As part of this network the ACDS is also a founding member of the Southern African Society for Disaster Reduction (SASDiR). SASDiR brings together several DRR role-players in the region and holds the SASDiR Biennial conference hosted by different SADC countries on a rotational basis.

In partnership with SASDiR and the National Disaster Management

Centre, South Africa, the ACDS also produces Jàmbá: Journal of Disaster Risk Studies, launched in 2007. Jàmbá is an Open Access journal on the African continent with accreditation status from the South African Department of Higher Education and Training and is the official journal of the SASDiR.

Jàmbá: Journal of Disaster Risk Studies
Jàmbá is a trans-disciplinary publication in the field of disaster risk reduction and resilience, aimed at serving as a platform for discussion and debate in this relatively new study field. Jàmbá: Journal of Disaster Risk Studies aims to engage, inform, and catalyse scholarly discourse within research and real-world practices that work towards the minimisation of vulnerabilities and disaster risks throughout developing communities with special emphasis on Africa.

The intended focus of Jàmbá is on the African continent but also welcomes related articles from other regions. The journal crosses and affects disciplinary boundaries to promote communication, collaboration and teamwork between professions and disciplines to avoid disaster risk creation, address the vulnerability or limit the adverse impacts of hazards, within the broad context of sustainable development. ⬥

THE DISASTER MANAGEMENT INSTITUTE OF SOUTHERN AFRICA (DMISA)

CONTACT DETAILS

Tel
084 800 0733

Email
office@disaster.co.za

Postal and physical address
DMISA
37 Howard Drive
Northpine
Brackenfell
7560
South Africa

Registrar
Mr Pat Adams

Website
www.disaster.co.za