

DISASTER MANAGEMENT

Official Journal: Disaster Management Institute of Southern Africa



Volume 2 No 5

A high-speed photograph of water splashing into a pool of water, creating a dynamic and energetic scene. The water is captured in mid-air, with individual droplets and ripples clearly visible. The background is a soft, out-of-focus gradient of light blue and white, suggesting a bright, clean environment.

WATER:
MORE THAN JUST A CLIMATE ISSUE

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Enquiries

Please consult our website: www.disaster.co.za or the DMISA Facebook page.

Ms K Muller Tel: +27 (0)11 822 1634

Fax: +27 (0)86 652 8066

Email: Karin@disaster.co.za

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DISASTER MANAGEMENT

DMISA

President

Mduduzi Nxumalo

Deputy President

Owen Bekker

Councillor: Portfolio - Journal

Shadi Tsebe

Disaster Management Journal Editor

Lee Raath-Brownie

lee@fireandrescue.co

Cell 082 371 0190

Journalist

edit@fireandrescue.co

Advertising

advertising@fireandrescue.co

Design and layout

Marc Raath

marc@fireandrescue.co

Finance

Vicki Jacob

accounts@fireandrescue.co

Circulation

Vicki Jacob

subs@fireandrescue.co

Secretary

Vicki Jacob

Administration

Mirriam Moroane

Contributions

Dr Mmaphaka Tau

Dr Johan Minnie

Schalk Carstens

Dr Elias Sithole

Neo Lebethhe

Dr Andries Jordaan

Erika Swart

Michelle Kleinhans

Tinus de Beer

Publisher

Lee Raath-Brownie

FIRE AND RESCUE INTERNATIONAL

Tel 011 452 3135/6

Fax 086 671 6920

Box 8299 Greenstone 1616

www.fireandrescue.co

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Mduduzi Lancelot Nxumalo

Dear Reader

It is a great privilege for me to present my first message as the President of DMISA. It is a privilege and a humbling experience because I know who has been here before and how hard all of them worked and how much all of them have achieved. A particular word of thanks to my predecessor Mr Bafana Mazibuko for the sterling leadership he provided during his term of office. I also want to thank every member of the Executive Committee and the administrator for their dedication and hard work, which will become apparent as I provide feedback on their portfolio reports.

Mr Bafana Mazibuko is the immediate past president of the Institute and

the portfolio holder for Protocol, Legislation and Policy Writing; he is supported by DMISA board members, Ms A Bruwer, Dr J Belle and Mr N Rylands. The Institute has finally concluded the constitutional amendment for our organisation, which is a milestone in terms of the process for alignment with professionalisation. The constitutional amendments were effected and adopted during the 2018 DMISA Conference and Extra-ordinary General Meeting held in Kopanong Hotel and Conference Centre in Benoni, Ekurhuleni. It is hoped that the effected amendments will influence the direction of the Institute to comply with the requirements of the South African Qualification Authority (SAQA) to maintain our professional recognition for the future.

Mr Pat Adams is the chairperson of the Executive Committee and is responsible for the portfolio Finance, Administration, Sponsorship and Conference. He ensures that the office is administered in accordance with the rules of the Institute and is ably supported by board members, Ms N Solomons and Mr O Kgole.

The Budget for the 2019 / 2020 financial year was approved by the Board on 1 March 2019.

The heartbeat of our Institute has always been its finances, administration, sponsorship and conferences. The chairperson of the Executive Committee, with the assistance of our administrator, are continuing serving our Institute with dedication and commitment.



Mr Owen H Becker is the Deputy President and the portfolio holder for Training, Skills Development, Standards and Tours and he is supported by DMISA board members, Mr T Khupari, Mr F Daams and Ms BF Swart.

The LG SETA is in the process to revise and develop the NQF 4 and 5 Disaster Management Qualifications in order to align them to the Quality Council for Trades and Occupations. The Disaster Management Officer qualification should be ready for submission by April 2019.

Ms Shadi Tsebe, portfolio holder for Journal Production and Marketing, is supported by board members, Dr M Reddy and Mr TE Motlhale. We can report that the last journal was circulated prior to conference 2018 and the publication was very well received. The latest Journal publication will be sent out during March/April 2019. Artwork for the DMISA badges will be finalised during May 2019.

Ms Lebogang Mosotho carries the Regional Matters, Equity and Recruitment Portfolio and is supported by DMISA board members, Mr G Otto and Ms T Moumakwa. I do believe we, as DMISA, have quietly made great strides in terms of equity and look forward to real measurements in this regard. We should recognise that our ability to embrace diversity and promote equity has direct influence on our ability to deliver on our mandate and speaks about our acceptability in our environment.

The portfolio holder for Professionalisation of DMISA and Website Management, Dr J Minnie, supported by board members, Mr SW Carstens and Ms M Gwala. DMISA is living up to its obligations as SAQA-registered professional body and is participating in- and supporting key initiatives furthering the professionalisation agenda and our mission to support the discipline and the community of practitioners, keeping in mind our ultimate goal of contributing, through professional capacity and capability development, to the reduction of disaster risk and the improved management of the impacts of those risks that cannot be avoided. Applications for professional registration is steady, the administration of these is well-managed by the registrar and administrator, our network of assessors is being expanded and the designations are respected in the wider fraternity. We are in regular contact with SAQA and we are building relations with LG SETA



Bafana Mazibuko handing over the reigns to Mduduzi Nxumalo

and NDMC through our participation in the review of the Disaster Management Officer and Disaster Management Manager qualifications within the ambit of the QCTO.

The portfolio holder also continues to maintain and expand the DMISA website as key information source for professionalisation and all matters on which DMISA members should be informed.

My own portfolio includes Partnerships, International Relations, Public Relations and Media Liaison and I am fortunate to be supported by DMISA board members, Mr B Ntsebesha and Ms M Machoga. In terms of partnering with SALGA, we are currently engaging with the president, Mr Parks Tau. We are awaiting for a date of a meeting with the leadership to conclude the MOU. The Office of the President has set May 2019 as the month to have all the MOUs signed by relevant stakeholders/department. SALGA did indicate that it values the good work DMISA is doing in trying to bring professionalism in the Disaster Management sector by providing a space for municipal officials to affiliate, share ideas and assist one another in the promotion of a safe environment and resilient communities in line with the objects of Local Government.

DMISA is also delighted with the highly successful DMISA 2018 Conference, 'Mobilising future ready resilience sustainably reducing disaster risk and disaster impact, today and tomorrow', held on 19 and 20 September 2018 at the aha Kopanong Hotel and Conference Centre in Benoni, Gauteng.

We are grateful for the wonderful support we received from our delegates, exhibitors and sponsors, namely: Gauteng Provincial Disaster Management Centre (PDMC), the National Disaster Management Centre (NDMC), the South African Weather Service (SAWS) and the City of Ekurhuleni at Conference 2018.

Hoping to see all our delegates, exhibitors and sponsors at our conference in 2019, which will be held at the ATKV Hartenbos Resort in Mosselbay, Western Cape on 18 and 19 September 2019.

Situated along the world-famous Garden Route between Cape Town and Port Elizabeth, ATKV Hartenbos Beach Resort is one of South Africa's premier vacation destinations with state-of-the-art conference facilities.

The Institute would like to thank the publisher, Ms Lee Raath-Brownie and Ms Shadi Tsebe, exco member responsible for Journal Production and Marketing for the publishing of the DMISA Journal.

In closing, I believe we are rapidly moving into exciting and somewhat uncharted territory, things that we have hoped for, for a long time have happened and we need to take the opportunity, take the initiative and keep focused on our core business; supporting the profession and the professionals to have a positive influence on disaster risk reduction.

Mr ML Nxumalo
DMISA President

DMISA COUNCILLOR: JOURNAL AND MARKETING SHADI TSEBE



Shadi Tsebe

I am most honoured to accept the position as an Executive Committee member responsible for the portfolio of Journal Production and Marketing, a position that has been held by my remarkable predecessor. I intend to guide the portfolio members in their work and discussions as effectively and efficiently as possible and uphold the trust they have placed in me. We aim to continue to develop our mission of giving only the best possible service to our DMISA members by contributing positively and ensuring that the members' concerns and contributions are put first.

South Africa is experiencing an enormous problem of water scarcity, which is 10 years away except if an earnest move is made to restore and save our waterways and catchment regions, repair and maintain disintegrating infrastructure and actualise water re-use. Without intervention, South Africa faces a shortage of around 3 000 billion litres of water for each year by 2030. The measure of water on earth is consistent and can't be expanded or diminished, however, it is unevenly appropriated over the earth. South Africa gets a yearly precipitation of 492 millimetres while whatever is left of the earth, gets 985 millimetres. Subsequently, South Africa is named a water-stressed country. There is likewise

uneven appropriation of precipitation crosswise over South Africa. The eastern portion of the nation is a lot wetter than the western half because of the idea of the climate conditions. South Africa likewise encounters rotating times of dry seasons and floods, which influences the measure of water crosswise over South Africa. What is more, hot dry conditions result in a high evaporation rate.

Researchers anticipate that with global warming, South Africa will encounter a lot wetter wet seasons and a lot drier dry seasons, bringing about an expansion in floods and dry seasons. A further issue adding to this interest is water quality. Water quality is characterised as water that is protected, drinkable and speaking to all life on earth. In South Africa, the scarce fresh water is decreasing in quality because of an increase in pollution and the destruction of river catchments, brought about by urbanisation, deforestation, damming of waterways, devastation of wetlands, industry, mining, farming, vitality use and unplanned water contamination. As the human populace increments, there is an expansion in contamination and catchment demolition. There is a need to ensure that we educate our communities countrywide on proper water usage.

DMISA Conference 2018

On another note, 2018 DMISA Conference was a success. The conference, under the slogan, 'Mobilising future ready resilience', sustainably reducing disaster risk and disaster impact, today and tomorrow, which was held in Benoni, Ekurhuleni, Gauteng, has been a success. Dr Zweli Mkhize, National Minister of Cooperative Governance and Traditional Affairs delivered the keynote address. He paid a special tribute to the fire fighters who died in fighting the fire in a building in Johannesburg central business district (CBD) and requested that we ensure the safety of our disaster management personnel. He also thanked all South Africans in using water sparingly during the drought in various areas in South Africa. In addition, he requested all South Africans to keep on saving water as South Africa falls under the top 30 water-scarce countries in the world. He added that special attention must be given to the effects of climate change.

Mr Dikgang Uhuru Moiloa, MEC of Cooperative Governance and Traditional Affairs, said all departments must work together in ensuring the safety of all fire fighters. He showed a video of the building on fire in Johannesburg and shared the trauma caused by such fires. He presented a short slide show highlighting the





UPDATES AND NEWS

FROM THE NATIONAL DISASTER MANAGEMENT CENTRE

The National Disaster Management Centre (NDMC) continues to execute its legislative mandate of promoting an integrated and coordinated system of disaster management amongst national, provincial and municipal organs of state, statutory functionaries and other role players involved in disaster management.

This journal provides me with the opportunity to provide a high level update to stakeholders on the activities of the NDMC for the period under review.

Humanitarian assistance and disaster relief towards Malawi, Mozambique and Zimbabwe

South Africa heeded to the call of the three countries, Malawi, Mozambique and Zimbabwe, for humanitarian assistance and other technical support since they have been affected by the Cyclone Idai. To this end, a National Joint Operational and Intelligence Structure (NATJOINTS) Priority Committee has been established to coordinate the relief efforts, co-chaired by Department of Cooperative Governance (DCoG) through NDMC and the South African Police Service (SAPS). The committee meets daily.

The following activities are put in place:

- A Joint Operation Centre (JOC) is activated in the two countries ie Malawi and Mozambique. The South African deployed members are part of the JOCs.
- Zimbabwe was affected recently and a team has been deployed to assist with the Search and Rescue from SAPS.

Malawi relief actions

Air support and personnel has been deployed through South African National Defence Force (SANDF) to assist with rescuing the displaced people and distribution of relief materials. South African Military Health Services assisted with some of the medical supplies at their disposal and treatment of patients. An estimated number of 25 members in the team have been deployed in Malawi comprising professional nurses, doctors, paramedics, rescuers and environmentalists, amongst others.

Mozambique relief actions

The country is the worst affected. An estimated number of 43 medics and Air Force crew members have been deployed and the numbers changes depending on the need. South Africa

deployed air support to rescue trapped displaced and injured people and distribution of relief materials. The South African Military Health Services is currently assisting with medical treatment of injured displaced persons.

An estimated amount of 500 displaced people have been rescued.

Two field hospitals were projected to Mozambique at Beira Airport to assist with treatment of patients and also serve as an onsite health facility since there are too many injured people and outbreak of diseases have been projected.

Zimbabwe relief actions

The Zimbabweans made a request for various supplies and most urgently 10 cadaver dogs for recovery activities. South Africa responded positively to assist Zimbabwe.

The Department of International Relations and Cooperation (DIRCO) is coordinating the donations from various contributors. Border security is monitoring and reporting the movement statistics within the borders shared with South Africa. So far the movement is normal. South African deployees are working with non-governmental organisations (NGOs) that are in Malawi and Mozambique.

South African Weather Services provides weather forecast to update the priority committee.

The NDMC, through the United Nations Disaster Assessment and Coordination (UNDAC), has deployed an official to assist with disaster coordination. ▶



Dr Mmaphaka Tau

weaknesses in fighting disasters. He stated that systems must be created in Gauteng that all disaster management departments respond immediately across borders in the province. "There should not be any red tape or administration procedures preventing disaster management departments in Gauteng in assisting and saving lives," he said. He also made a presentation on how technology can be used in fighting crime and disasters. All other presentations at the conference were well received.

With a well-structured organisation, a clearly defined mission and vision, competent staff, clear protocols and guidelines for operational execution, we are definitely in a better position to respond to the challenges that await us. I would like to thank the conference coordinator, Mr Pat Adams, for his hard work and dedication throughout.

In closing, I leave you with the words of John Wesley:
Do all the good you can

By all the means you can
In all the ways you can
In all the places you can
At all the times you can
To all the people you can
As long as ever you can
God bless you all.

Thank you

Shadi Tsebe
DMISA Councillor: Journal and marketing



Humanitarian assistance and disaster relief in Malawi, Mozambique and Zimbabwe



South Africa heeded to the call of the three countries

► **National drought coordination**

The drought conditions persist even though rainfall has been received within the north eastern parts of the county during early summer. The three provinces, Eastern, Northern and Western Cape, are still reeling from drought with pockets within other provinces.

The DCoG through the NDMC continues to coordinate stakeholders and response measures for drought in the country particularly through the National Joint Drought Coordination Committee (NJDCC). The provincial disaster management centres and their joint operation centres continue with the drought coordination in their respective provinces in collaboration with the relevant sectors, municipalities and private sector, eg non-governmental organisations. The objectives of the NJDCC are as follows:

- To coordinate all the response and recovery plans from all relevant sectors in an effort to develop a coherent, comprehensive, substantive and practical drought response plan.
- To effectively gather all relevant information to ensure positive communication on the state of South Africa pertaining to current drought situation and build resilience among our communities

The NJDCC has terms of reference in place that outlines the roles and responsibilities of all the above mentioned task teams. The functions of the tasks summarised as follows:

- **National Intervention Task Team:** Facilitating and coordinating the monitoring, reporting and evaluation of impact of the interventions implemented in provinces.
- **Funding Task Team:** The task team provided assistance with the analysis and assessment of all the projects as presented by the organs of state for funding. Robust discussions are held to ensure proper allocation of funding to projects and avoid duplications.
- **National Communications Task Team:** Ensured the development of the communication strategy that was approved by the Inter-Ministerial Task Team (IMTT) and the communication of key messages on drought and water scarcity.
- **Humanitarian Task Team:** To ensure proper planning and distribution of verified and tested products to the communities.
- **National Food and Nutrition Security Task Team:** Assists with the food security status and crop estimates to understand the food security status in the country and intervene in affected provinces. The risk profile modelling team assists with the weather forecast and modelling, including the impact on agricultural production and awareness to the farmers.

The National Joint Drought Coordination Committee meets on a monthly basis to report, monitor the implementation of drought intervention measures and evaluate the impact of the interventions made to the affected communities. The NJDCC reports and make recommendations to the Inter-Ministerial Task Team, which is chaired by the Minister of Cooperative Governance.

Drought response and relief

The Department of Cooperative Governance, through the NDMC, facilitated and coordinated drought relief measures by mobilising and allocating resources since 2013/14. It is important to note that drought conditions became extremely felt in 2015 and to date, some parts of the country are reeling from drought.

During 2017/18, the country experienced rainfall, which brought relief to the northern parts of the country, however the three Cape provinces were still affected by drought and as a result, they declared a provincial state of disaster. An amount of R433,5 million was allocated and transferred to Northern Cape, Eastern Cape and Western Cape provinces to address the drought situation.

In February 2018, the Head of the National Disaster Management Centre reclassified the drought disaster as a national disaster. Subsequent to the reclassification proclamation, in March 2018, the Minister of Cooperative Governance declared a national state of disaster as a result of drought. The decision was based on the fact that the drought situation persisted and there were pockets of drought in other provinces. In the 2018 Budget Speech, the Minister of Finance stated that “a provisional allocation of R6 billion has been set aside in 2018/19 for several purposes, including drought relief and to augment public infrastructure investment.”

The National Joint Drought Coordination Committee, through its Funding Task Team, facilitated and coordinated the applications for funding by the affected sectors and municipalities. In October 2018, the National Treasury announced an amount of R3,2 billion allocation from the R6 billion provisional allocation for drought intervention measures. The funds were allocated to the following sectors, ie Water and Sanitation, Environmental Affairs, Agricultural sector and the water services authorities.

It is anticipated that the allocated funds will go a long way in alleviating the effects of the prevailing and future drought conditions and the negative effects of climate change and variability being experienced by the country. The NJDCC will

always be on the ground to monitor the implementation of the intervention measures and evaluate the impact thereof.

Coordination of disaster resilience building

The Department of Cooperative Governance, through the NDMC, is now focusing on the resilience phase in addressing the drought situation. In this regard, the NJDCC broadened its focus beyond the continual monitoring of relief projects to include focused projects, funded from the allocations of the respective organs of state, in the Medium Term Expenditure Framework (MTEF) aimed at the identification and implementation of Disaster Risk Reduction projects.

The resilience-building phase of the drought is currently the key focus for all sectors. It is significant for government to put efforts that will ensure investment in disaster risk reduction measures that include climate change adaptation and resilience building measures. In order to facilitate this process, the NDMC, in consultation with all sectors and stakeholders represented at the NJDCC and the National Disaster Management Advisory Forum (NDMAF), developed the 'Draft Drought Resilience Operational Plan 2018/19'. The plan aims to facilitate and coordinate the development and implementation of risk reduction (mitigation and climate change adaptation) measures by members of the NJDCC in order to reduce the impacts of the drought hazard, to promote livelihoods restoration needs of the affected communities and promote recovery and resilience in key affected sectors. In this regard, each organ of state effort will be focused on resilience building programmes to mitigate towards the drought shocks.

Impact-based Early Warning System for Severe Weather

The project is currently at an advanced stage with several pilot tests already completed in the different provinces. Both winter and summer rainfall areas were subjected to pilot tests using empirical information from past severe weather events to ensure that actual weather related consequences were factored into the testing. The disaster management practitioners and the weather forecasters have been working closely with the different provinces and the various stakeholders to ensure that all elements of severe in their respective areas are considered and planned for in the final product.

The Value Chain Early Warning Technical Task Team (TTT)

The Technical Task Team (TTT) currently enjoys the support of several key departments involved in the current drought management process. These include the Council for Geoscience, the Council for Agricultural Research, The Department of Rural Development and Land Reform and the South African Weather Services (SAWS). Each organisation participates in one of several work streams to supply data and information related to their core mandate and together information is shared over several important themes. The objective of the formation of this task team is to ensure that important information is processed and shared in order to inform important disaster risk related discussions on a national scale.

Partnerships and collaborations

The Early Warnings and Capability Management Systems unit in the NDMC is currently finalising several partnership and collaboration agreements with various research entities. These include a renewed Memorandum of Agreement (MOA) with the Agricultural Research Council (ARC) and The South African Weather Service (SAWS). This will further cement these organisations together for not only a closer working relationship but also to conduct new product development on other thematic areas common to them. A new Memorandum of Understanding (MOU) between the CSIR's Natural Resources and Environment division and the National Disaster



Air support and personnel has been deployed through South African National Defence Force (SANDF)

Management Centre will ensure that a new integrated drought monitoring and forecast platform be developed with relevant indicators in order to serve as an early-warning mechanism for South Africa for the hazard related to drought phenomena.

Report on the Sixth Annual National Fire Safety and Prevention Seminar

The National Disaster Management Centre has hosted its Sixth Annual National Fire Safety and Prevention Seminar from 27 February to 1 March 2019 in Tzaneen, Mopani District in Limpopo Province. This seminar was attended by over 150 delegates ▶

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- ▶ representing municipal fire services, industrial fire services, academia, key sector departments, etc. This seminar has once again revealed that fire risks and losses continue to rise with devastating impacts on our communities particularly those most vulnerable to fires. It also became clear that effectively responding to the challenges posed by fires require multi-sectoral and multi-level engagements and strategies. The signing of a Fire Safety and Prevention Pledge by the Executive Mayor, Cllr Rakgoale, served to energise the local political leadership to continue to support the fire services in general and fire safety and prevention in particular.

While the seminar noted that significant progress has been made particularly with NDMC driven skill-based capacity building and the review of the legislation, a lot of work still needs to be done for us to significantly tackle our complex fire problem. The challenges posed by the growing wildland-urban interface require us to integrate our plans to reduce fire risks and to effectively respond to such fires when they do

occur. Similarly, the seminar demonstrated the importance of partnerships between government and the private sectors. This is necessary as it creates shared value while contributing to resilience building in identified communities. In this regard, all delegates were encouraged to explore possibilities of partnering with business organisations operating within their jurisdictions. As part of this seminar, fire safety inspections were conducted at a number of key and strategic facilities in the area. Inspection reports, which will include key recommendations, will be shared with all inspected facilities and follow-ups will be initiated to ensure and monitor compliance going forward.

Yours sincerely

Dr Mmaphaka Tau (PhD)

Deputy Director-General (Head):

National Disaster Management Centre (NDMC)

Department of Cooperative Governance (DCoG) 🇷🇷



The Sixth Annual National Fire Safety and Prevention Seminar was held in Tzaneen



This seminar was attended by over 150 delegates representing municipal fire services, industrial fire services, academia, key sector departments, etc

NEW PREMISES FOR GAUTENG PROVINCIAL DISASTER MANAGEMENT CENTRE

The Gauteng Provincial Disaster Management Centre's new building

A building has been bought through the Gauteng Department of Infrastructure Development located in Midrand to accommodate the Gauteng Provincial Disaster Management Centre (PDMC). The premises are situated at 11 Janadel Avenue, Riverview Office Park, Block B, in Midrand.

A contractor was appointed by the Provincial Department of Infrastructure Development to renovate and do petitioning. The building was officially occupied by Gauteng PDMC staff on 20 August 2018. The centre will be officially opened and launched on the 25 April 2019.

Reason for the move

The Disaster Management Act, 2002 (Act no: 57 of 2002) as amended, Section 29 (1) compels Gauteng Province and other provincial governments to establish a disaster management centre. The previous PDMC was decommissioned in 2012. There was no physical disaster management centre in the province but the function was operating, hence the need to establish one.

Several disasters over the past few years have raised questions about the province's ability to respond to calamity. In 2016 a tornado hit the City of Ekurhuleni, leaving a trail of damage. In December 2017, the City of Johannesburg was hit by heavy rainfall that caused destruction in several areas, including Lenasia, Tshepisong, Thembelihle, Alexandra, Protea Glen Extensions, Roodepoort, Kagiso and Braamfischerville.

Benefits of the new premises

The Disaster Management Act as amended places a significant amount of emphasis on monitoring and evaluation and assigns a significant responsibility in this regard to the PDMC and municipal disaster management centres (Section 33, 34 and 40 of the Disaster Management

Act). The current capacity of the disaster management centres to perform monitoring and evaluation is limited due to the current inopportune placement of the PDMC as well as the limited number of human resource capacity. The PDMC is currently embarking on the process of reviewing the PDMC structure.

Most people at the PDMC are disaster management practitioners and fire and rescue services experts. At this stage, there are few specialists within the PDMC and Provincial Fire and Rescue Services. The centre is thus in the process of acquiring specialists in the field.

The PDMC is also responsible for monitoring how municipalities respond to disasters. When there is no disaster, the centre would conduct disaster risk assessments in communities. All the high-risk or hotspots areas would be visited to identify risks.

The centre also facilitates training and awareness to communities on disaster management and Incident Command System (ICS).

The new centre also coordinates an urban search and rescue team (USAR Team-South Africa), which specialises in rescuing people in collapsed buildings and in complex emergencies. The USAR Team was assessed and classified by the United Nations in 2017 and it passed. It is made up of 120 technicians and the team management. This team has been made available to help other provinces in the country.

Future changes envisaged

A single provincial comprehensive system for information and warning of the public; an automatic monitoring system ie Denel Disaster Information Management System (DIMS); Advanced Fire Information System-Council for Scientific and Industrial Research (AFIS-CSIR),

CMORE-CSIR; CSIR Radar Technologies; chemical, biological, radiological and nuclear defence (CBRN) solutions, drones, a 24-hour call centre and an early warning system are some of the technologies that the people of Gauteng should expect in a new provincial disaster management centre to be implemented in the Phase 2 of the PDMC.

The new facility will have a 24-hour call centre and systems that can track hazards and risks and send early warnings to communities working with the MDMCs. The plan is to link the centre's system with all strategic stakeholders and the South African Weather Service (SAWS). The plan is to have information that is more geographically specific and to provide a timeline when it can be predicted.

The plan about the utilisation of the drones is to have a situation where users can fly the drones over the disaster area before and after the disaster has struck. Before the disaster, the drones will give the immediate profile of the area that was affected by the disaster. After the disaster, the drones will be able to do high level risk assessment.

Also, a call centre will be situated at the disaster management centre taking calls from the community without duplicating the first responder's roles and responsibilities.

Another area of disaster that the centre plans to address, is the transportation of dangerous goods by truck. Relevant officials will be in a situation where they know the trucks carrying dangerous chemicals, where they are going and which route they are using. This will enable them to study the wind direction and be aware if there were to be an accident involving this truck, which communities would be affected due to the direction of the wind. 🚚

A CONSEQUENCE MANAGEMENT APPROACH TO DISASTER MANAGEMENT: RESPONSE MANAGEMENT PART 4

By Dr Johan Minnie and Schalk Carstens

In this series of articles, a consequence management approach to the reactive elements of disaster management is discussed. The basic departure point of the authors is that consequences and the responsibilities for dealing with those consequences form a logical and useful point of departure and organising framework for dealing with disaster preparedness and response. Hazards and the progression of vulnerability combine to create hazard impacts, which in turn have both predictable and unpredictable consequences. The defined responsibilities of different role-players link them to the observable and known consequences of the impact and require action from them.

The first article in this series stated the case for the consequence management approach, which is being unpacked in this series of articles. The second article in the series explored the concept of preparedness, which is key to being ready to manage consequences. The third article discussed preparedness planning and the hierarchy of preparedness plans that enable jurisdictions to conduct effective consequence management. In the third article we pointed out that preparedness planning will establish an enabling state of readiness and effective knowledge and capacity to rapidly respond to any emergency that may be expected by a jurisdiction, whether that jurisdiction is

spatial or functional. Preparedness planning reflects responsibility and provides the space for line functions to express their role and functions in a disaster.

In this article and the next two articles, we focus on response management within the wider consequence management framework.

Response management

Response management is the heart of the consequence management concept because if response management cannot be implemented effectively and efficiently, there is little purpose in any preceding planning.

When a hazard translates into a disaster, every line function is supposed to know exactly what to do so that they can effectively implement their specific skills, knowledge and practical experience in the task they need to fulfil in disaster response. For example, when there is a safety and security incident, then all the safety and security role-players ie police, military, traffic, law enforcement will only focus on their specific areas of jurisdictions, such as evacuating people, instituting roadblocks, doing traffic control and stopping loitering.

The same principle will apply to the rescue of humans where the emergency services will work together to prevent further injury to human beings and

stopping fires, to rescue trapped people and to transport patients to medical facilities as quickly as possible. These activities will normally be dealt with by ambulance services, hospital trauma services, as well as fire brigade services.

Response refers to the actions implemented when a hazard impact has occurred or is imminent. Response typically involves emergency and essential services, security services and relief organisations. In major incidents and disasters, response management becomes a complex problem involving multiple organisations and resources working in difficult and dangerous conditions to as quickly as possible safeguard life, property, the environment and the interests of communities and households affected by a hazard are also responders, sometimes called first responders because they are the first to react to the impact. In an international context, though, first responders more typically refer to the emergency services that are first on the scene of incidents, these are normally ambulance services, fire and rescue services and law enforcement agencies for the area.

The response planning part of response management

The practical implementation of response planning typically occurs during response. While preparedness planning established what will in all likelihood be done, response planning can be seen as a more detailed action-oriented activity that responds and adapts to the real situation experienced during response. The goal of preparedness planning can be seen as establishing a situation where the relevant agencies are 'prepared to respond', while response planning will have to adapt to circumstances as they develop.

Although preparedness planning can be seen as a concept that encompasses response planning, the tactical and operational execution of emergency operations require on-the-ground planning and management, which is more response planning than preparedness planning. The totally rigid execution of preparedness plans would not always be possible or desirable in all situations as they develop in real life.

Within preparedness planning and training, the individual who will be

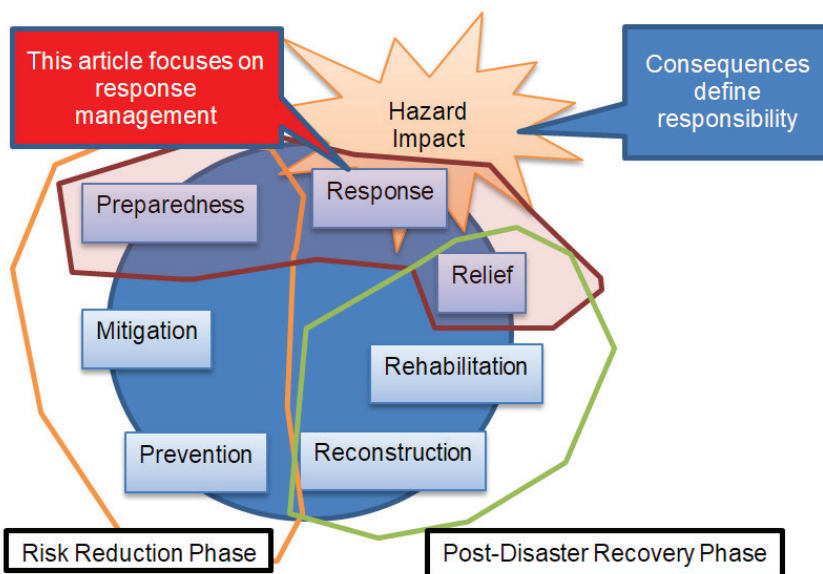


Figure 1: A representation of the much used (and admittedly much criticised) Disaster Management Continuum, indicating the focus of this article

responding to situations should be empowered and equipped to adapt a generic preparedness plan for a situation into a real life response plan that adapts to conditions on the ground.

An introduction to response coordination

The need for cooperation between parties responding to emergencies and disasters is self-evident when one observes the number of agencies, personnel and equipment that can get involved in such responses. If observed closely, even minor incidents display complexity in the assignment and acceptance of responsibility for different aspects of the response. Those responding to incidents may include emergency, lifeline utility and normal operational services and disciplines from various spheres of the government, from private sector entities and also from community-based, national or international NGOs. A wide variety of possible equipment and resources may be in use by full-time, part-time and volunteer personnel who have different social and professional backgrounds, different levels and specialisations of training and who are used to different organisational cultures and management systems and protocols. With so much complexity, coordination is clearly needed to ensure that those that need help are assisted as quickly and efficiently as possible and that impact on life, property, the environment and socio-economic activity is limited.

Coordination is also required between primary and supporting role-players. The role-players who have responsibilities in responding to emergencies and disasters can be divided into primary and supporting role-players due to their levels of responsibility and involvement. In responding to a fire, for example, one would imagine that a fire brigade would have primary responsibility but that other agencies may be supporting the fire brigade during response, say for example traffic police to deal with traffic around the site of the fire and the water department of a jurisdiction that ensures water supply to fire hydrants or water tankers.

Some of the most prominent responses to the need for coordination is embodied in firstly the Unified Command (UC) and Multi-Agency Coordination (MAC) components of the well-known Incident Command System (ICS) originating in the United States, secondly the London Emergency Services Liaison Panel's Major Incident Procedure Manual, thirdly the Major Incident Medical Management and Support system known as MIMMS and fourthly the cluster approach used by the United Nations Office for the Coordination of Humanitarian Affairs (UN/OCHA). The

Cluster	Lead Agency
Protection	UNHCR
Food Security	FAO and WFP
Emergency Telecommunication	WFP
Early Recovery	UNDP
Education	UNICEF and Save the Children
Sanitation, Water and Hygiene	UNICEF
Logistics	WFP
Nutrition	UNICEF
Emergency Shelter	UNHCR and IFRC
Camp Management and Coordination	UNHCR and IOM
Health	WHO
Information Management	Humanitarian and Emergency Relief Coordinator (OCHA)

Table 1: Structured coordination of humanitarian operations through the use of clusters. Source: OCHA Pakistan



Figure 2: UN approach to clustering. Source: OCHA Pakistan

table below indicates the clusters used in the structured coordination by UN/OCHA of United Nations humanitarian operations.

Another example of a clustering approach to promote coordination is that provided in a disaster preparedness, response and relief plan developed for the Western Cape Government in South Africa, the six clusters used in the plan are as follows:

- Infrastructure, transport and essential services;
- Environment, agriculture and water;
- Community support services;
- Emergency services, safety and security;
- Support services, information and communication; and

- Hazard specialist and representation of those effected.

By clustering role-players with other similar role-players that they most often cooperate with or who shares responsibility with them, improved coordination is achieved. By grouping certain role-players, communication is optimised and complexity is reduced.

Conclusion

This concludes the discussion of response management and the elements of response planning and response coordination that support effective response. We have only really introduced response coordination in this article and will expand more on response coordination in the next article. 🏠

INCIDENT COMMAND POST (ICP) VS EMERGENCY OPERATIONS CENTRE (EOC)



On the other side of the coin is the emergency operation centre (EOC).

Emergency operation centre

An emergency operation centre (EOC) is a place removed from the incident and this centre fulfils a coordination function and NOT a command function. Within the EOC various agency representatives could be found where they discuss: priorities, resources, public information, agency policy and provide coordination and guidance functions to the incident commander (IC) and his/her team at the ICP. A joint information centre (JIC) may be housed at the EOC and in many situations all or some of the resource order would go through the EOC.

Notice the word ‘coordination’ thus EOCs are more about coordination than command and control.

Decisions made at the EOC affect the incident response as well as the public response. The decisions made at the EOC are not tactical decisions; tactical decisions are made by the incident commander and the command staff at the incident scene from the incident command post.

The critical role of the emergency operation centre is:

- Supporting incident commanders
- Supporting other communities or jurisdictions
- Coordinating resources
- Developing situational awareness
- Informing the public

When we use correct and generic terminology, we will make a difference in every single important role during large/complex incidents from coordination, guidance from an emergency operation centre and from directing and managing the tactical management of the incident from the incident command post.

Together we can make a difference! 🇿🇦

Since South Africa adopted the Federal Emergency Management Agency (FEMA)-based Incident Command System within the emergency response arena, starting with veld and forest fire fighting and quickly moving from a Fire Management System to an All Hazards Incident Response system within the country, one should ask the question what is the reason for still using the term Joint Operations Centre (JOC) on larger more complex incidents (non-military incidents) instead of the term Emergency Operation Centre (EOC)?

In a National Incident Management System (NIMS) and within the Incident Command System (ICS), one will not easily find the term ‘Joint Operations Centre’ or ‘JOC’ as sometimes prefer to refer to during larger more complex incidents. This term is used in the military arena or when managing major events.

A NIMS and within ICS (a sub-component of a NIMS) during larger/complex incidents, one would rather use the term Emergency Operation Centre (EOC), instead of ‘JOC’ to coordinate and NOT to manage the incident. Let us explore

the differences between an incident command post (ICP) and an emergency operations centre in more detail.

Incident command post

The incident command post (ICP) is located at or in the immediate vicinity of the incident site and is the focus of the conducting of direct, on-scene control of tactical operations. Incident planning is also conducted at the ICP. The ICP may be collocated with the incident base camp. This is the location (ICP) where the incident commander (IC) and his/her incident management team such as command and general staff, is located and from where they direct ALL tactical operations and incident management, whether it is from a first response vehicle or in a full incident command post located in a building or an ICP within a base camp.

Incident management team

An incident management team is a group of highly skilled and trained personnel that work as a cohesive unit during the phase of an incident, often in support of a specific community or region and with a specific delegation of authority.

In summary, the difference between an incident command post (ICP) and an emergency operations centre (EOC) is:

Incident command post (ICP)	Emergency operations centre (EOC)
Works at tactical level focusing on the specific incident only	Works at a strategic level focusing on the big picture of the incident. It does not have the operational focus
It is located near the incident	It is not located at the incident place
Is responsible for operational activities	Provides resources, coordination and guidelines



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- Wildland Fire Investigation
- Leadership for the Wildland Fire Officer
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- Leadership Programme

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UNITI

DISASTER RISK ASSESSMENT TOOL

Uniti, in collaboration with DMS NPC, developed a disaster risk assessment (DRA) tool that can be accessed online and utilised by every official from all spheres of government, all departments or the private sector in order to develop a dynamic risk profile for the areas for which they are responsible. Even more, communicate and manage incidents.

The Uniti Disaster Risk Assessment Tool has been developed to ensure compliance with the requirements and objective of key performance area (KPA) 2 ie “Establish a uniform approach to assessing and monitoring disaster risks that will inform disaster risk management planning and disaster risk reduction undertaken by organs of state and other role players.” This indicates clearly that risk assessment must be done before any risk reduction or developmental planning can be undertaken.

It is generally far more cost-effective to prevent disasters from occurring beforehand rather than recover from them afterwards. In developing countries, the United Nations Development Programme (UNDP) is promoting the goal of sustainable development and it is argued that disaster risk awareness considerations should be incorporated into all development programmes and planning, both to protect the development process and to reduce the risk of wasting scarce development resources. Disaster management legislation in South Africa aims to further mitigate and to include these measures in the Integrated Development Plans (IDPs) implemented throughout the country. These projects are prompted by growing awareness of the disaster risks faced and increasing realisation that some level of protection is necessary and possible.

The question that arises is, ‘How must disaster risks be assessed and how can decisions be informed and reached on the appropriate level of protection necessary to effectively manage disaster risk?’

Disaster risk is a dynamic process that is influenced by a combination of hazard, conditions of vulnerability and available capacity to manage risk. The conditions and processes that influence disaster risk could include urban growth,

increased informal settlement density, infrastructure development and the intensification of climate change.

Disaster risk is the potential loss of life, injury or destroyed or damaged assets, which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of a hazard, exposure, vulnerability and capacity. Disaster risk therefore depends on a combination of three factors:

- The severity, probability, predictability and frequency of the hazard eg flood or drought
- The conditions of vulnerability of the people, property and the environment exposed to the hazard and
- The available capacity to manage the disaster risk.

The above translates into the following formula, which has been adopted for use by the Uniti risk assessment tool:

$$\text{Disaster Risk} = \text{Hazard} \times \frac{\text{Vulnerability}}{\text{Capacity}}$$

In other words, the impact associated with a disaster risk is determined by the nature of the hazard, occurring in an area exhibiting a certain degree of vulnerability, with a certain level of available capacity to manage the consequences should they occur.

The outcome of a comprehensive disaster risk assessment process is a dynamic risk profile, depicting the various areas and communities at risk, identified vulnerabilities associated with identified hazards, as well as the capacity existing in the area.

A dynamic risk profile requires the undertaking and regular review of the following:

- Identification and quantification of priority risks
- Mapping of hazards, vulnerabilities, capacities and high risk areas and
- Plotting of risk quartile matrix for decision-making and priority risk reduction planning purposes.

The Uniti Disaster Risk Assessment Tool enables users to:

- Regularly update their risk profiles (hazards/vulnerabilities/capacities)
- Build capacity
- Improve risk reduction through enhanced prioritisation of risk reduction planning and decision-making
- Rapidly respond and recover from the impacts of risk, (incident

- management) and
- Enhance the management of communication and reporting for all the above.

The Uniti Disaster Risk Assessment Tool makes use of the above process to generate a dynamic risk profile, producing the deliverables:

- Mapping of hazards and vulnerabilities (including critical facilities)
- Quantification of hazard index, vulnerability index, capacity index, risk and resilience scores and priority index shown in attribute tables
- Hazard and vulnerability attribute tables associated with mapped areas providing details of each of the components of risk, including quantification scores.
- Risk quartile matrix, plotting priority risks across four quadrants in order to determine the most effective/feasible risk reduction measure for the disaster risk in question, based on the outcome of the quantification of the disaster risk components.

Risk reduction measures include: tolerate/accept, treat/mitigate, transfer/contingency planning and terminate/prevent. Outcomes of this process include a list of priority areas with associated priority risks for the development of contingency plans, as well as risk reduction plans for consideration and inclusion in the IDP.

In addition, the risk quartile matrix is a useful disaster risk monitoring and evaluation tool, enabling one to measure the success of risk reduction interventions/ measures following the review of one’s risk profile. Regular reviews are necessary to ensure a dynamic risk profile, which should be undertaken at least seasonally, before/after major development and following major incidents.

The Uniti Disaster Risk Assessment Tool is only one of the many features available on the Uniti platform. It not only provides one the capability to manage a dynamic disaster risk profile but also provides a comprehensive disaster management communication system as well as an incident management system. For more information on these and other features of the Uniti system, contact Uniti on Tel: 021 422 2771 or DMS NPC’s Tinus de Beer on cell: 082 453 6509 or visit the following websites: www.disastermanagement.co.za and/or www.dms-online.co.za.

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UNITI
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Uniti has partnered with DMS NPC for implementation, training and support purposes. DMS NPC is an organisation whose vision it is to ensure resilient communities that are self-reliant and adaptable through sustainable livelihoods. DMS NPC is a member of DMISA and IRMSA and has accreditation from LGSETA, Services SETA, TETA and AgriSETA.

DMS NPC
Enhancing Community Resilience



DMISA EXCO AND COUNCIL ANNOUNCED FOR 2018 TO 2020

The Disaster Management Institute of Southern Africa (DMISA) announced its office bearers for 2018 to 2020 at a special council meeting held on 21 September 2018 at the Kopanong Hotel and Conference Centre situated in Benoni in the Gauteng Province. The special council meeting was followed by DMISA's 2018 annual general meeting (AGM). A moment of silence was observed in silent reflection of the lives lost during the past year's disasters. Also noted was the passing of South African Weather Service (SAWS) stalwart and chief forecaster, Dr Eugene Poolman. On a lighter note, congratulations were extended to Erika Swart, who has been appointed as head

of centre for the Ekurhuleni Disaster Management Centre.

DMISA office bearers for 2018 to 2020

Mr Mduzuzi Lancelot Nxumalo takes over as president of DMISA from Mr Bafana Mazibuko and Mr Owen Becker was elected deputy president. Mr Pat Adams was re-elected as chairperson of the DMISA Executive Committee (EXCO).

EXCO for the period 2018 to 2020

President: Mr M Nxumalo
Deputy-president: Mr OH Becker
Immediate past president: Mr BA Mazibuko
Chairperson: executive committee: Mr P Adams

Additional members: Dr JA Minnie, Ms ESM Tsebe and Ms L Mosotho.

DMISA Council for 2018 to 2020

Mr M Nxumalo, Mr OH Becker, Mr BA Mazibuko, Mr P Adams, Dr JA Minnie, Ms ESM Tsebe, Ms L Mosotho, Ms N Solomons, Ms BF Swart, Mr TE Motlale, Mr O Kgole, Ms T Moumakwa, Mr T Khupari Dr J Belle, Ms M Machogo, Ms J-M Strauss, Mr N Rylands, Mr B Ntsebesha, Ms M Gwala, Dr M Reddy, Mr SW Carstens, Mr G Otto and Ms A Bruwer.

Congratulations on those serving for the next two-year period. May the Institute go from strength to strength 🇷🇷



Mr Bafana Mazibuko handing over the presidential chain to Mr Mduzuzi Nxumalo



Mr Mduzuzi Nxumalo, president and Mr Owen Becker, vice president

TWO GOLD COMMENDATIONS

AWARDED AT DMISA'S ANNUAL CONFERENCE

Two Gold Commendations were awarded at DMISA's annual conference held in Ekurhuleni in 2018. The Gold Commendations were handed over by the chairperson of the DMISA Executive Committee (EXCO), Mr Pat Adams to outgoing president, Mr Bafana Mazibuko and deputy president, Mr Mduduzi Nxumalo.

Mr Bafana A Mazibuko

- In commendation of his outstanding service to the disaster management profession and the Institute and in promoting disaster risk reduction in southern Africa
- For his undivided upholding and promoting of the objectives of the Institute
- His unselfish consideration and caring for the wellbeing of his colleagues
- And for the exemplary manner in which he is serving his term as president.

Mr Mduduzi L Nxumalo

- In commendation of his outstanding service to the disaster management



Mr Pat Adams handing over the Gold Commendations to Mr Bafana Mazibuko and Mr Mduduzi Nxumalo

- profession and the Institute and in promoting disaster risk reduction in southern Africa
- For his undivided upholding and promoting of the objectives of the Institute
- In recognition of his diligent and unwavering contribution to the

- success of conferences
- And for the exemplary manner in which he is serving his term as deputy-president.

Congratulations to Mr Bafana A Mazibuko and Mr Mduduzi L Nxumalo for their remarkable achievement! 🇿🇦



Mr Pat Adams was re-elected as chairperson of EXCO



Mr Bafana Mazibuko, Mr Pat Adams, Mr Mduduzi Nxumalo and Mr Owen Becker



DMISA EXCO for the period 2018 to 2020

DMISA HOLDS DISASTER RISK REDUCTION 2018 CONFERENCE IN EKURHULENI

The Disaster Management Institute of Southern Africa (DMISA) held its annual conference at the Kopanong Hotel and Conference Centre situated in Benoni in the Gauteng Province. Themed 'Mobilising future ready resilience: Sustainability reducing disaster risk and disaster impact, today and tomorrow', the conference was held on 19 and 20 September 2018 and co-hosted by the City of Ekurhuleni Metropolitan Municipality and supported by the South African National Disaster Management Centre (NDMC), the South African Weather Service (SAWS) and the Gauteng Provincial Disaster Management Centre.

The two-day conference provided opportunity for a diverse range of stakeholders in disaster management from across Africa to gather and share skills, knowledge and experience and was preceded by a workshop on the development of national guidelines for initial on-site assessment being developed by the National Disaster Management Centre (NDMC).

Dr Mal Reddy presided over the opening of the conference with the traditional candle lighting ceremony and a minute of silent reflection for those whom had passed. Special mention was made to the loss of three fire fighters during the high rise fire in the Johannesburg CBD.

Ekurhuleni Metro's Community Safety MMC, Vivian Chauke, welcomed dignitaries, delegates and sponsors and provided an overview of Ekurhuleni's disaster management activities.

The keynote address was delivered by Dr Zweli Mkhize, National Minister of Cooperative Governance and Traditional Affairs (CoGTA), who called on municipalities to prioritise disaster risk planning and mitigation.

Dikgang Uhuru Moiloa, MEC for CoGTA, Gauteng Province provided the status quo of disaster management in the Gauteng Province.

SAWS' Mnikeli Ndambe discussed 'Towards a weather and climate informed disaster risk management' saying that knowledge in disaster risk management is not only to communicate what we know

but also to recognise what we don't know. "There is no doubt that all disaster risk management actors, scientific experts, policymakers and practitioners are confronted with the following key challenges ie partnerships, knowledge and innovation.

Dr Mmaphaka Tau, Head at the NDMC provided an extensive overview of the current status of disaster management in South Africa from the NDMC's perspective. His presentation detailed South Africa's climatic zones, fire services, regional and international collaborations and strategic partnerships and sector leaderships. Dr Tau furthermore discussed the some key drivers of disaster risks in South Africa ie: KPA 1: Integrated institutional capacity for DRM, KPA 2: Disaster risk assessment, KPA 3: Disaster risk reduction, KPA 4: Response and recovery and the enablers. He elaborated on the key challenges and provided feedback on the 2017 DMISA Conference resolutions.

Dr Johan Minnie provided a presentation on the future of resilient sustainability explaining how we influence future risk and how to mobilise future ready resilience that sustainably reduces disaster risk and the impact of disasters and enable sustainability in general. He detailed the critical requirements needed and said that the future of resilient sustainability depends on sustainability focusing wider than development and economics, an inclusive definition of resilience ie also future-ready, increased innovation in resource use and continued effective combined efforts to reduce direct losses. As accelerators he added digital twinning for improved exploration, simulation and learning and improved risk communication and information design.

Head of KwaZulu-Natal Provincial Disaster Management Centre, Jonty Ndlazi's presentation focused on 'Radical transformation for disaster risk management – a case of KwaZulu-Natal Province'. Ndlazi shared the intricacies in complying and the implementation of Disaster Management Act by various stakeholders at all levels saying that stakeholders at all levels must assess risks, plan and implement disaster risk reduction measures with the relevant communities from a ward level, for if we fail to plan we are planning to fail.

During the plenary sessions Francis Hoets, director of operations, DIMS NPC, discussed Strengthened early warning institutional arrangements for the enhancement of community resilience while Elisabeth Webster of SAWS's presentation focused on 'Impact-based severe weather early warning system: Experiences from the pilot phases as well as implementation in early 2019. A presentation on 'Flood early warning for flood and climate resilient cities of the future' was presented by Bongani Dladla of Royal Haskoning.

Mass fatality management: inclusion of forensic pathology services in disaster management was the topic of Jaco Louw of Forensic Pathology Services. He described the mandate, role and function of the Forensic Pathology Service and detailed the minimum forensic pathology mortuary standards vs mass fatality management. He said that the overall disaster preparedness for mass fatality management requires continuous planning, involvement and partnerships in line with the Disaster Preparedness Framework between Forensic Pathology Services and local DMCs and other stakeholders.

Gauteng PDMC's Lindokuhle Ngubane discussed 'Mainstreaming climate change adaptation and disaster risk reduction in the Gauteng Province'. "Successful implementation of this framework will depend on executive and political ownership", said Ngubane. The mainstreaming of climate change adaptation into disaster risk reduction in the province should theoretically allow for the gradual implementation of climate change response measures within existing budgets balancing incremental costs with the economic, environmental and social values produced, realising no-regrets interventions, rather than necessitating additional dedicated climate change budgets in an already resource scarce municipal context.

Western Cape PDMC's chief director Colin Deiner discussed integrated fire and disaster response during the Western Cape storm disaster on 7 June 2017. Deiner described the provinces fire risk, its preparedness and response to the incident, storm warnings, incidents and response, PDMC activities and multi-agency command. He also detailed the wildfire incidents and operational

response and post-incident burn scars and rebuild programme.

Charissa da Costa of Aurecon provided information on 'Climate change adaptation: subsistence agriculture in Genadendal, Western Cape' while A-aihash Modack and Daniël Brink of Aurecon discussed urban and regional planning for a resilient future.

Alize le Roux of the Council for Scientific and Industrial Research (CSIR) discussed 'The Green Book: planning support tool for identifying and adapting South African settlements at risk to the impacts of climate change'. Le Roux said the Green Book was commissioned with the aim of supporting municipal planning on the development of climate-resilient cities and settlements through research in climate adaptation, ultimately facilitating the mainstreaming of climate change adaptation and disaster risk reduction into local government planning instruments.

DiMTEC's Prof Andries Jordaan provided a report on disaster management in South Africa he compiled on request from Southern African Development Community (SADC). Prof Jordaan provided background on his research methodologies and reported on the disaster risk reduction activities different departments. He also

shared a detailed SWOT analysis and said that the study focused on the disaster risk management system and therefore governance was under spotlight.

Schalk Carstens discussed the Western Cape Drought Disaster Preventing Day Zero - What if? Carsten's said that the 'Blame Game' arises because there is currently lack of clarity of what and when the National Department of Water and Sanitation (National Water Act) and municipalities and water authorities (Water Services Act) and where the responsibility is vested in the National Department of Agriculture. The development of a directive of emergency procurement in declared disasters will remove any obstacles and ensure appropriate response to declared disasters.

Jurgens Dyssel of the NDMC discussed the Guidelines on contingency planning saying that this guideline provides a structure (template) to draft a contingency plan and lists preparedness and response as the two main components of a contingency plan. It specifies various sub-components for each component to be put in place by an organ of state to adequately prepare for and respond to an occurrence.

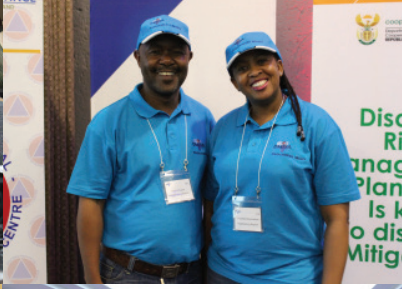
Nabeel Rylands shared the Western Cape's experience on drought risk

information management. Rylands said that there is a need to establish a Spatial Information Forum, which will ensure that credible data sets are available to stakeholders to inform decision making. The structure must include all stakeholders who are addressing water security, economic security, humanitarian relief, safety and security as well as communications. Various data sets must be combined in the development of the risk profiles and risk registers for the different disasters that can occur in municipalities, provinces and nationally, so that informed risk reduction interventions could be developed.

Dr Roman Tandlich of Rhodes University discussed 'Social unrest, business continuity and resilience of public services in South Africa while Dr Johannes Belle of DiMTEC's presentation focussed on an exploratory assessment of water scarcity and economic impact thereof on businesses in a small town of Senekal in the Free State Province. Manelisi Ndaba discussed the 'Pilot resilience programme in the uMgungundlovu District.

A panel discussion followed, which focussed on mobilising future ready resilience – sustainably reducing disaster risk and disaster impact, today and tomorrow.







DISASTER MANAGEMENT INSTITUTE OF SOUTHERN AFRICA



IDDR COMMEMORATED IN UPINGTON, NORTHERN CAPE

International Day for Disaster Reduction (IDDR) 2018 was commemorated at Naba Lodge in Upington in the Northern Cape on 15 and 16 November 2018 and was hosted by the National Disaster Management Centre (NDMC), in collaboration with the Northern Cape Provincial Disaster Management Centre (NC PDMC) and ZF Mgqawu District Municipality. The commemoration was held over two days and included a Disaster Risk Management Practitioner’s Session with 179 participants and 350 people in attendance for the main IDDR commemoration event.

Since its inception in 1989, after a call by the United Nations General Assembly for

a day to promote a global culture of risk-awareness and disaster reduction, IDDR celebrated annually on, 13 October has been raising awareness of how people as individuals and communities around the world reduce their exposure to disasters and educating others about the need to reduce the risks.

The gathering of various sectors in Upington provided an opportunity to not only celebrate this important day but to reflect, share case studies and plan going forward how every person can contribute in reducing the risk of disasters. The two days engagements were seized with the question, “How do we reduce disaster risk and build

resilience by moving from commitments to impactful action?”

Disaster Risk Management Practitioner’s Session

Climate change was raised sharply as one of the key challenges facing communities through changes in weather and climate hazards. Natural hazards and climate change extremes pose a significant development challenge to the region. The issue of drought dominated discussions as the Northern Cape, like many other Provinces across the country was affected by drought; hence it became a simple case study understood by all in attendance looking at its negative impact.

Phillip Seane, acting chief director of the Northern Cape PDMC, welcomed delegates and encouraged all stakeholders to increase their levels of disaster risk preparedness and in their areas of work to be ready for eventualities, as disasters do not negotiate their occurrence and their associated impacts. “Disasters are a reality, for example drought, veld and urban fires that are being experienced in many parts of South Africa”, said Seane.

Dr Mmaphaka Tau, head of the NDMC, said in his presentation that the deliberations and resolutions of the DRM Practitioners Session must positively contribute towards service delivery. Dr Tau said that on 28 October 1982, the World Charter on Nature was developed and adopted by most countries of the world, which



emphasised a collective endeavour to protect nature and advance sustainable use of natural resources, both biotic and abiotic. The Charter echoed a need for the development and implementation of integrated measures and plans aimed at disaster risk reduction.

He emphasised the need for development programmes that will result in accumulated positive change and reduce the risk of disasters. Dr Tau highlighted the strategic role of disaster risk management in the attainment of the Sustainable Development Goals (SDGs) that are fundamental pillars of Disaster Risk Reduction and sustainable development and growth. Dr Tau encouraged all practitioners to think globally and act locally.

Nosiseko Mashiyi of the South African National Space Agency (SANSA) discussed the 'Effects of drought on vegetation: Earth Observation' and presented an overview of SANSA's programmes and products that support disaster risk management functions such as the National Mosaic that spans from 2006 to 2016, outlining landscape changes over time. Mashiyi emphasised the relevance of Earth Observation's data as an enhancer in human settlements mapping and monitoring; water resources mapping and monitoring; disaster management based on real-time data and the vegetation mapping and monitoring. She added that data on drought monitoring is one of the valuable data sets, which could assist disaster managers in managing and monitoring drought, including simulation of potential impacts to crops and rangelands.

The South African Weather Services' (SAWS) Mnikeli Ndabambi discussed 'Climate variability and climate change: exploring modelling scenarios for the country' and said that South Africa is affected by global climatic conditions. South Africa is amongst countries projected to experience an increase of between one to two degrees Celsius per annum of near-surface temperatures, suggesting global warming is upon us. He added that weather and climate is unavoidable and impacts in the economy, lives and social dimension. Ndabambi encouraged all participants to continue with the implementation of the Paris Agreement as part of contributing towards reducing the impact of climate change. He warned participants of the forecasted risk of prolonged and long term drought. "We need to move towards rotating climate sensitive route".

Louwrens Ferreira of the Department of Environmental Affairs (DEA) presented on a 'Nexus between invasive plants and drought: the effect of invasive plants



in ecosystems of the Northern Cape', highlighting the negative effect of invasive plants as a factor that reduced the mean annual runoff. His presentation focused on the Savannah and Nama Karoo Biomes. Ferreira reported that 97 percent of the Northern Cape is exposed to risk of degradation due to high populations of invasive plants such as the honey mesquite and velvet mesquite, which are the main Category 3 invader *Prosopis* species in the province. He added that about 360 000ha of land in the Northern Cape had closed *Prosopis* stands that used about 90 billion litres of water per annum. "Since 2001 to date, Working for Water has cleared about 63 000ha of land infested with *Prosopis* sp. at a cost of R220 million."

Mr O Thebe, Department of Water and Sanitation, discussed the approach used by his department in managing drought conditions and highlighted four key drought types. He said that at the start of the current drought, there was confusion on who had to lead the response coordination. Thebe added that this was attributable to lack of understanding on who the owner of a drought disaster was. He emphasised the need to improve coordination in the assessment and verification of drought and to ensure rapid response to water shortages as a result of drought. He highlighted the need for improvement of capacity of municipalities or Water Service Boards as implementing agents of water supply to localities. He further highlighted the need for an enhanced drought monitoring and floods early warning systems and the need to improve and better coordinate communication in the management of drought or any future disasters such as floods.

Exploring adaptation scenarios: drought, a multi-faceted, slow-onset phenomena was the topic of Dr Mokhele Moeletsi of the Agricultural Research Council, South

Africa (ARC). Dr Moeletsi shared details on a number of ARC's research programmes including rainwater harvesting technology. He encouraged participants to promote conservation agriculture through minimum tillage as an adaptation strategy to drought. "The development of drought early warning systems is necessary and improved drought information dissemination to users."

The KwaZulu-Natal PDMC's Sibongiseni Ngema discussed 'Drought management: interventions in sustaining the provincial economic activities/drivers in KwaZulu-Natal' and shared the province's experiences in managing drought disaster including the role of the PDMC coordinating, facilitation and provisioning of support. Ngema illustrated through the Standardised Precipitation Index (SPI) that the northern parts of KwaZulu-Natal was the most drought-stricken areas. He reported on various interventions implemented by the province as part of managing the drought such as the war on water leaks, the implementation of water restrictions and the supply of water tankers to communities by Department of Water and Sanitation. "The Department of Basic Education (DBE) installed water tanks in some schools in areas of high risk of water scarcity. The province drilled, equipped and refurbished some boreholes. A further funding of R122 Million was approved for the extension of drought interventions.

Kwela Nceba of the Western Cape PDMC presented on 'Drought management: Interventions in sustaining the provincial economic activities/drivers in the Western Cape' and outlined various strategies deployed by the Western Cape Government in averting 'Day-Zero'. Nceba shared few proposals for future management of slow-onset disasters such as drought ie clarity on the roles between various government sector departments and consistent risk communication and messaging. ▶



▶ Voice of Farmers' Ms S Vivashi provided information about her farming enterprise and highlighted some of the challenges farmers face during drought conditions. She farms three commodities ie cattle, goats and sheep and said that there has been a substantial decrease in rainfall and veld production recently, which impacted on livestock productivity and source of livelihood. As a farmer, she was forced to adapt her farming approach, fed livestock and send them into the market earlier than it is of economic benefit. Amongst challenges highlighted, was the lack of support for small-scale or emerging farmers.

Land care for agricultural productivity was the topic of Victor Mohlabe of the Department of Agriculture, Forestry and Fisheries (DAFF)'s presentation who said that land degradation is a result of human actions. He emphasised the importance of sustained interventions in addressing long term drought impacts and emphasised the need to educate the youth and build human capacity (information) in mitigating the effects of disasters.

A case study on capacitating Namakwa District Municipality Fire Services was presented by Leon Vermeulen of Karoo Hoogland Municipality and the NDMC's Lloyd Phetlhu as supported by Santam.

Dr Moses Khangale of the NDMC presented on the current partnerships between the NDMC and the Namakwa District Municipality in building the capacity of fire services in the district. Dr Khangale also presented a 12 point plan on improving veld fire preparedness by district municipalities, with a special focus on the Namakwa District Municipality. In addition, he discussed the role of the private sector in disaster risk management on behalf of Santam.

Nkosizankusa Mankayi of the Council for Geoscience discussed prevalent geo-hazards in South Africa, outlining the council's functions and highlighted the need for coordination towards sustainable development on dolomitic land. She said that Dolomite occurrence is prominent in parts of the Northern Cape ie and parts of the North West, extending to Gauteng. Mankayi highlighted that repairing sinkholes is very costly. She emphasised sustainable land use and management practices in dolomitic areas adding that sinkholes influence property value. "Water management is critical for houses build on dolomitic sites."

IDDR 2018 commemorations

The Minister of Cooperative Governance and Traditional Affairs (CoGTA), Dr Zweli Mkhize, led South Africa's celebration of the 2018 International Day for Disaster Risk Reduction (IDDR) calling on better planning and coordination to implement disaster risk reduction plans. Minister Mkhize was joined by the premier of Northern Cape, Sylvia Lucas; MEC responsible for Local Government in the Northern Cape, Bentley Vass; the executive mayor of Dawid Kruiper Local Municipality, Mayor Limakatso Kolo; acting executive mayor of ZF Mgcawu District Municipality, Mayor Mpho Mashila as well as key stakeholders including councillors, emerging farmers, traditional leaders and representatives of private sector institutions.

The second day of the IDDR celebration began with a site visit of the 323km flood diversion wall project in the vicinity of Upington along the banks of Orange River. This project will benefit farmers who suffered extensive multiple damages due to flooding of the Orange River. Once fully completed, the project will have cost around R1,1billion. From the disaster point of view, this wall

protects economic investment such as the farms managed by the emerging farmers. The high proportions of Prosopis invader plant species with its deep root systems and high water consumption deplete the groundwater table with a potential to cause land degradation and ultimately, desertification.

Addressing delegates, Premier Sylvia Lucas called for better planning for disasters to ensure preparedness and also emphasised the need for resourcing such plans for better and impactful implementation.

In his address, Minister Mkhize emphasised the significance of IDDR as a celebration of how people and communities around the world are reducing their exposure to disasters, which will in turn contribute to the achievement of IDDR 2018 theme, 'Investing in disaster risk reduction for resilience', reducing direct disaster economic losses in relation to gross domestic product by 2030. He called for the reduction of exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, improving preparedness and early warning for adverse events are all important and will surely assist in medium to long term to reduce the risk of disasters.

Minister Mkhize said that even though the country received summer rainfalls in different parts, drought conditions persisted particularly in the Western Cape, Eastern Cape and Northern Cape provinces where provincial state of disasters were declared in terms of the Disaster Management Act, 2002. He highlighted the funding totalling R79,1 million allocated to dealing with the challenges of drought during 2017/2018. For the 2018/19 financial year, R84,6 million was allocated to the Provincial Department of Agriculture, Land Reform and Rural Development for the transportation and provision of livestock feed to the affected farming communities.

He also touched on the negative effects of veld fires within the context of disasters as it also poses a major hazard to human lives, livelihoods and ecosystem and property.

In conclusion, Minister Mkhize called for disaster risk reduction and increased resilience anchored on collaboration across governments and key stakeholders to generate and making more effective use of scientific data and information, identification of knowledge, use indigenous knowledge and capacity gaps and co-produce solutions that can effectively support decisions and actions towards resilience building. 🇿🇦

MALAWI LAUNCHES NATIONAL RESILIENCE STRATEGY ON DISASTER MANAGEMENT AT IDDR COMMEMORATION

On 19 October, 2018, Malawi commemorated the International Day for Disaster Reduction (IDDR) in Lilongwe, Malawi under the theme, 'Reducing Direct Disaster Economic Loss has the power to transform lives'.

The guest of honour to the function was Honourable Cecilia Chazama, the Minister of Home Affairs and Internal Security. Minister Chazama joined various partners in a solidarity march to the venue where she toured pavilions of various players in disaster risk management.

As one way of breaking the cycle of food and nutritional insecurity and other humanitarian crisis, the Malawi Government intends to launch a National Resilience Strategy (NRS) to serve as a roadmap to guide programme designs, funding decisions and other priorities.

This was disclosed by the Malawian Minister of Home Affairs and internal security, Cecilia Chazama in Lilongwe at the IDDR commemorations.

She said that the NRS will help the government and its development partners to face and deal with challenges the country meets in many crises. "This NRS will be implemented by ministries' departments and agencies, civil society organisations, the private sector and the United Nations (UN) agencies", said Minister Chazama.

She added that the country is making strides towards building resilience but there are challenges being faced. There is a need for more risk-informed investments that will ensure integration and coherence. The NRS launch comes as a wakeup call after the 2015 disaster where it is estimated that the country lost US\$335 million while the cost of recovery was pegged at US\$494 million. At the same time it is also estimated that the 2016 drought recovery was pegged at US\$500 million.

Chief secretary to the Office of the President and Cabinet, Lloyd Muhara, recently announced that Malawi is losing 1,7 percent of its Growth Development Product (GDP) to disaster. Muhara said there is a need for Malawi as a country to reverse



the situation for among other things, applying various interventions.

The 2018 theme IDDR theme continues as part of the Sendai Seven campaign, centred on the seen targets of the Sendai Framework. This year focusses on Target C of the Sendai Framework, reducing disaster economic losses in relation to global GDP by 2030.

In fulfilling its mandate of serving the youth, women and children, YONECO is working tirelessly to contribute towards mitigating the impact of natural disasters through their

helpline caravans as well as ensuring disaster preparedness through raising awareness on the national radio station, YONECO FM. Further to this, they are in partnership with other agencies, which provide humanitarian aid in providing beneficiary feedback and response mechanisms through their toll-free helpline services.

YONECO showcased its ICT-based tools that are used in disaster response including its Helpline service and other interventions. YONECO FM broadcasted the event live from the venue, Masinth Ground in Lilongwe, Malawi. 📺

IDDR AND CLIMATE CHANGE

SYMPOSIUM HELD IN EKURHULENI



Dr Elias Sithole and Shadi Tsebe



Speakers at the IDDR and Climate Change Symposium held in Ekurhuleni

Gauteng Cooperative Governance and Traditional Affairs (CoGTA), together with the City of Ekurhuleni Disaster Management (DEMS), held a symposium on 9 November 2019 focusing on climate change in commemoration of the International Day for Disaster Reduction (IDDR) at the Boksburg Civic Centre in Ekurhuleni.

Programme director for the event, Bafana Mazibuko of Ekurhuleni DEMS, provided background to the symposium and IDDR, the effect of climate change on disasters and introduced the speakers.

Ekurhuleni MMC for Community Safety, Councillor Vivienne Chauke, highlighted the importance of committing to the ideals of the Sendai Framework for Disaster Risk Reduction 2015 - 2030 and detailed the

four key priorities. Councillor Chauke added that Ekurhuleni signed the pledge to the 2010 - 2020 World Disaster Reduction Campaign, 'Making Cities Resilient: My City is Getting Ready' on 7 November 2015. "We further pledged a commitment to the 'Ten-Point-checklist for Making Cities Resilient'. With the signing of the pledge, the City of Ekurhuleni is politically committed to the six enabling conditions for Disaster Risk Reduction and disaster resilience", she added. "Whilst the disaster management practitioners are implementing the requirements of the Disaster Management Act, we should do an oversight whether they are in line with the requirements of the Act and the Sendai Framework."

Dr Elias Sithole, Head of the Gauteng PDMC, said that there is definite need

to successfully integrate disaster management policies as part of the Gauteng Province's strategy on disaster risk reduction. He emphasised the importance for the need to build capacity as well as for emergency preparedness. "Disaster risk reduction must be included in the Integrated Development Plan (IDP) of each city," said Dr Sithole. "Gauteng Province spent R400 million on post-disaster recovery since 2010. This could have been spent developing resilient communities and preventing displacement," he added. He also mentioned the recent study commissioned by Gauteng Province to determine the flood-prone areas within the province.

Is'haaq Akoon of Ekurhuleni's Department of Environmental Resource Management provided an interesting presentation on Ekurhuleni's perspective on climate change and its proactive approach in building resilience. He highlighted the key environmental risks in the metro and the city's strategies and commitments to ensure a sustainable and resilient city. Akoon emphasised the importance of resilience mainstreaming within all departments.

The South African Weather Service's (SAWS) Elizabeth Webster explained impact-based forecasting, warnings and severe weather warnings, detailing international developments and providing information on the progress of SAWS' local Impact-Based Severe Weather Warning System pilot projects. "The Impact-based Severe Weather Warning System will change the Early Warning System to a user-orientated, risk-based



Is'haaq Akoon of Ekurhuleni's Department of Environmental Resource Management and Shadi Tsebe of DMISA

EKURHULENI APPOINTS NEW DIVISIONAL HEAD: DISASTER MANAGEMENT AND HEAD OF THE DISASTER MANAGEMENT CENTRE

Ekurhuleni has appointed Erika Swart as its new Divisional Head: Disaster Management and Head of the Disaster Management Centre. The centre is situated in Bedfordview, Ekurhuleni. After seven years of absence from the disaster management fraternity, Erika Swart returned to her previously held position in the City of Ekurhuleni, after serving more than thirty years in disaster management. She has been appointed from 1 September 2018 as Divisional Head: Disaster Management and Head of the Disaster Management Centre.

She left her previously held position in 2011 and has now taken up her present position. During her absence, she dedicated her time to assist the Southern Business School as a lecturer in Disaster Risk Reduction. She underwent several courses to align her for this task.

Swart has worked in the local government disaster management arena since 1981 and served in several positions since then. Presently she is a Fellow of the Institute and a master's graduate of the University of the Free State. The DMISA fraternity knows her as the conference coordinator and councillor of the Institute.

In order to address the disaster management challenges in the City of Ekurhuleni, the City's top 16 hazards were identified during a risk and vulnerability assessment of the city. The Ekurhuleni Disaster Management Centre, with the assistance of the relevant departments, identified risk mitigation, preparedness and prevention plans and activities in order to address these priority hazards.

Swart took over the position from Mr Bafana Mazibuko, acting Divisional Head:



Disaster Management and Immediate Past President of the Institute.

We wish Erika Swart well in her endeavours! 🇷🇺

weather warning system adapted for South African conditions”, said Webster.

Gauteng CoGTA's Nareema Solomons presented on behalf of Lindokuhle Ngubane of the Gauteng PDMC on the Provincial Climate Change Mainstreaming Framework. The presentation featured the legislative frameworks for climate change adaptation (CCA) and disaster risk reduction (DRR) in South Africa and detailed the Gauteng Provincial Government's policy on CCA and DRR and the research project to integrate CCA and DRR. “Successful implementation of this framework will depend on executive and political ownership. A key factor to the success of the framework is a high degree of cooperation amongst the spheres of government as well as political support,” she said. “The mainstreaming of climate change adaptation into disaster risk reduction in the Province should theoretically allow for the gradual implementation of climate change response measures within existing budgets balancing incremental costs with the economic, environmental and social values produced, realising no-regrets interventions, rather than necessitating additional dedicated climate change budgets in an already resource-scarce municipal context”, she concluded. 🇷🇺



City of Johannesburg disaster management volunteers joined the organisers



City of Johannesburg disaster management team



PART TWO

DROUGHT INDICATORS FOR SOUTH AFRICA

By Dr Andries Jordaan (PhD) PrSciNat, PrDM, MMM, DWD, Director, Disaster Management Training and Education Centre for Africa (UFS DiMTEC), Faculty of Natural and Agricultural Sciences, University of the Free State

This article provides a guide for drought indicators for South Africa. The proposed indicators are in line with international best practice. Two of the leading countries in the world on drought management, the USA and Mexico, utilise similar indicators for drought monitoring and drought declaration. The USA expanded the number of indicators to more than 20 and is therefore in a position to better monitor the impacts of drought at all levels. Ten primary indicators are proposed. This should be expanded in future. The National Drought Task Team of South Africa accepted the proposed indicators as a good start and we expect the Department of Agriculture, Forestry and Fisheries (DAFF) and the National Disaster Management Centre (NDMC) to formalise the use of these indicators for all of South Africa.

Drought indicators

The finalisation of the drought indicators discussed in this report followed a process of consultative meetings between representatives from AgriSA, the Department of Water and Sanitation (DWS) and the Agricultural Research Council (ARC) under the chairmanship of DAFF. All parties involved in the development of the drought indicator document agreed that it was work in progress and the guidelines and

indicators for drought declaration would be adjusted as we obtain more insight into especially the different thresholds. One of the major gaps identified are the thresholds for different types of drought and when a dry period becomes a drought, since these thresholds are not the same for all sectors due to the inherent differences in vulnerability and/or resiliency to drought.

Drought indicators proposed for South Africa are classified as primary and secondary indicators. The primary indicators are those indicators that are easy to monitor using meteorological data, satellite images and gauging stations, while the secondary indicators require actual field visits to the affected area. Not one single drought index fitted all needs to determine the different types of droughts. The idea with primary indicators is that continuous monitoring will take place and once certain thresholds are reached, drought classification can take place based on the thresholds and evaluation of secondary indicators are then activated. The secondary indicators serve to 'ground-truth' the impact of the dry period.

Drought indicators selected for South Africa

Table 1 summarises the thresholds for the indicators for different drought classifications.

One single indicator on its own is not sufficient to measure drought and a combination of indicators is required; for example, the six-month Standardised Precipitation Index (SPI) of $-1,3$ might indicate a D2 drought classified as a severe drought but the soil moisture content and the Normalised Difference Vegetation Index (NDVI) results remains within the D1 classification due to good rains prior to the six month period in which the SPI was measured. That will put the specific drought in a D1 category in spite of the low SPI values. In order to classify a dry period into a specific drought category, at least three of the indicator thresholds must concur. Composite indicators such as the (i) Combined Drought Indicator (CDI), (ii) Global Integrated Drought Monitoring and Prediction System (GIDMaPS), (iii) Multivariate Standardised Drought Index (MSDI) and (iv) United States Drought Monitor (USDM) should be implemented to monitor drought accurately. The National Drought Task Team (NDTT) specialist working group on drought indicators, however, proposed the indicators as shown in Table 1 as primary use for South Africa until the establishment of a drought monitor platform that should monitor drought in South Africa.

Dry periods and drought impact different sectors differently. Internationally it is

accepted to declare the D3 and D4 droughts as disaster droughts, during which time government safety nets should be activated. An analysis by Jordaan et al. (2010) in the Northern Cape and by Jordaan and Sakulski (2014) in the Eastern Cape shows that SPI -1,2 is already disastrous for smallholder and communal farmers due to their high vulnerability and low resilience.

The primary indicators shown in Table 1 should be supplemented with secondary indicators, which are more an indication of the impact of the drought. Indicators are grouped as meteorological, remotely sensed and hydrological.

Meteorological indicators

A negative deviation from the normal (climatological mean) precipitation, required to maintain adequate soil moisture water content for normal plant growth, supply of reservoirs, streamflow and groundwater level, may result in drought. Precipitation is the main source of water for soil moisture, reservoirs, streamflow and groundwater; the lack thereof affects all these indicators. South Africa does not have significant snowfall and snow as an additional source of water for rivers and dams is not considered. The Palmer Drought Severity Index (PDSI), for example, is an indicator used in the USA in areas where snow is a source of water.

The effect of abnormally high temperatures increases evapotranspiration as well as stress in plants whilst further depleting surface water reserves through evaporation. High temperatures coupled with low relative humidity and desiccating or continental winds result in large water demands by vegetation. When the condition prevails over long periods it may lead to drought. The percentage of normal precipitation and SPI are recommended as meteorological indices for South Africa.

Precipitation expressed as percentage of the long term mean

Total precipitation for any period is expressed as a percentage of the long term average. Below the threshold of 75 percent for a certain period, the index may indicate meteorological drought. Depending on the period for which the deviation is calculated, it may serve as an indicator for both agricultural (12 months and less) and hydrological (24 months and more) droughts. Important, however, for especially crop farmers is the timing of the deviation. A low percentage of normal precipitation combined with high temperatures during the growing season of specific crops might have disastrous results. On the other hand, a

low percentage of normal precipitation outside the growing season might not be as damaging.

Standardised Precipitation Index (SPI)

The SPI quantifies precipitation deficits at variable time scales and provides an indication of drought intensity and duration (severity), based on the historical distribution of rainfall. It has been applied with success in various parts of the world. Its simplicity and application over a wide range of climatic regions and all seasons makes it an attractive tool for delineation of drought conditions. The SPI has been used to track the evolution of drought at time scales ranging from 1 to 24 months or longer. Depending on the relevant period, the index can be used to identify both agricultural and hydrological droughts.

Important, however, is the time scale of measurement and during which season it is applied. The three-month and six-month SPI during the growing season is very important for crop farmers since a low three- and six-month SPI from November to March in the summer rainfall area can result in total crop losses. The 12-month and 24-month SPI is more relevant to livestock farmers but a low six-month SPI during the growing season might also impact negatively on livestock farmers.

The SPI and Standardised Precipitation Evapotranspiration Index (SPEI) are, globally, the preferred index to be used for drought risk assessment (WMO, 2009), henceforth the use of the SPI and SPEI as the preferred indicators for drought classification. In order to understand the meaning of SPI and SPEI, one should also review some other definitions and concepts related to these indices (McKee et al., 1993; Western Regional Climate Centre, 2011). Tom McKee, Nolan Doesken and John Kleist of the Colorado Climate Centre formulated the SPI in 1993 to give a better representation of wetness and dryness to quantify a precipitation deficit for different time scales and for different locations. It was designed to be an indicator of dry and wet periods that recognises the importance of time scales in the analysis of water availability and water use (McKee et al., 1993; 1995; Keyantash and Dracup, 2002; Moreira et al., 2008).

The advantage of the SPI and SPEI is that one can relatively easily analyse dry periods or anomalously wet periods at a particular time scale for any location in the world with daily precipitation records (McKee, 1995; Moreira et al., 2008).

The appropriateness and robustness of these indices to characterise dry periods has already been shown in several studies (Keyantash and Dracup, 2002; Paulo et al., 2003; Paulo and Pereira, 2005; 2007; 2008, Moreira et al., 2008). The SPI has the following desirable traits (McKee et al., 1993):

- SPI is uniquely related to probability.
- The SPI is normally distributed and is therefore useful to monitor dry and wet periods.
- Because of the normal distribution of SPI, the drier and wetter climate regimes are represented in a similar way.
- The precipitation data used in SPI can be used to calculate percent of mean precipitation for a specific time period.
- The precipitation data used in SPI can be used to calculate the precipitation deficit for a specific period.

Remotely-sensed agricultural drought indicators

Earth Observation (EO) data can be employed to provide information on the abundance and condition of vegetation. The data are remotely sensed and unlike several other climate products, which are interpolated from point values, they are comprised of contiguous pixels representing conditions on the ground. Various bands in the visible through near infrared and short wave infrared are sensitive to, amongst others, various characteristics of vegetation.

Normalised Difference Vegetation Index (NDVI)

The Normalised Difference Vegetation Index (NDVI) expresses vegetation health in terms of the amount of reflectance/radiation in the red and near-infrared bands. The index is used to analyse remote sensing measurements and assess whether the target being observed contains live green vegetation or not. The NDVI is often directly related to other ground parameters such as percentage of ground cover, photosynthetic activity of the plant, surface water, leaf area index and the amount of biomass. Several derivatives of this index, based on cumulative and historical data, may provide information on the duration and intensity of drought, while the contiguous nature of the data is an excellent indicator of the spatial extent of such a drought.

The Vegetation Condition Index (VCI)

The VCI compares the current NDVI to the range of values observed in the same period in previous years. The VCI is expressed as a percentage and gives an idea where the observed value is situated between the extreme ►

Cat	Description	Freq.	Meteorological	
			% of Normal Precipitn.	SPI
D0	Dry	1:3yr	< 75% for 30 days	-0,5 to -0
D1	Moderate drought	1:5yr	< 70% for 30 days	-0,8 to -
D2	Severe drought	1:10yr	< 65% for 180 days	-1,3 to -
D3	Extreme drought	1:20yr	<60 % for 180 days	-1,6 to -
D4	Exceptional drought	1:50yr	< 65% for 360 days	-2 or less

Table 1: Drought classification and index thresholds

- ▶ values (minimum and maximum) in the previous years. Lower and higher values indicate poor and good vegetation state conditions, respectively.

One of the challenges for the use of VCI is the fact that the satellite data do not distinguish between man-made droughts as a result of overgrazing and actual drought. Therefore, one should consider different indicators in combination with each other.

The Percentage of Average Seasonal Greenness (PASG)

The PASG provides an indication of the cumulative vegetation activity over a specified period ie a growing season, relative to the long term average for the period. The index expresses the current cumulative vegetation activity determined by the cumulative NDVI as a percentage of the long term average cumulative NDVI value for the specified period. Over a shorter time span, such as a three-month to six-month period, the PASG provides an overview of conditions relating to possible drought stress during a growing period and is therefore relevant for the monitoring of agricultural drought. At a 24-month time scale, the index may be more applicable as an indicator for hydrological drought.

Soil Moisture Index

Drought occurs when the balance between rainfall, evapotranspiration and

discharge leaves less available water in the soil storages than necessary for plant growth and for support of animals. The key role of available soil moisture in the root zone is providing food for people and animals. This feature places accurate monitoring and effective responses as central issues in food security. In this regard, drought can be considered as a combination of moisture deficit and land use due to this idealised cause-effect relationship, which assumes that a shortage of rainfall (the cause) leads to a soil moisture deficit that results in a reduction of vegetation production (the effect). This relationship gives an opportunity to provide an early warning system for drought by monitoring soil moisture. Remote sensing of soil moisture is a new development with good potential for drought monitoring.

Hydrological indicators

Hydrological indicators are important for the irrigation sector and these are an indication of the amount of water available for irrigation. Livestock farmers also depend mostly on groundwater and potable water for livestock drinking water and are, as such, also threatened by hydrological drought. Streamflow and dam level indicators are not finalised as yet and there is still a knowledge gap in South Africa in this regard. Obviously, critical river levels will differ according to watershed characteristics as well as the time of the year. Low streamflow

levels just before the rainy season might not be critical if compared to after the rainy season; the same applies for dam levels and groundwater levels. The measurement for streamflow, dam levels and groundwater levels should be translated to an index, which represents the percentage of normal long term flow during a specific time of the season. One possible method is the use of the same calculations used for SPI or the Z score. The Z score is calculated as follows:

$$Z = \frac{X - \bar{X}}{\sigma}$$

where X = streamflow value (observed or simulated)
 \bar{X} = mean streamflow for the same period of measurement (observed)
 σ = Standard deviation

Reservoirs/dams

Generally, a reservoir is a storage system created by a wall across a river and its purpose is for harvesting water during the rainy season when streamflow rates are more than the required water supply abstraction rates. Therefore, during dry and/or drought periods water supply is sustained by appropriate releases from the reservoir. The reservoir storage level is therefore a function of the season's runoff amounts, meaning that during drought little water is harvested and the reservoir level will be low. Based on previous records, the Department

Remote sensing			Hydrological					
NDVI	PASG	1-month VCI	St Veg Health Index	CPC Soil Moisture %	Dam levels zone Z score	Str. Flow Z score	Groundwater level % Z score	
1,7	3month PASG < 90%	< 90%	36 - 45	21-30	In the moderately low zone	21-30	60- 100	
1,2	6-month PASG < 90%	< 80%	26-35	11-20	In the low zone Z= -0,8 to -1,2	11-20 Z= -0,8 to -1,2	40- 60 Z= -0,8 to -1,2	
1,5	12-month PASG < 90%	< 70%	16-25	6-10	In the very low zone Z= -1,3 to -1,5	6-10 Z= -1,3 to -1,5	30- 40 Z= -1,3 to -1,5	
1,9	12/24-month PASG < 80/90%	< 60%	6-15	3-5	Water below the absolute minimum Z= -1,6 to -2	3-5 Z= -1,6 to -2	15- 30 Z = -1,6 to -2	
	12/24-month PASG < 80%	< 60%	1-5	0-2	Dams dry Z<-2	0-2 Z<-2	0- 15 Z<-2	

of Water and Sanitation (DWS) has prepared graphs that indicate zones/ranges of water levels in the different reservoir during the year.

Water levels falling in and below the 'Low' zone/range would signal drought conditions ([www.dws.gov.za/hydrology/State of Dams/WMA/Indicators-](http://www.dws.gov.za/hydrology/State%20of%20Dams/WMA/Indicators-) for dams across the country). These tools (graphs) for dams across the country are available on the DWS's website. It is important to mention here that the characteristics of the storage zones are different for different dams depending on the hydrology and general water supply and water use pattern of the system. Also important is the time of measurement. An empty dam at the end of the rainy season might be an indication of extreme drought while the same dam level at the beginning of the rainy season might reflect a normal dry period.

Streamflow levels

Streamflow levels are a direct or indirect function of precipitation in the catchment area of a specific river. Some of the precipitation water (runoff) also enters the ground and is released into the stream after weeks, months or even years. In certain areas, water directly from streams is used in various agricultural activities such as irrigation and water for livestock.

Depending on the size of the catchment, drought stress can cause serious impacts on streamflow. As for reservoirs, indicators should be prepared to indicate zones/ranges of water levels in the river over the year but only for sites that are not under the influence of releases from upstream reservoirs. However, because most critical streamflow sites are influenced by artificial reservoir releases and/or other human activities, such graphs are not readily available for streamflow but can be easily generated by a professional hydrologist/engineer where necessary. This is currently a gap in the drought monitoring system and should be calculated to quaternary catchment level.

Groundwater

- Drought is exacerbated by lack of precipitation and excess evapotranspiration. Groundwater is affected in various ways by a drought and the components and characteristics of groundwater that are affected are:
- Groundwater recharge (water that infiltrates and replenishes the aquifer)
- Groundwater discharge (into surface water bodies, springs or the ocean)
- Groundwater storage (total volume of water withheld within the aquifer)
- Groundwater levels (level of the water table in the aquifer).

Groundwater availability fluctuates less seasonally, making groundwater

a good buffer against drought. Groundwater is often available during earlier parts of a drought when surface water has run out and only in later stages of a drought will groundwater storage and hence availability diminish as a result of a continued drought. Hence, groundwater can be used as a drought mitigation strategy but only to a certain degree because the available groundwater may not represent the present day recharge. It should be noted that during drought, it is often boreholes that fail and not the aquifers.

After a drought event, groundwater may be in short supply even after rainfalls start and therefore it tends to react with a time lag relative to rainfall and surface waters, both at the onset of a drought and in the end of a drought.

Summary

The adoption of quantitative drought indicators should go a long way in taking the guessing out of disaster drought declaration. The indicators discussed in this article are the primary indicators and should be used in combination with secondary indicators to ground truth the actual impact of a dry period. Secondary indicators include actual grazing condition, actual soil moisture content, crop conditions, animal condition, drinking water supply and others. These are discussed in a follow up article. 🌍

UPCOMING EVENTS

APRIL 2019 - SEPTEMBER 2019

25 - 26 April 2019

Disasters and Health: State of Science

This symposium will be a dynamic event convening the leading disaster experts from the fields of science, academia, government, finance and technology. The objective of the symposium is to identify the important issues enabling and constraining an evidence-based approach to disaster preparedness and response, with a particular focus on health.

Venue: Washington DC, US

For more information visit: <http://hjfcvent.com/events/disasters-and-health-state-of-science>

12 - 18 May 2019

2019 Global Platform for Disaster Risk Reduction

The sixth Session of the Global Platform for Disaster Risk Reduction (GP2019) will take place in Geneva, Switzerland from 13 to 17 May 2019, convened and organised by the UN Office for Disaster Risk Reduction (UNISDR) and hosted by the Government of Switzerland

Venue: Geneva, Switzerland

For more information visit: www.unisdr.org/conference/2019/globalplatform

7-10 May 2019

2019 WADDEM Congress on Disaster and Emergency Medicine

With a theme of "The Future" the congress will challenge the thinking of more than 600 international participants drawn from all continents and from all areas of health care and emergency management. It will include over 30 tracks with high profile international and local speakers as well as a range of interactive and innovative sessions designed to maximise the congress experience for participants and create a legacy for the future

Venue: Brisbane, Australia

For more information visit: <https://wadem2019.org/>

29 - 30 May 2019

World Conference on Disaster Management: Continuity and Resilience Today

The World Conference on Disaster Management, Continuity and Resilience Today in partnership with the Business Continuity Institute, the Disaster Recovery Institute Canada and the Disaster Recovery Information Exchange, is Canada's premier event addressing continuity management, providing a global perspective on current and emerging issues for continuity management practitioners

Venue: Sheraton Centre Toronto Hotel, Toronto, Canada

For more information visit: <https://10times.com/worldconference-disaster-management>

10 - 12 June 2019

NEEDS 2019

The Fourth Northern European Conference on Emergency and Disaster Studies aims to explore the challenges of crisis and disaster research and intervention in an interdisciplinary perspective

Venue: Uppsala University, Sweden

For more information visit: <https://needs2019.com/>

11 June 2019

African Smart Cities Summit 2019

The 3rd annual African Smart Cities Summit prepares African cities for the future. It will bring together under one roof public and private sector players who will determine the future of African cities and reinvent urban living in the smartest ways possible

Venue: Gallagher Convention Centre in Johannesburg

For more information visit: www.smart-summit.com

12 - 13 June 2019

8th Australian and New Zealand Disaster and Emergency Management Conference

The annual conference will provide a two day educational program to facilitate presentations and conversations on leadership, resilience, multi-agency approach, community involvement, climate change, volunteers, communication, collaboration and preparedness throughout the disaster and emergency management sector

Venue: RACV Royal Pines Resort, Gold Coast, Australia

For more information visit: <https://anzdmc.com.au/>

18 - 19 September 2019

Disaster Management Institute of Southern Africa (DMISA) Annual Conference

The annual conference of the institute is the biggest annual disaster management conference in Africa and routinely attracts more than 300 delegates. The institute is recognised as the mouthpiece of the disaster management profession in Southern Africa. The conference provides an annual opportunity for a diverse range of stakeholders in disaster management from across Africa to gather and share skills, knowledge and experience.

Venue: ATKV Resort Hartenbos in the Mossel Bay Municipality, Garden Route District

For more information contact:

Karin Muller

Tel: 011 822 1634

Email: Karin@disaster.co.za

THE DISASTER MANAGEMENT INSTITUTE OF SOUTHERN AFRICA (DMISA)

DMISA office

Contact details

Tel: 011 822 1634 **Fax:** 086 652 8066

Email address

karin@disaster.co.za

Postal address

PO Box 7130
Primrose Hill
1417

Physical address

Suite 5
123 Rietfontein Road
Primrose
Germiston, Gauteng
South Africa

Office hours

08h00 to 13h00

Website

[http: www.disaster.co.za](http://www.disaster.co.za)

Institute administrator

Karin Muller
Email: karin@disaster.co.za



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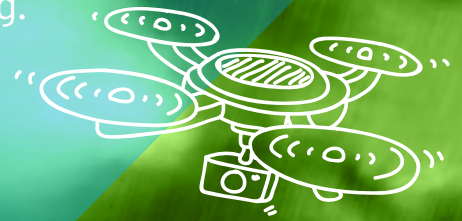
Dr Elretha Louw

Principal, Environment and Planning

T: +27 21 5266021

E: Elretha.Louw@aurecongroup.com

aurecongroup.com



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