Working on Fire holds 20th Anniversary Fire Symposium in Kruger National Park, South Africa

At the start of the Symposium, guests were warmly welcomed with a Working on Fire marching parade

Working on Fire held its 20th Anniversary Fire Symposium in the Kruger National Park in Mpumalanga in partnership with the Nelson Mandela University George Campus and SANParks. The event was held at the Skukuza Conference Centre from 8 to 10 November 2023, with a field day with aerial and ground firefighting operations on 9 November 2023.

On the start of the Symposium, guests were warmly welcomed with a WoF marching parade, some chanting and singing of the National Anthem.

Session 1: Working on Fire-Kishugu Joint Venture and its integrated fire management approach to fire management

Working on Fire stakeholder manager, Linton Rensburg, welcomed all dignitaries, delegates, speakers and exhibitors followed by a video from Working on Fire on climate change and wildfires in 2023. Senior general manager for conservation and area integrity for Kruger National Park, Danie Pienaar, provided an interesting presentation, overviewing the Kruger National Park's integrated fire management approach and welcomed all.

The keynote address and official opening was presented by Trevor Abrahams, managing director of Working on Fire (WoF), who discussed climate change and wildfires: the rapidly changing game, policy and operational responses. Abrahams also shared the current South African fire trends and the key challenges including mitigating the impact of climate change, resourcing wildland fire management and collaboration such as legislative jurisdictions and international collaboration. He outlined the policy and operational imperatives such as ▸

- collaboration ie intra state, inter state, Africa and the incident command system (ICS) and training standards, the refocusing of wildland fire management, preventative and preparedness policies and actions, education, fuel load management, invasive alien eradication, integrating science and integrated fire management for example, using early detection.

Roland Hendriks, chief director at the National Disaster Management Centre (NDMC), discussed South Africa's preparedness for future wildfires on behalf of Dr Elias Sithole. The presentation included a legislative overview, the current review of the Disaster Management system in South Africa, improvement of fire services capacity, a policy shift from suppression to mitigation and adaptation, data collection and further research to inform risk reduction. In his conclusion, Hendriks stated the following: "1. Improvement of fire services capacity: The NDMC to support PDMCs to increase building capacity within fire services, with respect to training and equipping municipal firefighters to respond to wildfires, particularly on the WUI.

2. A policy shift from suppression to mitigation and adaptation: The White Paper on Fire Services underscores a policy shift from fire suppression to mitigation, prevention and preparation. The approach is both logical and pragmatic and more likely to reduce the negative socio-economic and ecological effects of fire than the current, largely one-dimensional, focus on fire suppression.

3. Integrated fire management strategies: The 'business as usual' approach to the wildfire problem in South Africa will not solve the fire problem.

4. Governance and legislation: There should be alignment and harmonisation between respective legislation to ensure an integrated legal framework for managing wildfire risk in the country. All spheres of Government must ensure that there is a dedicated budget to ensure that their responsibilities towards the NVFFA are implemented.

5. Reduction of fire risk: The National Fire Safety and Prevention Strategy implores municipalities to incorporate fire-risk reduction into the planning of new developments, aims to prevent and combat veld, forest and mountain fires throughout the Republic. The NVFFA also provides for prevention and mitigation of veldfire risk through the establishment of variety of institutions, methods and practices, in line with the provision of Section 20 of Disaster Management Act 57, of 2002.

6. Data collection and further research to inform risk reduction: Post-disaster assessment findings should be integrated into risk assessments as a measure of actual impacts. Standard impact reporting procedures for municipalities and government departments should be developed and implemented.

7. Adopt a learning approach: Residents can reduce the risk to their homes by addressing the risks surrounding their properties, creating defensible spaces around structures and managing or modifying vegetation to reduce fire intensity and spotting. It is critical to inform a learning and adaptive approach in this regard to support more effective veldfire risk management.

Session 2: Climate change and the new "normal" in integrated fire, chaired by Prof Edith Vries

Kevin Rae, chief forecaster: Disaster Risk Reduction (DRR) at the South African Weather Service (SAWS) discussed comparative performance and daily behavioural characteristics of the Canadian Fire Weather Index (FWI) and the Lowveld Fire Danger Index (FDI) models in a South African domain. Rae provided an update on the collaboration between SAWS and the CSIR on the calibration and evaluation of an improved National Fire Danger Rating System (NFDRS), which builds on research previously conducted by the CSIR, improving from daily and municipality level forecasts to high resolution, hourly outlooks and include fire weather observations, fire moisture codes and fire behaviour indices. He also shared the latest research project ie the Government of Flanders

Kim Connors, executive director of the Canadian Interagency Forest Fire Centre (CIFFC) Canada, shared the lessons learnt from Canada's unprecedented fire season in his topic 'strengthening global collaborations in wildland fire management'. Connors said that the CIFFC was created in 1982 and facilitates cooperation between federal, provincial and territorial wildland fire management agencies. It also support member agencies through coordination of firefighting resources within Canada and internationally. He said that the cumulative area burned in Canada in 2023, estimated from satellite

The Symposium saw numerous international and local speakers sharing their research and knowledge

hotspots, is 18 466 108 hectares, adding that they received international support from 12 countries. Connors also shared the reasoning behind its collaboration and coordination, adding that no single agency can do it alone, that Canada has a long history of wildfire as it has nine percent of world's forest and that the global wildfire issue worsening. He also shared what makes International cooperation a success such as commitment, saying it is more than the sharing of ideas and best practices, commitment to negotiating terms ie give and take, exchange standards and commitment to cultural learning and acceptance.

Dr Danie Boshoff, senior lecturer of Geography at the North-West University discussed the role of climate on large fire events in the Western Cape. Dr Boshoff said that teleconnections like El Niño Southern Oscillation (ENSO) and the Southern Annular Mode (SAM) exert significant influence on fire seasons, which can lead to an uptick in large fires during dry and warm periods. He added that future predictions include rising temperatures and less precipitation in the southwestern regions of Africa, increase in heatwave frequency and high-fire danger days. The research methods included CapeNature that generated a map displaying the geographical distribution of the 15 largest fire incidents in the Western Cape spanning from 1927 to 2021, precipitation anomalies were visualised using the IRI Climate Lab interactive tools adding that the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 climate reanalysis datasets were used to plot and display ENSO (SOI) and SAM phases via the KMNI Climate Explorer. Sharing the results he said that in the Western Cape, more than half of the largest fire events occurred in the years following the El Niño phase of ENSO, positive phase of SAM (66 percent) and below normal seasonal precipitation anomalies (66 percent) and that only 27 percent of the large fire events occurred after La Niña phases of ENSO, negative phases of SAM and below normal seasonal precipitation anomalies.

Dr Christo Marais shared a presentation on climate change and the "new normal" for integrated fire management, looking at the potential contribution of integrated wildland fire management to ecosystem-based adaptation to climate change. Dr Marais discussed the key driver of climate change ie the increased CO2 levels in the air and its implications on the environment and biomes. He also discussed the implications of changing vegetation cover during wildland fires and the effect of vegetation cover on the water retention abilities of soils. Dr Marais shared the impact of bush encroachment on livelihoods and soil carbon, the considerations for managing the developed zone wildland interface and the need for land-use based risk assessments. He discussed the fuel reduction ▸

Most of South Africa's fire protection associations were represented

measures undertaken by fire protection associations and prescribed burning. "There is a need to create a pool of well-trained practitioners through a knowledge co-creation process", concluded Dr Marais.

Session 3: Empowering Africa to become IFM compliant chaired by Dr Christo Marais

Haritiana Zacharie, head researcher, Land, Landscape and Development Research Lab (LLandDev) in Madagascar, discussed using remote sensing data in supporting wildfire early warning in East-Africa and shared experiences from the Regional Eastern Africa Fire Monitoring Resource Centre (REA-FMRC). Zacharie discussed designing of early warning systems for East Africa, the calibration of the Fire Weather Index, the calibration of the Fine Fuel Moisture Code (FFMC) and said that early warning has been done operationally for three years in Madagascar; communication to stakeholders and the public via social media, WhatsApp and the geoportal and to the local community via radio. Identification of high prone fires areas and implementation of 65km agricultural fuelbreaks, mainly around Ankarafantsika National Park in northern Madagascar between 2021 and 2022; established in generally open landscapes dominated by grassy savanna to limit the spread of fires and create an additional 615ha of farmland for crop production to limit further slash-and-burn activities in the national park and so further reduce the potential for future fire ignitions. Data for all Eastern African countries are available from January 2019 to today.

Dr Paolo Fiorucci of the Centro Internazionale in Monitoraggio Ambientale (CIMA) Research Foundation in Italy discussed enabling integrated fire management strategies through integrating a comprehensive smart modelling chain into a wildfire early warning system. He said that the CIMA Foundation is supporting the establishment of a Network of Centres of Excellence in Africa and that the project was initiated and supported by the UNDRR Africa Office and the Government of Italy. Its aim is to promote and facilitate enhanced engagement and collaboration between various stakeholders NGOs, academia, practitioners and scientists. Dr Fiorucci also described the Rischio Incendi e Coordinamento (RISICO), which is a Forest Fire Danger Rating System, which started in 2000 for the Liguria region in Italy and expanded nationwide in 2003 and adopted by the Italian Civil Protection Department and is operational in several countries

including Bolivia, Ethiopia, Ukraine, Moldova, Georgia, Armenia, etc and recently implemented in Ethiopia. He said that RISICO, together with Propagator, a fire propagation model for operational use during emergencies forms a unified tool to support Integrated Fire Management strategies.

Dr Ida Herdieckerho of the University of Eastern Finland, looked at taming the flames using participatory GIS as a tool to support community-based fire management in land use planning in the Southern Highlands of Tanzania. Dr Herdieckerho said that uncontrolled fires wreak havoc on societies, economies and the natural environment with most fires caused by agricultural activities. The community-based fire management (CBFiM) programme actively engages local communities in the development and implementation of strategies designed to prevent, control or utilise fires in ways that will improve their livelihood, health and security. They used participatory GIS (PGIS), a process in which community members contribute their own experiences, relationships, information and ideas about a place to the creation of a map to use as Village Fire Management Plans (VFMP) looking at problem- tree analysis, mapping fire incidences of the past five years, fire risk maps and fire break maps.

Prof John Kessy of the College of Forestry, Wildlife and Tourism at Sokoine University of Agriculture in Tanzania, shared the development of community level action plans for the enforcement of the national integrated fire management (IFM) policies, including processes and lessons from Tanzania. Although IFM supportive policies and legal frameworks are in place, they are not translated to actions at community level. "Village level action plans and by laws are in place and implemented by each village to varying degrees of success and fire incidences have been reduced and fire suppression is effectively done. However, monitoring and evaluation needs to be developed and the Southern Tanzania model needs to be scaled to other parts of the country. The Government, through the Private Forestry Programme (PFP2), has developed standardised action plans and by-law templates to facilitate the scaling up of the model to other parts of the country", said Prof Kessy.

Kim Connors of CIFFC in Canada and Working on Fire's Trevor Abrahams handed paintings over to each other's organisations in thanks

- Tiaan Pool, head of department at Nelson Mandela University, George Campus, discussed the implementation of integrated fire management practices on the Southern Highlands of Tanzania. Pool shared the statistics including the plantation ownership, number of fires detected, the hectares of commercial forests lost and the total value of timber lost. "The methodology used included understanding the land use and broader leadership culture in regions, analysing of existing use of fire such as crop preparation, honey hunting, grazing, hunting, brick making and charcoal making, knowledge of fires and use of fires (design short courses), understand the legal system/ authority, train instructors and extension officers, establish village fire committees and proto-teams. We also looked at the bylaws (including the issue of burning permits, use of the FDI, fire investigation, creation of a Fire Fund, planned burning). We ensured an understanding of the weather (FDI), initiated distribution of the FDI warnings, tools and equipment, risk analyses and fire management plans including training to all villages but established a pilot village that could serve as blue print for others", said Pool.

Navashni Govender, senior manager: Conservation Management for the Kruger National Park, shared the integrated fire management plan for the Kruger National Park. She included the lessons learnt from seven decades of fire management, the fire policies from 1926 onwards, the Park's rainfall, geology and fire frequency, its long-term fire experiments and the influence of fire regimes. Govender said that semi-arid savanna systems are robust ecosystems that have developed with and exist due to variable fire regimes with the greatest difference being: no fire versus annual fires (50 years). "The Kruger National Park as a complex ecosystem in which we need to balance human values and needs with ecosystem processes with limited resources. This can be achieved through strategic adaptive management, cooperation and partnerships ie WoF and through education, awareness and training", said Govender.

Day two

Day two of the event started off with several presentations in the morning followed by a game drive and field day, which showcased both aerial and ground firefighting resources using integrated fire management as a key tool in managing biodiversity and wildfire risks. This followed by a boma braai, South African style.

The morning presentations started with Nicolene Oliver of AON, discussing business continuity plans and processes followed by a presentation from Wimpie van Onselen and Quinton Taylor of Dräger South Africa, who shared Dräger's solutions for wildland firefighting.

Fred Ludick, operations manager at Risk Management Resources, provided an overview of their operational areas and resources including fire detection, aerial operations and integration, which was followed by a presentation by Tony Marcos, CEO of the Kishugu Training Academy, discussing wildfire training for both management and firefighters and what the future holds in context of climate change and global warming.

Coenie Lamprecht, CEO of Kishugu Fleet, provided an overview of fleet management as a key component of integrated fire management and the application of advanced technology in vehicles and drivers, which was followed by a presentation by Emile Grobbelaar, CEO of Kishugu Aviation, looking at aerial firefighting as a critical component in early initial attack and global best practices.

Session 4: Prevention the key to mitigating the increased incidence of wildland fires, chaired by Tiaan Pool

Nokuphila Buthelezi of the eThekwini Metropolitan Municipality in KwaZulu-Natal discussed using fire to manage grasslands in eThekwini Metropolitan Municipality. She provided background on Durban's eco system, which is situated in the Maputaland-Pondoland-Albany Biodiversity Hotspot. Buthelezi shared the threats to open spaces (grasslands). She said that large-scale restoration programmes were established to manage the grasslands and she detailed the Fire and Invasive Species Control (FISC) Programme. The management interventions include invasive alien plants (IAP) control and the application of prescribed burns, providing sustainable green jobs and skills to previously marginalised communities, protect critical biodiversity areas within the municipality (KZN SS), promote supply of ecosystem services to the municipality and its citizens and develop and mentor small medium and micro enterprises (SMMEs). The methods used included a combination of manual, chemical and mechanical control and the use of fire through prescribed burns.

Dave Dobson of Umziki Forestry Consulting discussed how changes in the ecology of fires as a result of climate change will affect management decision making. Dobson detailed the changes in the southern African fire regime, adding that it will become generally drier. He shared a causal loop diagram that provided a visual picture of how the different elements in our fire ecology system fit together, interact and change over time. The causal loop diagram included temperature, wind, rainfall and CO2 seeding. Projections and actual data show that in the summer rainfall region, the climate will be warmer and more erratic. Overall the amount of rain remains the same but with heavier rainfall events, there will be more lightning and more hail. In the winter rainfall region the climate is expected to become drier. He also discussed the option of plantation slash ie to mulch or burn. "Are we prepared for future wild fires?" asked Dobson.

Dr Pieter Olivier, director at MAP Scientific Services (MAPSS) looked at harnessing the power of wildfire data to enable integrated fire management for safer landscapes. Dr Olivier said that a data-driven approach to wildfire management can mitigate the impact of wildfires on people, the economy and the environment. He provided an overview of the Moses Kotane Local Municipality in the North-West Province of South Africa, which is 571 900 hectares with a population of 242 554 people. In the 2023 fire season they had 2 753 fires, which burnt 198 610 hectares; 35 percent of the total area. The solution was to determine the number of fires and where they are happening by using a model combining AI and remote sensing detect and map every fire that takes place in South Africa every day. Then provide the tools to utilise this data easily to report, plan and respond to wildfire risk.

Gaston Hedwigino Tahintsoa, researcher at REAFMRC in Madagascar, discussed analysing interactions between landscape structure and fire-resilience at watershed level, sharing their experiences from Ankarafantsika National Park in Madagascar. Tahintsoa said that five percent of the planet's plant and animal species are found in Madagascar, with an endemicity rate approaching 80 percent. There are several biodiversity hotspots due to the recurrence of wildfires. "Limits of fire suppression-centred strategies have become evident, especially in underdeveloped and technologically less equipped countries such as Madagascar due to limited budget allocation, resulting in the concept of fire resilience becoming increasingly relevant", said Tahintsoa. He shared statistics and said that large wildfires often occur in homogeneous open (grassland) and closed (forest) landscapes, with cropland less impacted by fires. A mosaic landscape reduces ▶

the fuel load and helps to control and fight fires. He also discussed the effect of the weather and topography to fire behaviour, saying that these results offer new options for fire and land managers in designing and implementing more fire resilient landscapes.

Louise Wessels, manager at the Greater Overberg Fire Protection Association (GoFPA) provided delegates with an overview of the Seventh International Wildland Fire Conference, which was held in Porto in May 2023, sharing the benchmark exercise with some new perspectives and take-home messages. She shared some of the take home messages from the presentations and added that fire protection associations are a key component to integrated fire management as they encapsulate landscape management. "The proposed governance model calls for fire-risk assessment and determining how communities and cultures perceive risk and accept fire impacts. That perception drives risk management and promotes clear communication. Stakeholder engagement is crucial for governance and having stakeholders involved in decision-making helps with monitoring and aiming at continuous improvement, measuring progress and planning for shorter periods under context of uncertainty", said Wessels. The take home messages included building relationships, focussing on local communities –risk identification, their competencies, communication and ownership of their risks, perceived risk and education, pre-fire knowledge, post fire interventions have to be identified and planned for, informed budgeting and investing in fire protection associations.

Nothando Ngobeni, fire researcher at Working on Fire, discussed the effect of the time of day on factors that affect fire intensity in Southern African savanna. Ngobeni described savanna characteristics and manipulating fire intensity as a management tool. She said that the aim was to see the effect of burning at different times of the day on fire intensity, to investigate whether fuel characteristics or weather conditions affected fire intensity among fires that were set at different times of day and to see whether fire occurring in the day is more intense than fire occurring early morning and late afternoon. "Substantial variation in fire intensity was obtained by just changing the time of day that we burned, however, we can still use time of day as a management tool", said Ngobeni. She detailed the methodology and shared the results, adding that the results suggest that specific weather conditions, fire behaviour and fuel characteristics are directly affected by the time of day at which fires are applied. "The results of our study are consistent with findings of Ndri et al (2018) where we found that relative humidity was the only variable that varied between all three days."

Angel Goldsmith from Kings College London's Geography Department and Faculty of Social Science and Public Policy in the UK presented on the prophylactic land-use for wildfire risk reduction at South Africa's wildland-urban interface, a Knysna case study. He discussed the various settlement forms ie informal settlements, township settlements and formal settlements in the WUI and detailed the risk perception, practicalities and challenges of each. "There is no evidence of coordination between the land management department and fire service department/agencies with respect to projected land developments. There is an urgent need to educate the public about the importance of prophylactic land-use and vegetation management in the WUI. Land desperation combined with housing pressure and uncontrolled development strains practicalities of prophylactic land-use in South Africa's WUI areas", said Goldsmith.

Session 5: Better collaboration of global, continental and local level, chaired by Trevor Abrahams

Johann Savage Breytenbach of the Free State Umbrella Fire Protection Association discussed implementing the Incident Command Systems (ICS) as a critical component of response and management of wildfire emergencies in the Free State. Breytenbach said that the Free State Province surface area is 129 464km², population density: 22,8/km² (second lowest in the country), the biomes are 86,7 percent grassland, 6,47 percent Nama Karoo and 6,49 percent savanna. The land use is 91,9 percent agricultural, cultivated land is 32 000km² (24,7 percent total surface area) and grazing/ natural veld 87 000km2 (67,2 percent total surface area). In the 2019 to 2023 fire seasons they had 53 378 fire incidents, 2 308 694 hectares burnt of which 19 were large fire incidents, which burnt 401 429,64 hectares. He shared the challenges faced by the fire services and disaster management. He detailed the Free State Provincial Wildfire Management Framework (FSPWMF) and its practical implementation of integrated wildfire management using ICS principles and structure and the incident specific virtual EOC/JOC, the incident management teams and firefighting resources. "ICS is the critical component enabling effective wildfire incident response", said Breytenbach.

Dr Abigail Croker of the Centre for Environmental Policy, Imperial College London in the UK discussed community-based fire management (CBFiM) in East and Southern African savanna-protected areas and shared a review of the published evidence. Dr Croker said, "There is a pyric transition: decline in community fire use and total area burnt X increase in agrarian political resistance fires and large wildfire events resulting in a wildfire paradox in need of a bottom up CBFiM. She detailed the savanna burning emissions abatement schemes and discussed the climate, biology and fire; topographic environment and fire and society, culture and fire assumptions. "Traditional fire management versus market-based approach? The SBEA projects under the Clean Development Mechanism present a market opportunity with 'real, measurable and long-term benefits related to the mitigation of climate change'," said Dr Croker.

Each session was followed by a panel discussion allowing the audience a chance for questions and comments.

Working on Fire's Trevor Abrahams thanked everyone for their presentations, attendance and sharing of information during the event's closure, where after Kim Connors of CIFFC in Canada and Trevor handed paintings over to each other's organisations in thanks.

See next page for photo gallery →







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