



Johanes A Belle, Samkelisiwe Lubanga

EVALUATING THE EFFECTIVENESS OF FIRE PROTECTION ASSOCIATIONS (FPAs) AS A VELD FIRE MANAGEMENT STRATEGY IN THE NORTHERN CAPE, SOUTH AFRICA

Abstract

It is often said that, “*Fire is a bad master but a good servant.*” Countries all over the world are challenged by devastating fires, which force them to develop strategies and tactics to minimise and prevent veld and forest fires. Fire Protection Associations (FPAs) are organisations established for veld firefighting in communities. FPAs are the South African way of community based fire management initiatives. This study investigated the effectiveness of FPAs in veld fire management in the Northern Cape Province as mandated by the South African National Veld and Forest Fire Act (NVFFA), 101 of 1998. The focus was on preparedness by FPAs to prevent and mitigate veld fires in this very volatile province of South Africa. Using the Disaster Preparedness Framework by Kent (1994) and the South Africa Integrated Fire Management Framework, the study adopted a qualitative research approach and was descriptive in design. Questionnaires with open-ended questions were administered to 19 out of the 25 FPAs in the province and 76 participants were involved. The study concluded that despite many challenges faced by FPAs in the province, these organisations play a critical role in firefighting and the FPAs have always minimise the impacts of veld fires in their areas of operations.

Key words: Fire Protection Associations (FPAs), Veld fire management strategy, Veld fires, National Veld, and Forest Fire Act (NVFFA), Disaster Preparedness.



A TŰZVÉDELMI SZÖVETSÉGEK (FPA) HATÉKONYSÁGÁNAK ÉRTÉKELÉSE ERDŐTŰZEK ESETÉN A DÉL-AFRIKAI KÖZTÁRSASÁG ÉSZAK-FOKFÖLDI TARTOMÁNYÁBAN

Absztrakt

Gyakran mondják “A tűz jó szolga, de rossz mester”. A világ legtöbb országát pusztítják erdőtűzek, amelyek különböző stratégiák kidolgozására készíteti a kutatókat. A Tűzvédelmi Szövetségek (FPA), olyan szervezetek, amelyeket erdőtűz oltási célra hoztak létre. A szerző ezen szervezetek hatékonyságát vizsgálja a Dél-afrikai Köztársaság Észak-Fokföldi tartományában. A tanulmány Kent, a katasztrófákra történő felkészültségi keretrendszerét és a Dél-afrikai Integrált Tűzgazdálkodási Keretet felhasználva kvalitatív kutatási módszerek alapján készült. Emellett a szerző egy nyílt kérdőívet is készített 76 válaszadóval. A cikk eredményeként megfogalmazható az FPA-k tűzmelegelőzési hatékonysága a Dél-afrikai Köztársaság Észak-Fokföld tartományában.

Kulcsszavak: Tűzvédelmi Szövetség (FPA), Erdőtűzmenedzsment stratégia, vegetációtűz, Nemzeti Erdő-és Vegetációtűz Törvény, katasztrófavédelmi felkészülés

1. INTRODUCTION

South Africa and the international community are faced with the challenge of veld fires also known as wildfires. These fires occur naturally or may be human-induced. Though they are destructive they also have an ecological role to play in the ecosystem. Fires have been part of the ecosystem for centuries and they also became an important management tool for domestic use and is used by commercial land users such as farmers, for vegetation management. Catastrophic fires however forced countries to derive and develop strategies and tactics for better management and prevention of these fires [6].

Open fires which are not brought under control in the early stages may become aggressive and catastrophic, and as a result pose serious threat to lives, assets, livelihoods and the environment.



The rise in frequency of veld fires is exacerbated by global warming and climate change requires new proactive fire management styles using innovative technology [6].

South Africa adopted the Integrated Fire Management (IFM), which incorporates different fire management activities in a strategic framework to reduce the overall impact of unwanted wildfire damage and promote the beneficial use of fire. IFM brings together all stakeholders involved in fire management. The diagram below depict the six components of IFM

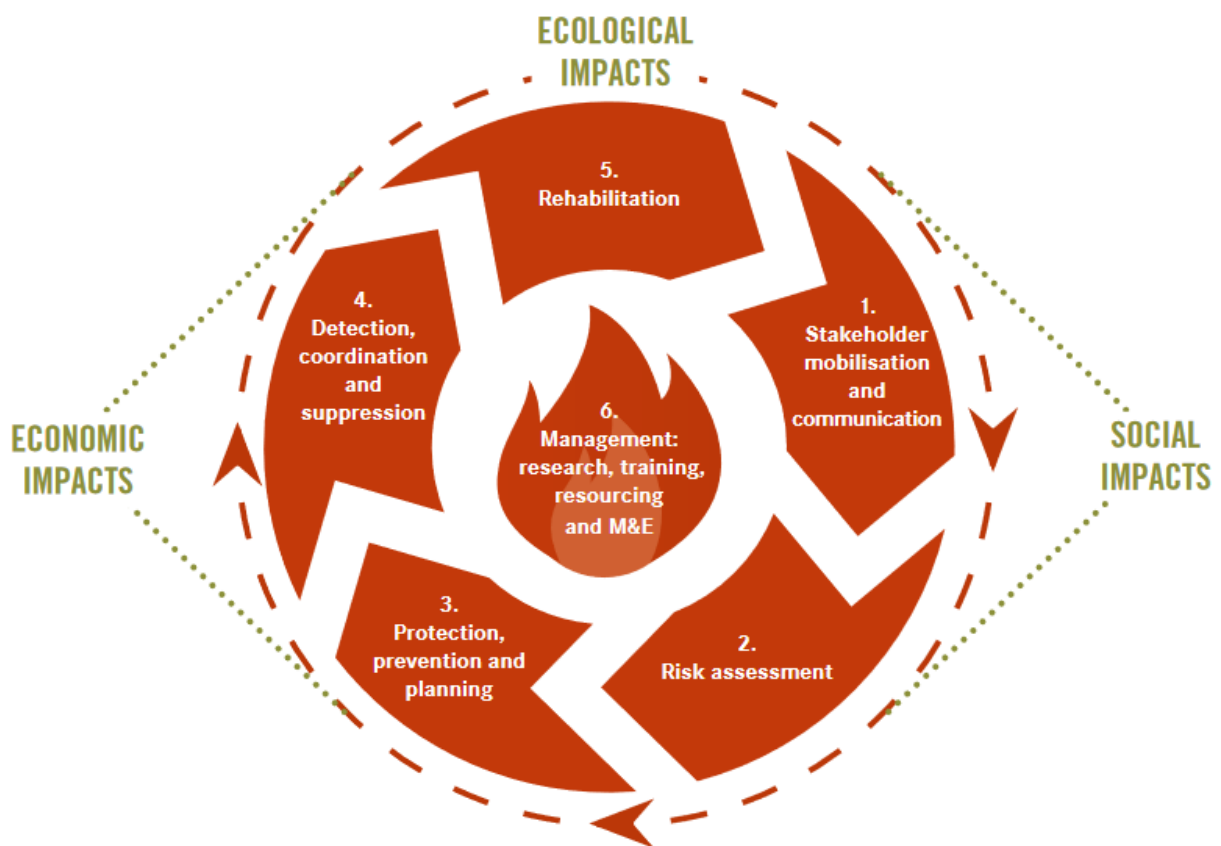


Figure 1- Integrated Fire Management Framework; Source: FYNBOSFIRE, 2016

In South Africa, and under the IFM, each stakeholder has his responsibility and role to play to combat and manage fires. Key stakeholders in IFM include:

- Landowners and land managers;
- Organised associations of landowners such as conservancies and agricultural associations;



- Fire Protection Associations;
- District and (where delegated) Local Government or Traditional Leaders;
- Provincial and District Disaster Management;
- National Government; and
- Working on Fire, which is an Expanded Public Work Programme (EPWP) [4].

In South Africa, the National Veld and Forest Fire Act 101 of 1998 (NVFFA 101 of 1998) was developed and implemented to get land owners and users to participate in fire management practices due to the frequency and devastating effect of veld fires [6]. Fire protection Associations (FPAs) were introduced in South Africa as a direct result of the Act.

Section 3 of the NVFFA 101 of 1998 states that “*owners may form an association for the purpose of predicting, preventing, managing and extinguishing veld fires and apply for its registration*” (South Africa, 1998:5). The Act also serves as a framework for veld fire management in South Africa [11].

The mandate of FPAs is to develop and implement integrated fire management practices in their properties with joint ventures with the neighbouring FPAs, institutions, and organisations in an effort to minimise adverse impacts and maximize benefits of utilising fires. It is in line with this mandate that this paper investigates the readiness of FPAs in managing veld fires in the Northern Cape Province of South Africa.

The Fire Protection Associations (FPAs) are one of the fire management strategies in South Africa and they are organisations formed in assisting to reduce the impact of veld fires. These organisations are involved in disaster management, as they need to take proper action in planning and preparing for anticipated veld fire disasters in their respective areas and ensure efficient and effective response and recovery thus addressing the whole disaster management continuum with fire as the hazard.

The study area

The Northern Cape Province as illustrated in **Figure 2** is the largest of the nine provinces of South Africa by surface area covering 372 889 Km². The province has five (5) district municipalities (**Figure 3**) and 27 local municipalities. The dominant language in the province is Afrikaans followed by Setswana. English and isiXhosa are widely spoken in the province as



well [17].



Figure 2 - Northern Cape in South Africa Source: [22]



Figure 3: District Municipalities in the Northern Cape Province Source: Local government hand book, n.d

The province has a population of about 1.2 million whose main livelihood is mining and agriculture [18].

The main vegetation is the Nama Karoo biome with succulent Karoo biome and Savanna biome in some areas (Rutherford & Westfall, 1994). **Figure 1.3** illustrates the main biomes in the Northern Cape.

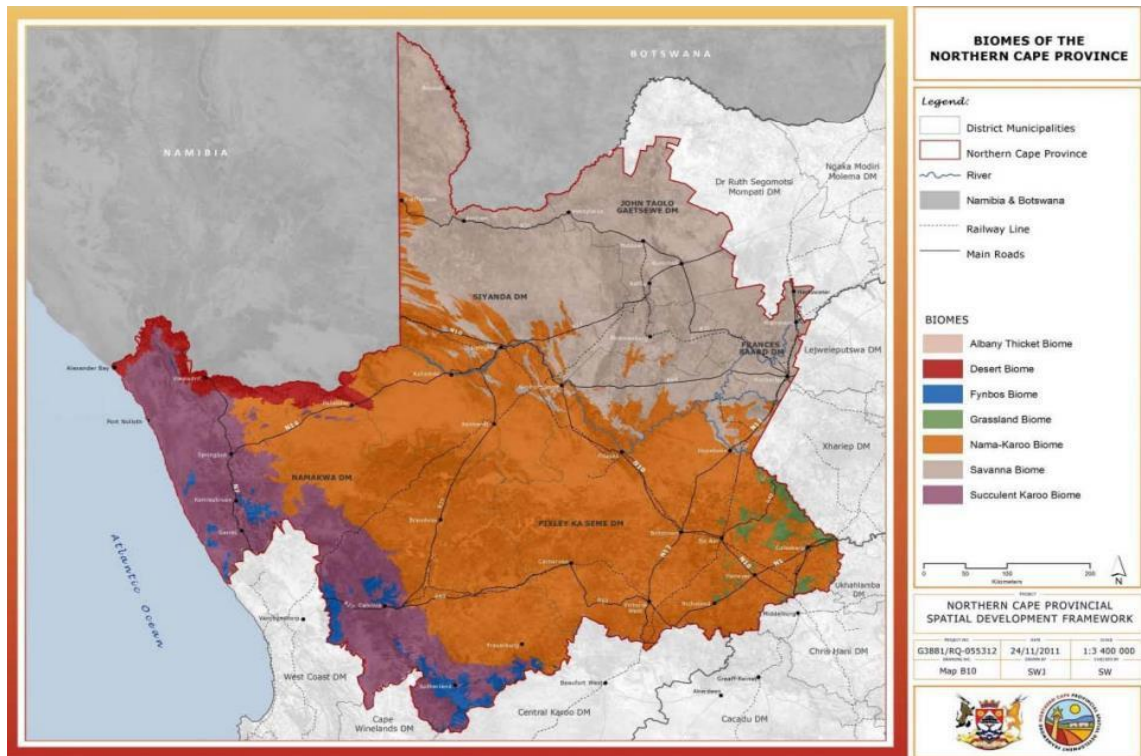


Figure 4 - Northern Cape biomes, source: (Northern Cape government, 2012)

Climate in the Northern Cape

The province is typically that of a desert and semi-desert area. It has generally low rainfall and a hot and dry region with fluctuating temperatures. The average annual rainfall over the province is 202 mm and the evaporation levels exceed the annual rainfall. While the western areas of the Province, which include Namaqualand, receive rainfall during the winter months, the central, northern, and eastern parts of the province receive rain primarily during the summer months. Temperatures range between 34°C and 40°C in the interior part of the province during January afternoons and may go up to 40°C in most part of the province during summer. Average daily temperature in the winter is about 22°C while night temperature in winter may drop below 0°C.

Low rainfall, high temperature and rich biomass therefore create favorable conditions for catastrophic veld fires.



Veld fire risk classification

In a study conducted by Forsyth [11], the national veld fire risk classification map was developed which illustrates the overall veld fire risk in South Africa. It illustrated areas which were fire prone from Low veld fire risk to Extreme veld fire risk as shown in **Figure 1**. According to Forsyth et al, the Northern Cape is regarded as the lowest veld fire risk with an overall classification of 57.3%. About 0.2% is classified under extreme veld fire risk [7].

Based on the study conducted by Forsyth the map in **Figure 1** shows that the John Taolo Gaetsewe district municipality was on a High veld fire risk classification, the Z.F Mgcawu district on Medium to Low veld fire risk classification, Frances Baard district on High to Low veld fire risk classification, Namaqua and Pixley Ka Seme districts are on Low veld fire risk classification. These two (2) districts are the largest part of the low risk classification in the Province [7].

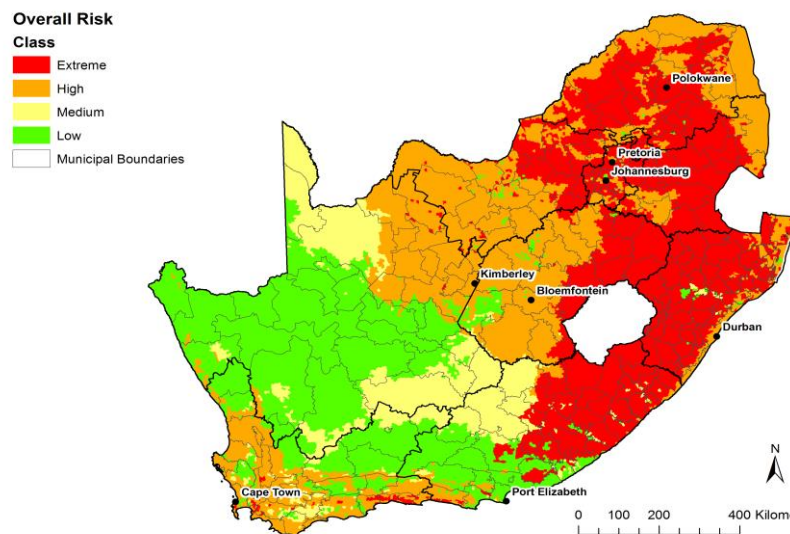


Figure 5 - National Veld fire risk classification; Source: [7]

The Northern Cape fall under high to extreme fire risk area. In such place the fires danger index (FDI) is always in the orange to red colour during the fire season (see Figure 5 on FDI)

Fire Protection Association (FPA)

Fire Protection Associations (FPA) are statutory organizations that are established and registered under the National Veld and Forest Fire Act (NVFFA) 101 of 1998. FPAs consist of rural communities and landowners that have volunteered and grouped themselves to prevent,



predict, manage and fight veld fires that threaten lives, property and sources of their livelihood like livestock, grazing land and crops on their farms. The NVFFA sets minimum standards and requirements that, landowners and land-users must meet and share resources in regards to the management of veld fires on their property regardless of them being FPA members or not [17].

The FPAs are associations which are the strongest pillar of integrated fire management created under the Act (Department of Water Affairs and Forestry [1]. The Act also puts responsibilities and accountabilities to landowners, users and representatives regarding fire management. The FPAs are the South African means of community based fire management initiatives for collective community unity in sharing resources to prevent, protect against and suppress veld fires.

The Forest Fire Association (FFA) was the first ever formed association in South Africa (formed in 1976), after the catastrophic fire incident that occurred in Mpumalanga and thus the National Veld and Forest Fire Act 101 of 1998, was later promulgated putting emphasis on the landowners, users and communities to get organised in order to prevent the re-occurrence of such devastating fire incidents (Forest Fire Association) [5]. The establishment of FPAs was then implemented countrywide as a response and preparedness strategy to veld fires in the country.

2. METHODOLOGY

Qualitative research and a descriptive research design were used to conduct the research. There are 25 established FPAs in the Northern Cape Province as of December 2016. A typical FPA is structured into four (4) executive members consisting of the chairperson, secretary, FPO and one (1) additional member, and its ordinary members whose number varies from FPA to FPA. In this study 19 FPA out of a total number of 25 FPAs in the province participated from which 76 respondents were purposively recruited ranging from secretary, FPO, chairperson, additional executive members and ordinary members. Questionnaires composing of mainly open-ended questions were used to gather data and the collected data were analysed using the thematic approach. The collected data was grouped into emerging themes and the deductive



reasoning approach was utilised as the study looked for similarities and differences of the data collected based on the research questions

3. RESULTS AND DISCUSSION

Results from data obtained from the field are presented in this section and discussed. Data collected from respondents are presented in the form of tables and figures.

Composition of FPAs

FPA members are mostly landowners with multiple responsibilities. In an FPA key positions will include the Chief Fire Officer (CFO), the Fire Protection Office (FPO), the FPA Manager and ordinary members.

The participants were asked what position they held in the FPA. Results showed that 47% of the respondents were ordinary members of the FPAs, 17% were chairpersons, 15% were secretaries and 11% were FPOs. The opinion of ordinary members was highly considered, as there was a need to encourage their participation and to be more involved as the executive members are in the FPA functionality. The composition of the FPA gave a fair balance of participation as at least all positions were represented even though the number of participants varied per position

Table 1- FPA Positions.

FPA POSITION	PERCENTAGE
Chairperson	17.11%
FPO	11.84%
Secretary	15.79%
Additional member	6.58%
Ordinary member	47.37%
Other	1.32%



TOTAL	100.00%

Level of education

Participants survey showed that 27 held a national diploma, 11 participants held Bachelor's degrees, 9 participants held a B- Tech/Honours, 22 completed Grade 12 (Matric) and 7 participants were below matric (Grade 12). The results showed that FPA members who participated are generally educated. This can be an important asset for the management of the FPA as many advantages are associated with better education.

Table 2 - Level of Education

LEVEL OF EDUCATION	NUMBER OF PARTICIPANTS
Below Matric	7
Grade 12	22
National Diploma	27
Bachelor degree	11
B Tech/ Honours	9
Total	76

General causes of veld fires

The study showed that 44% of the veld fires are caused by lightning, 19% by a combination of lightning and arson, 14% by arson, while 3% was caused by land preparation through burning. It was reported that most fires started from the main roads and spread inwards to properties.

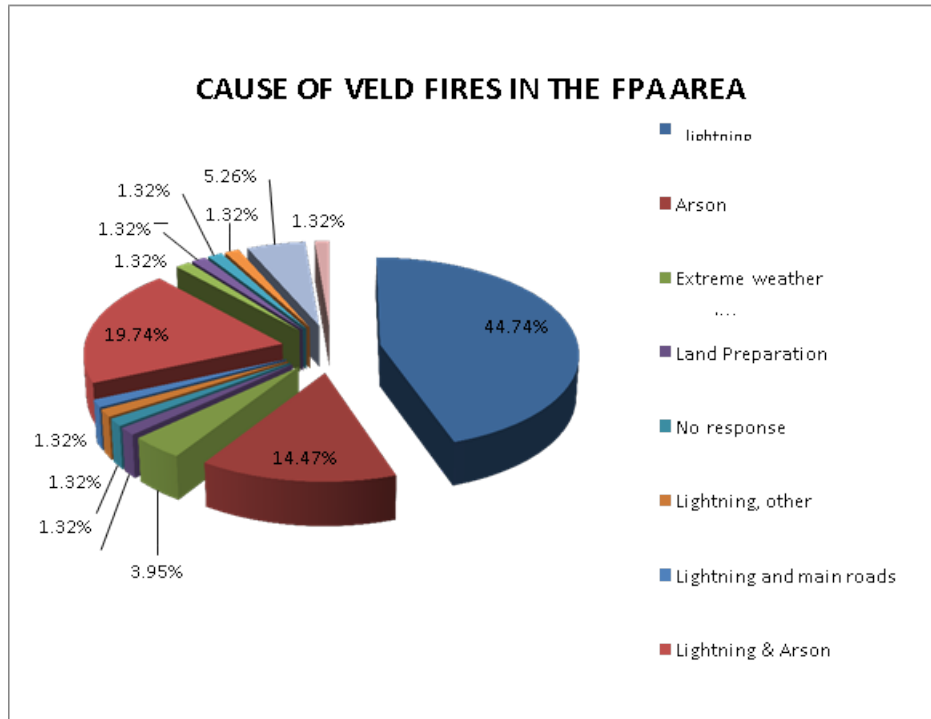


Figure 6 - Causes of veld fires

Implementation of the fire management plan

A typical FPA will conduct activities like risk assessment, stakeholder organisation, fire management planning, detection and suppression, rehabilitation, education, training and awareness, record keeping, monitoring and evaluation [4].

The respondents who were in possession of the fire prevention and suppression plans were asked if they implement the plans possessed by their FPAs. The results illustrated that 84% of the respondents stated that they had means to implement developed plans and the 14% highlighted that they do not have means and capabilities to implement such plans. Even though the majority of the FPAs implement the plans, the rest of the FPAs (14%) should also be on board, develop and implement the plans.

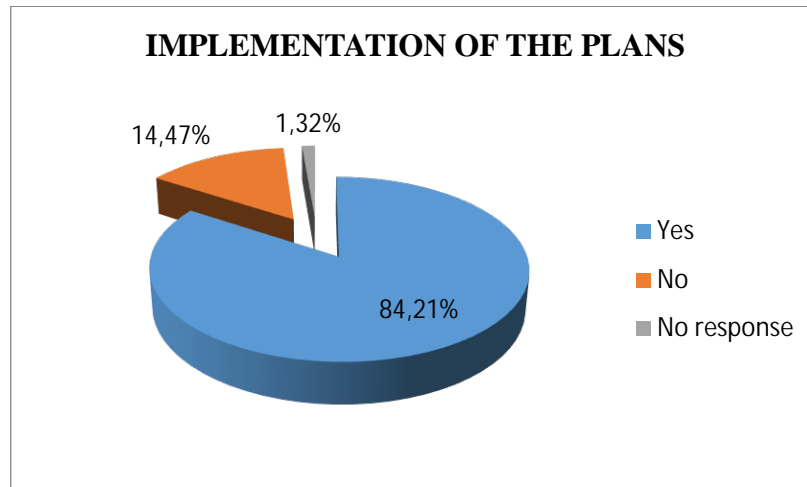


Figure 7 - Implementation of the plans.

Changes of frequent occurrence of veld fires before and after establishment

The respondents were asked if they noticed any change in the frequency of veld fires in their area after the establishment of their FPA, the results in figure above showed that 48.68% of the respondents reported that they had noticed a decrease in veld fires and a change in the frequency of veld fires after the FPA establishment and made justifications as follows:

- The FPAs are more organized and better planned
- More fires are reported and damages are reduced
- Since the establishment, firebreaks are created and fire awareness campaigns are conducted. The WoF team assists in the fighting of veld fires and that assist in minimizing damages.

In the figure above 36.84% reported that they did not notice any difference in the frequency of veld fires after the establishment of the FPA and 14.47% did not respond.

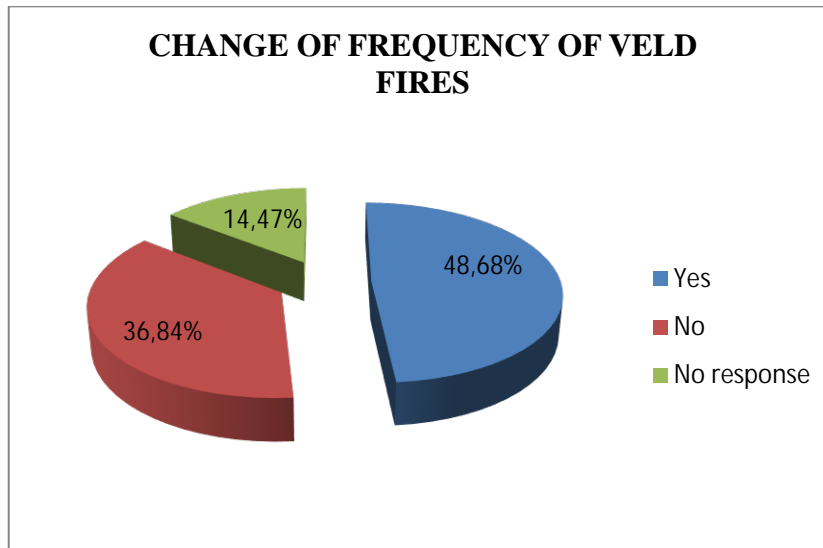


Figure 8 - Change in frequency of veld fires.

Fund raising

Funding is a major problem facing most FPAs. When asked how their FPA was funded, 39% reported that they are funded by their Farmers Union fees which is the main source of funding for most FPAs, 32% reported that they receive funding from the FPA membership fees and 7% reported that they were funded by the private sector. Another 2% reported being funded by the government. In general the respondents expressed the general lack of funds to manage FPAs effectively.

Utilisation of FDI for fire management within FPAs

Fire is a cheap tool of vegetation management and thus it is important to always be updated with the FDI forecast for the purpose of fire management. The results showed that 51.32% utilise the FDI for veld fire management in their area and 34.21% do not use the FDI for veld fire management. Early warnings such as the FDI are important to FPAs to ensure that there is proper monitoring of burning, and the combatting of veld fires. FPAs can permit burning during low FDI and prohibit burning when the FDI is high. This also assists FPAs to be strategic in firefighting during a given FDI.



FDI Description	Colour		Lowveld FDI Precaution
SAFE	BLUE	0 - 20	Low fire hazard. Controlled burn operations can normally be executed with a reasonable degree of safety.
MODERATE	GREEN	21 - 45	Although controlled burning operations can be executed without creating a fire hazard, care must be taken when burning on exposed, dry slopes. Keep constant watch for unexpected wind speed and direction changes.
DANGEROUS	YELLOW	46 - 60	Controlled burning not recommended when fire danger index exceeds 45. Aircraft should be called in at early stages of a fire.
VERY DANGEROUS	ORANGE	61 - 75	No controlled burning of any nature should take place. Careful note should be taken of any sign of smoke anywhere, especially on the upwind side of any plantation. Any fire should be attacked with maximum force at hand, including all aircraft at the time.
EXTREMELY DANGEROUS	RED	75<	All personnel and equipment should be removed from the field. Fire teams, labour and equipment placed on full standby. At first sign of smoke, every possible measure should be taken to bring the fire under control in the shortest possible time. All available aircraft should be called for without delay.

Figure 9 - Fire Danger Rating in South Africa; Source [4].

Possession of adequate personnel and firefighting equipment

Firefighting equipment makes a difference between effective response and insufficient response to fires. Respondents were asked if they possessed adequate firefighting equipment in their respective FPAs, the results showed that 53% do not have adequate firefighting equipment while 39% are having adequate firefighting equipment while 6.58% did not respond.

Trained and skilled firefighting personnel plays a big role for the quick containment of veld fires and to prevent catastrophe. The results show that 57% do not have adequate personnel for firefighting in their respective FPAs. While 35% reported that they have adequate personnel for firefighting.



Figure 10 - A landowner vehicle fitted with firefighting equipment. Source [4].

FPA training

Training is crucial to gain a fundamental understanding of fire management. When asked if any training was organised in the past two years for their members on fire management, the results showed that 69 respondents reported that there was no training offered to members in the past 2 years, only 6 respondents reported that there was training organised for the FPA members and 1 did not respond to the question.

When asked if their FPO was trained in firefighting, about 47% reported that their FPOs are not trained and 43% reported that their FPOs are trained. About 9 % did not respond to this question. There is almost an equal split between trained and untrained FPOs within the FPAs.

Overall effectiveness of the FPA

When asked on their thoughts about the overall effectiveness of their FPA the results illustrated that 61% reported that the FPA is effective in the overall examination while 25% reported that their FPAs were very effective. The 6% reported that their FPA is not effective, while 3% reported that they have no idea if their FPA is effective or not.

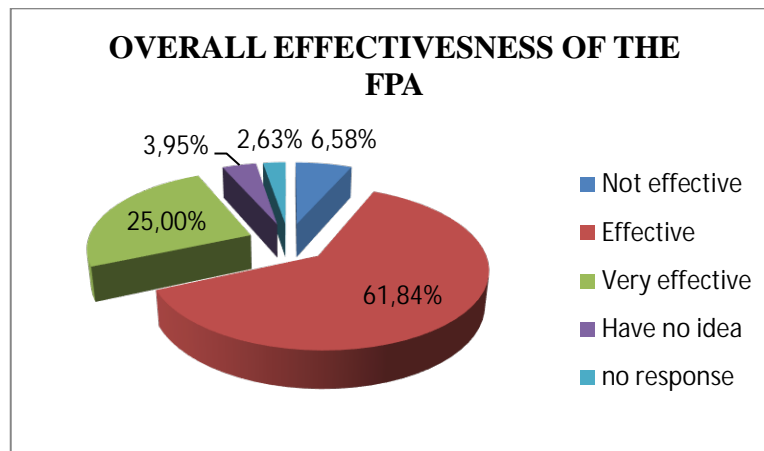


Figure 11 - Overall effectiveness of the FPA.

4. CONCLUSIONS

Preparedness of FPAs to response to veld fires

The preparedness framework served as a theoretical framework and guide for the study. The researcher discussed the operations and functionality of the FPA and based on the findings of the study and link with the preparedness framework in order to check if FPAs are effective and functional. This assisted in checking the areas of focus for continual improvement and functionality of the FPAs. All these steps can occur simultaneously and do not have to be the pre-requisite for each other.

Planning

In the preparedness framework, planning is the essential part of the framework. The majority of the FPAs reported that they possess fire prevention and fire suppression plans. These plans are being implemented hence the majority reported that they have experienced fires between 0-5 in the past 2 years. This minimal number of experienced fires may be due to the implemented plans being the contributor to minimised fires. To ensure readiness for veld fires, planning is essential for FPAs in the preparation for fire season. However, there were FPAs who reported that they do not implement or in possession of these plans.

Institutional framework

The majority of the FPAs reported that they do not have effective working partnership with government departments, the private sector or non-profit organisations (NGOs). These FPAs



need to re-consider having partnership with other stakeholders who are also responsible for veld fire management. Partnerships are important in order to build a good working relationship in veld fire management. FPAs need to establish partnerships with the South Africa Police Service (SAPS), as some cases need to be reported and the SAPS needs to assist them with investigations in cases of arson. Partnerships are important in order to share resources and share roles and responsibilities for veld fire management.

To ensure effective institutional arrangement, roles and responsibilities need to be clearly defined for different stakeholders and role players, including members of the executive and FPA members. FPAs can enter into FPA cross-border agreements with neighbouring FPAs for incidents when a fire crosses from one FPA boundary to the next. FPAs are to ensure that they abide by their policies and guidelines. Relationships with neighbouring FPA were noted and this was a good indication of FPAs doing teamwork.

FPAs reported they have mutual agreements with organisations such as Working on Fire (WoF), neighbouring FPAs, municipal fire services, and Mines. Working out agreements between people, agencies, and organisations for the provision of services during emergency incidents to ensure effective coordinated response is part of planning for readiness for an incident. FPAs can enter into various agreements such as mutual agreements for firefighting and resource sharing memorandums during planning in preparation for veld fire season. Agreements and plans should be in place and ensure that stakeholders are aware of such arrangements to ensure effective response and coordination of veld fires and to avoid confusion.

Information system

Communication is important during veld fires and under normal conditions. A disaster communication strategy and plan is important to be able to prevent and manage veld fires from becoming disasters. An effective information system is essential to gather information and disseminate it to members, relevant stakeholders and role players. FPAs rely on the South African Weather Service (SAWS) for the issuing of the Fire Danger Rating (FDI). The majority of the FPAs utilise the FDI for their veld fire management, and access their FDI via the internet or television. Different FPAs have other ways of disseminating information and use WhatsApp



groups and SMS's. Fire statistic records are kept but is not readily available to be accessed by the public to track veld fire trends in the province.

Resource base

Resources for firefighting need to be prepared and put in order well in advance for emergencies. Resource inventory for FPAs is important to know what resources are available for firefighting and those that they may require for better fire management. A majority of the FPAs have noted that they do not have adequate firefighting equipment in their respective FPAs. All members need to ensure that adequate firefighting equipment is available. Even though some FPAs reported that they have adequate equipment, for those who do not have the equipment there is still room for improvement. Some FPAs have equipment that is old and will eventually need to be replaced. Firefighting equipment is essential and with minimal equipment in an organisation, it can be challenging to fight veld fires. This must be one of the focal areas to improve within the FPAs for their better functionality. It is also noted that the Fire Brigade Services are further away from the FPA boundaries with a distance of more than 50 Km. This may have an effect on the response time in cases where veld fires require such resources.

Human resource is a challenge with the FPAs as the majority reported that they do not have adequate personnel for firefighting. This may also be influenced by the fact that the majority age group of the FPA members is 45 and above. At least the age group of about 35-40 years with more energy can be able to fight veld fires effectively rather than the older group.

Financial resource is important as much as human resource and firefighting equipment. Availability of financial resources to ensure FPA operations is essential, with no funds no operations can actually occur. FPAs have reported that they are funded through their Farmers Union and some through FPA membership. The other challenge that FPAs are facing is inadequate equipment and a lack of funds for training which may be contributors for their slow functionality.

Warning systems

Some FPAs rely on the FDI as an early warning system to ensure early warning within their area. Early warning assist them for fire readiness in their FPAs and ensure they raise awareness



in case of dangerous situations. Communication system such as telephones, cell phones, two-way radios and WhatsApp groups are used to share FDI information to members of the FPAs.

Education and training

It was recorded that a minority of FPA members were formally trained with the following courses:

- Kursus Beskrywing (US177082 & US 1170790)
- standard firefighting for owners and workers
- Advanced fire fighting
- Introduction to veld fires
- Basic fire fighting

It is essential that everyone who is involved in firefighting be trained accordingly. The majority that was not trained reported challenges with funding to organise training in their respective FPAs and required assistance in this regards in order to comply with section 17(a) of the NVFFA. FPAs conduct public awareness on veld fires in their areas and share knowledge with the community. A few reported that they conduct awareness campaigns in their respective FPAs despite challenges they face, while a majority of FPAs do not conduct awareness campaigns.

Response mechanism

FPAs need to know how they will respond to veld fire occurrences and this includes evacuation procedures and shelter for livestock and humans on farms. There is a need for the development of evacuation plans for such purposes. Some FPAs were privileged to be in partnerships with stakeholders such as the disaster management centre where they are able to access their call centre for information dissemination. The use of WoF teams was also advantageous for veld fire response. FPAs require the assistance of Fire Brigade Services but these services are a challenge in the province as there are only two designated fire services for the whole province (Kimberley and Upington stations).

Rehearsals

Some of the FPAs were in possession of veld fire suppression and prevention plans. These plans needed to be rehearsed and evaluated for improvement.



Effectiveness and functionality of FPAs in fire management in the area

The majority of FPAs are effective to execute their duties for veld fire management. It is evident that the FPAs have a positive influence in veld firefighting in their respective areas. Some FPAs possess fire suppression and fire prevention plans which contribute to the effective functionality of the FPAs. Despite challenges noted, their effectiveness for veld fire management is impressive. FPAs can improve their functionality and effectiveness more if they can acquire the required resources such as firefighting equipment, funds and personnel and build good working relationship with other stakeholders.

5. RECOMMENDATIONS

To enhance the effectiveness and functionality of the Fire Protection Associations the following is recommended:

- FPAs should ensure the training of their members in firefighting on an annual basis and provide refresher courses.
- Improve teamwork and conduct awareness campaigns in their areas.
- Development of fire suppression and prevention plans for those FPAs with no plans and review fire suppression and prevention plans for continual improvement for those FPAs who are in possession of these plans.
- Establish more partnerships to strengthen FPA institutional arrangements
- Development of a database for sharing of veld fire statistics in the province.
- Establishment of fire brigade services throughout the province.
- Avail funds for FPAs to acquire adequate resources such as firefighting equipment, training of personnel and funds for FPA daily functionality. Assistance with funds can be through different institutions involved in disaster management and veld fire management. The department of Agriculture Forestry and Fisheries is the custodian of the NVFFA, local municipalities which house the Fire Brigade Services and the department of Environmental Affairs which funds WoF teams, are institutions that can



work together to ensure FPA funding which will play a role to promote their effectiveness and functionality.

Concluding remarks

Fire Protection Associations (FPAs) are important organisations in responding to veld fires in South Africa. All the stakeholders like the Municipalities, farmers, Working on Fire, Disaster Management Centres, relevant Government Departments etc should all work together to promote FPA activities as fire is the main hazard in South Africa especially in the Northern Cape Province.

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Johanes A Belle & Samkelisiwe Lubanga

Disaster Management Training and Education Centre for Africa

University of the Free State, Bloemfontein campus, South Africa (1 & 2)

Email: Belleja@ufs.ac.za

Tel: +27514019347

ORCID: 0000-0003-0770-8995 & 0000-0002-9175-1218