NATA FIRE RISK MANAGEMENT STRATEGY

Prepared for the villages of Nata, Sepako, Maposa & Manxotae

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2021-2025

SUPPORTED BY

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ACRONYMS

CDC	Central District Council
CBFIM	Community Based Fire Management
DEA	Department of Environmental Affairs
DFRR	Department of Forestry and Range Resources
DWNP	Department of Wildlife and National Parks
MFMP	Makgadikgadi Framework Management Plan
GEF	Global Environmental Facility
FMC	Fire Management Committee
FPPC	Fire Personal Protective clothing
SLM	Sustainable Land Management
SGP	Small Grants Programme
SSPMP	Southern Sua Pan Management Plan
UNDP	United Nations Development Programme
IUCN	International Union for Conservation of Nature
NCT	Nata Conservation Trust
WMA	Wildlife Management Areas

ACKNOWLEDGEMENT

BirdLife Botswana, Nata Conservation trust and Department of Forestry and Range Resources would like to thank all partners and stakeholders who participated in developing this strategy. We are also particularly grateful to the people of Nata and the surrounding villages (Maposa, Manxotae, and Sepako) for their shared knowledge, experience with veldfires and their contribution in managing veldfires going onward.

We would also like to thank the Global Environment Facility Small Grants Programme (GEF/SGP) implemented by the United Nations Development Programme (UNDP) for making this strategy possible.

FOREWORD

For a long time people of Nata have been affected by reoccurring of veldfires which pose risk to their life, property/infrastructure, local economies as well as the flora and fauna. Nata Conservation Trust which is a community based organization is one area which needs strategic framework to protect and manage the beauty of nature found in the area. The sanctuary has plethora of wild species amongst them the greater and lesser flamingos. Unfortunately the lesser flamingo is decreasing in population according to the IUCN red list of threatened species, if people don't do nothing about the veld fires which continues to affect the ecosystem soon we won't have any lesser flamingos roaming around Nata a problem which will affect the business specifically Avi- tourism or bird tourism.

Nata Bird Sanctuary is an important reproduction site for flamingos, one of the most important in the world, the waters of the salty lake are rich in food for these beautiful birds; the pink greater flamingos are fed with artemies, a family of shrimp living in salt and alkaline waters, worms and small crustaceans, while the pink lesser flamingos feed on algae, usually found in hot and brackish waters.

The flamingos build tapered nests using soil clay and lay eggs; the timing of egg deposition is crucial, it is a race against time: the eggs have to be opened and the chicks must be able to fly before the pan water dries completely, otherwise the little ones, without food and incapable to fly, would meet with certain death. There is an elevated wooden platform on the Eastern edge of the delta, from which you can admire the flamingos without disturbing them.

The best time to visit the Sanctuary is during the rainy season, from December to March, as the Nata River is full at this time and its waters flow into the Delta and in the Sua Pan; this attracts many species of birds.
Other bird species which are found at the sanctuary includes, the grebe, the cormorant, various ducks, the plovers, the pelicans, the pink-backed pelican, the great white pelican, the avocet, the black winged stilt, the blacksmith lapwing, the bustard, the African fish eagle, the pied kingfisher, the black-chested snake-eagle, the blue-cheeked bee-eater, the martial eagle, the secretary bird, the African spoonbill, the Hottentot teal, the red-knobbed coot and the white-faced whistling duck.
In addition to birds, some mammals can be seen including red hartebeests, kudus, common reedbucks, springboks, elands, zebras, jackals, foxes, monkeys and squirrels.

Strategic planning is therefore important because it explains shared understanding of veldfires together with their risks and ways of combating the risks. This fire management strategy empowers people of Nata and neighboring villages to work together and overcome the problem which continue to affect their area. The management plan also will enhance the resilience of the natural ecosystem through sustaining biological diversity and human livelihoods in times of fire outbreaks. To perform and achieve all this, people from relevant departments, stakeholders, communities and experts were consulted to benefit from their skills and knowledge. This helped identify information, opinions and local factors around the villages.

DEFINITIONS OF TERMS

- Bush Fire- an uncontrolled fire that burns grass, bush or woodland and can threaten life, property and the environment.

- Asset- something valuable belonging to a person or organization that can be used for the payment of debts.

- Economic asset- any item of economic value owned by an individual or corporation, especially that which could be converted to cash.

- Environmental asset- is defined as naturally occurring living and non-living entities of the Earth, together comprising the bio-physical environment, that jointly deliver ecosystem services to the benefit of current and future generation.

- Cultural heritage asset- item that has value because of its contribution to a nation's society, knowledge and/or culture. They are usually physical or intangible attributes inherited from past generations.

1. BACKGROUND

BirdLife Botswana through a GEF/SGP funded project has been working with Department of Forestry and Range Resources (DFRR) and Department of Environmental Affairs (DEA) to facilitate, monitor and manage rangelands resources in the Nata Area for sustainable use by the current and future generations. It has been evident that prevalent land and livestock management processes in Makgadikgadi ecosystem are likely to compromise the continued flow of ecosystem goods and services from the savannah ecosystem that are necessary to sustain the national economy, local livelihoods and the rich fauna and flora diversity. Local communities need to participate meaningfully in mainstreaming Sustainable Land Management (SLM) principles into rangeland management and governance in order to secure the ecosystems goods and services necessary for current and future development and maintenance of biodiversity.

Among other initiatives the project aims to enhance monitoring and management of fires right from the community level by capacitating them with skills and resources necessary to prevent and manage not only fires but also rangelands resources.

2. INTRODUCTION

People have used fire as an important tool for various natural resource management for thousands of years. Traditionally, fire has been used as a management tool to control vegetation structure and composition, for hunting and to recycle nutrients locked in live and dead biomass. These uses have continued up to today particularly in savanna ecosystems of southern Africa and northern parts of Australia. However, improper use of fires often lead to veld fires, which are blazes that get out of control, destroying extensive tracts of forests and grasslands and may result in the loss of biodiversity and human life and it can also lead to structural fires. In the tropics, fires occur regularly and frequently in the under-storey of savanna woodlands such as the miombo. Africa is considered as the most fire-prone continent in the world and has been referred to as the 'fire continent' primarily because much of Sub-Saharan Africa, once consisted of a vast landscape of tropical and subtropical fire-prone savannas, and fire-influenced woodlands and shrub lands that have been shaped by the longest history of human involvement with fire in the world. The dry and warm winters, combined with abundant grass fuels and ready sources of ignition (both lightning and humans) ensure that fires are a regular feature of savanna landscapes. The long-term effects of uncontrolled veld fires are a reduction of bio-diversity through destruction of flora and fauna, reduction of soil fertility, an increased erosion rate and decreased infiltration, which lead to less water for livestock, irrigation, fish, wildlife and people. In Botswana, the Makgadikgadi ecosystem is one area that perfectly resembles an miombo savanna. The ecosystem is characterised by tall grasslands especially on the fringes of the salt pans. Surrounding this salt pans, are open mixed woodlands which also has a considerable amount of grass layer beneath them. This descriptions fits an area precisely prone to veld fires especially with the agrarian human inhabitants handling fires around every time. Thus, this strategy is geared for use by Nata, Manxotae, Sepako and Maposa villages.

2.1 Objectives Of The Nata Fire Management Strategy And Action Plan

The general objective of this strategy:

- To provide guidance to communities in the Nata, Manxotae, Sepako and Maposa areas on how to prevent and manage veld fires.
- Wildland fire suppression

The Strategy is intended to address the Nata wildfire problems by focusing on the four key areas:

1. Restore and Maintain Rangelands
2. Fire Adapted Communities
3. Improved Response to Fire
4. Emergency Medical Support

2.2 A Description Of The Area

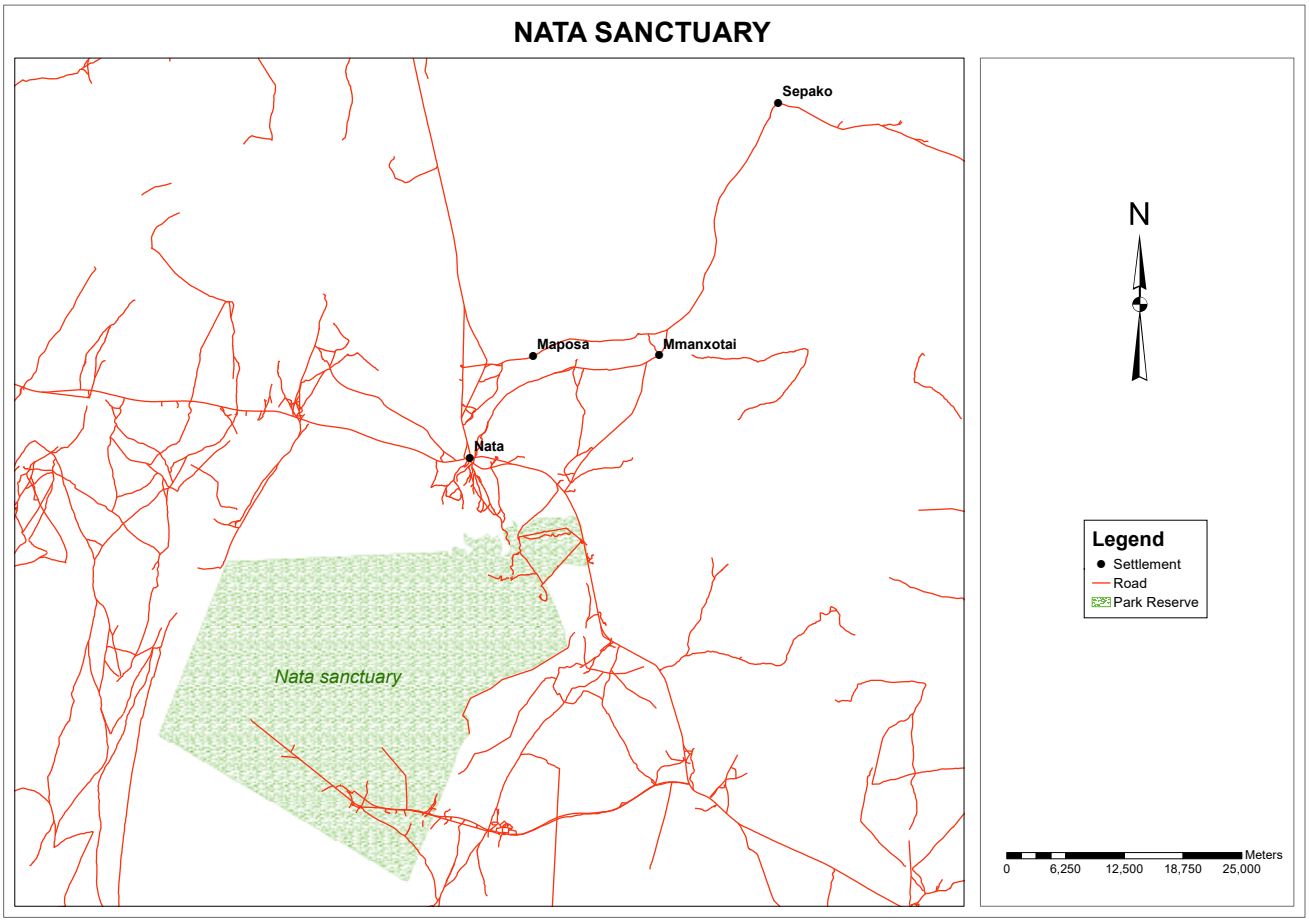


Figure 1: A map of Nata with Maposa, Manxotae and Sepako

Nata is small village at the crossroads for routes to the north and western parts of the country, coordinated at Latitude: -20° 13' 0.01" S, Longitude: 26° 10' 59.99" E The village provides an important refuelling and stopping point to get services for travellers to Kasane or Maun. Nata village is 190 kilometres from Francistown and 300 kilometres from both Kasane and Maun villages. The local community project been Nata Conservation Trust managed by a board of trustees and was carved out of cattle grazing land, owned by four communities of Nata, Sepako, Maposa and Manxotae. Of all the four villages, Nata is located at the centre of the other three villages. Manxotae is located 25 km north-east of Nata and coordinates are Latitude: -20° 07' 0.60" S, Longitude: 26° 23' 12.59" E, while Maposa is located 15 km north of Nata, the coordinates are Latitude: -20° 05' 33.00" S, Longitude: 26° 13' 6.00" E. Lastly Sepako is 50 kilometres north-east of Nata found at Latitude: -19° 51' 32.99" S, Longitude: 26° 29' 23.39" E coordinates.

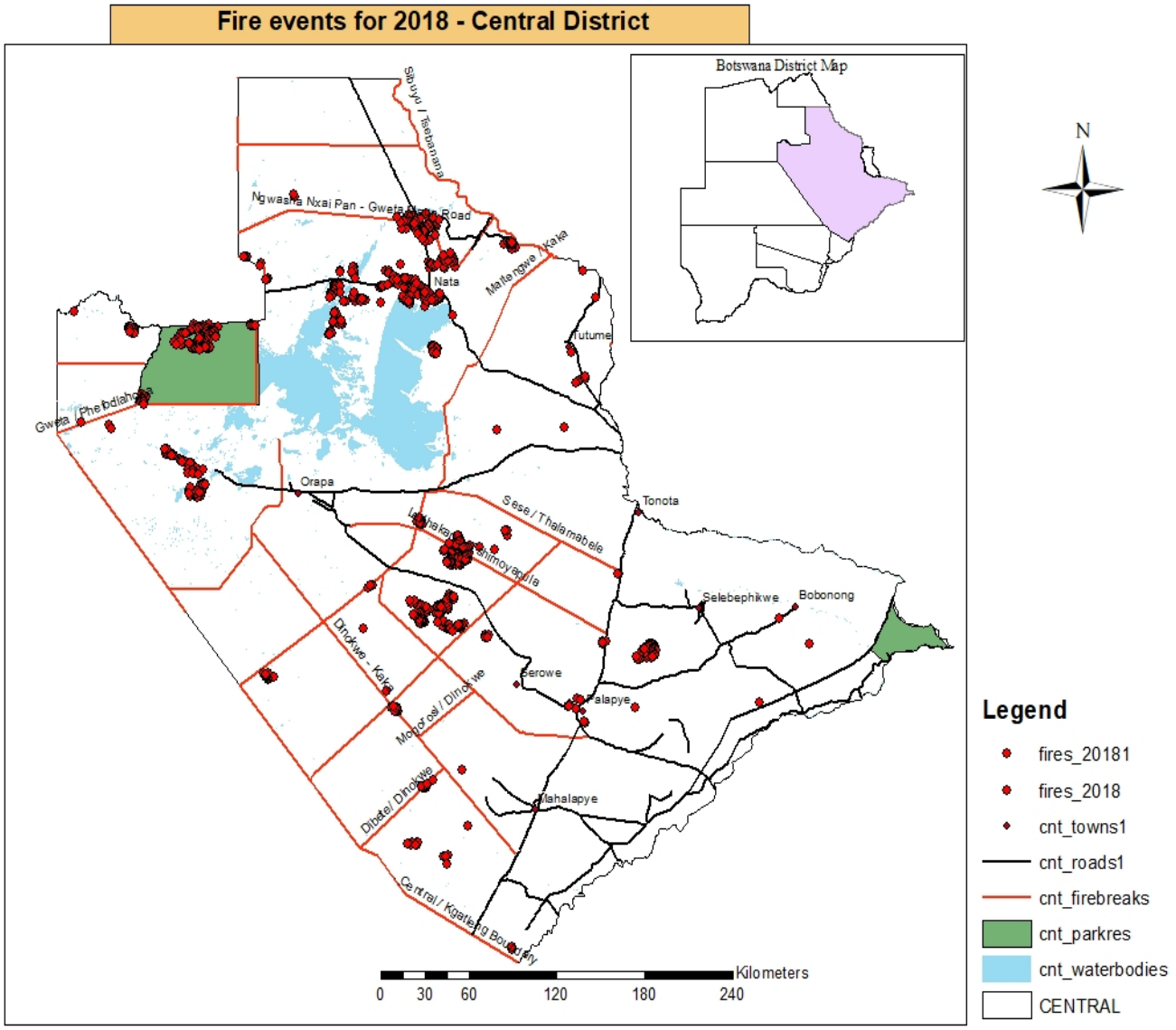


Figure 2: map showing fire events (source: Department of Forestry, Gaborone)

RESPONSES OF BIRDS TO FIRE OUTBREAK

The effects of fire to bird communities vary with fire intensity, season, characteristic of a site, climatic variation. Bird species also differ in their response to fire. During fire out-breaks, some birds act well in advance by migrating to seek new shelter as they are affected by smoke, heat and nests been destroyed. When vegetation is altered by fire, changes in vegetation favours some bird species and disadvantage others.

Many bird species are attracted to burning and recently burnt areas. The most common immediate responders are raptors. Raptors hunt, sometimes in very large numbers, among the flames of the fire front for fleeing large invertebrates and small vertebrates. Other bird's seed-eaters, insect eaters tend to be attracted to fire and its burnt residues, as they move closer to affected areas drawn from far and wide by the smoke. They do so to feed on burnt, killed or injured animals. After a relatively short time they move on, sometimes to the next fire. Burnt areas attract a very wide range of seed-eating birds, typically including, Doves, and a multitude of finches.

Some bird species need both burnt and unburnt areas. For example, in the early dry season, Finches nest on or near the ground so they rely on unburnt areas as fires at such times are likely to destroy many nests. Tree nesting vultures are highly likely to be affected by fire especially during breeding periods.

The reduction of food and cover for some resident bird species leads to starvation, predation or emigration. Species suited to more open habitats, mainly seed-eaters and insectivores, may move in temporarily, from adjacent areas or further afield, to take advantage of a flush of insects and seeds generated by the quickly responding growth of grasses and flowering annuals.

As vegetation restores from veld fires some species which once occupied the area begins to return or build up new nests, some take years to return. Low rainfall may slow the recovery of vegetation and return of birds.

It is clear that birds can act as indicators to rangeland degradation through how they respond to the environment or changes in the ecosystem.

2.3 CLIMATE OF THE AREA

Nata climate is semi-arid. Though it is hot and dry for much of the year, a rainy season, runs through the summer months of October to April. Rainfall tends to be erratic, unpredictable and highly regional. Often a heavy downpour may occur in one area while10 -15kilometers away there is no rain at all. Showers are often followed by strong sunshine such that a good deal of the rainfall does not penetrate the ground but is lost to evaporation and transpiration.

2.3.1 Rainfall

The rainy season is in the summer, with October and April being transitional months. January and February are generally regarded as the peak months. The mean annual rainfall varies from a maximum of over 650mm. Almost all rainfall occurs during the summer months while the winter period accounts for less than 10 percent of the annual rainfall.

2.3.2 Temperatures

Summer days are the hottest, especially in the weeks that precede the coming of the cooling rains, and shade temperatures rise to about 38°C and higher, reaching a blistering 44°C on rare occasions. Winters are clear-skied and very dry, the air usually warm during the daylight hours but, because there is no cloud cover, very cold at night and in the early mornings. Sometimes bitterly so - frost is common and small quantities of water can freeze.

2.3.3 Humidity

In summer, morning period humidity ranges from 60 to 80% and drops to between 30 and 40% in the afternoon. In winter humidity is considerably less due to lack of precipitation. Humidity can vary between 40 and 70% during the morning and fall to between 20 and 30% in the afternoon. Winds in this region blow from different directions and very strong since some places are characterized by less vegetation which act as wind breakers. Generally, the winds are higher during the summer months and lowest during the winter

months. It has been observed that winds are generally calm for substantial periods (wind speed less than one knot or 2km/hour are generally observed in the district.

The bush fire season in the Nata area usually starts in May and ends November. The fire season coincides with the dry months of winter season. This is the period when the vegetation starts to get dry but the first winter months have low occurrences of forest fires when they occur they are normally small in size. The frequency of bush fires occurrence starts to increase in August as temperatures start to rise. The peak fire season in the region usually occurs between August and October months as this are the hottest and driest months of the season before the first rains. The frequency of fire occurrences decreases during the start of the rainy season in November.

2.4 DEMOGRAPHIC VILLAGES OF NATA

2.4.1 Nata Village

Nata village is found in Tutume Sub-district within Central District of Botswana. The village is located approximately 200 km North of Francistown. Nata village lies on the northern side of Makgadikgadi Pans and Lekhubu Island, the world acclaimed tourism destinations. As per the Central Statistics Office Census of 2011, the village had a population of about 7732. The pattern of the current built up area exhibits characteristics of traditional settlement which grew organically. This form of settlement development effectuates several challenges such as; large irregular shaped plots, large tracts of underutilized open spaces, conflicting land uses, higher costs of physical infrastructure provision and limited vehicular circulation and access to the plots due to undefined road hierarchy. Therefore it became imperative a tool that will guide and coordinate the spatial development of the settlement in a sustainable manner.

2.4.2 Sepako Village

Sepako village is found in Tutume Sub-district within Central District of Botswana. The village is located approximately 63 km East of Nata village. Nata lies on the south eastern side of Makgadikgadi Pans. As per the Central Statistics Office Census of 2011, the village had a population of about 736. Similarly, the pattern of the current built up area exhibits characteristics of traditional settlement which grew organically. This form of settlement development effectuates several challenges such as; large irregular shaped plots, large tracts of underutilized open spaces, conflicting land uses, higher costs of physical infrastructure provision and limited vehicular circulation and access to the plots due to undefined road hierarchy. Therefore it became imperative a tool that will guide and coordinate the spatial development of the settlement in a sustainable manner.

2.4.3 Manxotae Village

Manxotae village is found in Tutume Sub-district within Central District of Botswana. The settlement is located approximately 33 km east of Nata village. As per the Central Statistics Office Census of 2011, the village had a population of about 725. The pattern of the current built up area exhibits characteristics of traditional settlement which grew organically. Like Sepako and Maposa, the form of settlement development effectuates several challenges such as; large irregular shaped plots, large tracts of underutilized open spaces, conflicting land uses, higher costs of physical infrastructure provision and limited vehicular circulation and access to the plots due to undefined road hierarchy. Therefore it became imperative a tool that will guide and coordinate the spatial development of the settlement in a sustainable manner.

2.4.4 Maposa Village

Maposa village is found in Tutume Sub-district within Central District of Botswana. The village is located along Nata/Sepako and is 18Km east of Nata village. As per the Central Statistics Office Census of 2011, the village had a population of about 423. The pattern of the current built up area exhibits characteristics of traditional settlement which grew organically. This form of settlement development effectuates several challenges such as; large irregular shaped plots, large tracts of underutilized open spaces, conflicting land uses, higher costs of physical infrastructure provision and limited vehicular circulation and access to the plots due to undefined road hierarchy. Therefore it became imperative a tool that will guide and coordinate the spatial development of the settlement in a sustainable manner.

5. LEGISLATIVE, POLICY, PLANS AND STRATEGIC FRAMEWORKS

The following frameworks have an impact on fire management in Botswana:

3.1. POLICIES

3.1.1 Forest Policy of 2011

Forest Policy is a framework that provides for guidance and facilitation in the management of forest and range resources of the country through conservation, development and sustainable use. Bush fire management is one of the topics covered in the Forest Policy. Management of Bush fires will ultimately have a bearing on the achievement of the main objective of the policy, which is, conserved and sustained use of forest and range resources.

The Forest Policy provides for an integrated Bush fire management approach that will enhance the fire management capacity, promote biodiversity and ecosystem integrity, and enhance human health and safety, as well as promoting social, cultural and economic benefits. The Policy aims at;

a) Developing and strengthening bush fire management institutions for effective coordination of fire management activities.
b) Promoting the development of fire management plans.
c) Develop capacity of interagency, local communities and land owners through knowledge transfer and skills development
d) Disaster Management committee

3.1.2 National Policy of Disaster Management of 1996

Bush fire is one of the identified potential disasters which may occur in Botswana. The National Policy on Disaster Management provides for comprehensive disaster management programme based on a series of activities aimed at reducing the impact of future disasters as well as reducing vulnerability. The policy also ensures that effective disaster preparedness measures are put in place in order to cope with disasters when they occur. It further provides for activation and effective emergency response and recovery plan.

3.2 PLANS AND STRATEGIC FRAMEWORKS

3.2.1 National Disaster Risk Management Plan

The National Disaster Risk Management Plan is the central disaster risk management for Botswana. It provides for a framework for sector Disaster Management Plans to be prepared by all Ministries and Organizations as well as Contingency plans for hazard specific preparedness plans, to be prepared at National, District and Village level

3.2.2. Nata Fire Risk Management Plan

The Nata Fire Risk Management Plan articulate the need for a focused Fire Risk management plan. The document propose the management plan with the view of protecting environmental and archeological resources found in the area. Further recommendations are made by the Nata Fire Strategy below:

- A holistic and systematic review of the firebreaks within the Nata area is required to ensure that alignments are effective, while exposing fragile soils to excessive wind erosion.
- Implementation of the Fire Management Strategy should be employed at a local level within the Nata area to help mitigate the development and spread of fires, such as extensive education and public awareness for local communities, and provide training and encourage local participation in fire management (DFRR)

- Construction and maintenance of firebreaks in line with the results of the firebreaks review (DFRR & DWNP).

- Construct Public education and awareness campaigns on fire management with the SSPMP (DFRR, CDC, Tutume sub-distict and Sua Town Council)

3.3. LEGISLATION

3.3.1 Herbage preservation act of 1978

The Herbage Preservation Act of 1978 provides for prevention and control of bush fires. The Act makes provision for establishment of Herbage Preservation Committees and members of these Committees are appointed by the Minister. The duties and functions of these committees in relation to the control and prevention of bush fires are provided in the Act. The following provisions are cited in the Act;

- Prohibition of burning vegetation
- Notice of intention to burn
- Fire break construction and maintenance
- Duty to extinguish fire
- Protection of life, person and Property by counter firing (Back burning)

3.3.2 The Wildlife conservation and National Parks Act

The Act provides for Botswana Wildlife resources and seeks to prevent species from becoming extinct. The Act sets out how wild animals can be used in all areas of Botswana. For the purpose of wildlife management, the country has been divided into 163 Controlled Hunting Areas (CHA's) and the management of each CHA will vary given whether it is a commercially (private) operated area or a community area, a multipurpose hunting area (hunting and photography) or only a photography area (non-consumptive uses) or inside or outside Wildlife Management Area (WMA) and on state land or Tribal land. SSPMP area is bordered by the CT 13 to the north, a Controlled Hunting Area within a Wildlife Management Area.

4. CAUSES OF BUSH FIRES IN NATA, MANXOTAE, MAPOSA, SEPAKO AREAS

4.1 BUSH FIRES

There are several anthropogenic causes of bush fires, which can be divided into two categories which are deliberate and accidental fires. Deliberate fires comprise fires used for hunting, improving grazing, early burning and or back burning to reduce the fuel load, creation of fire breaks, arson and smoking out bees during harvesting of wild honey. Other deliberate causes of wild fires also include cooking, waste dumps, and carelessness such as throwing out lit cigarettes, religious and the traditional practice of annual burns to improve grazing, fires to flush out game, fires to please the rain gods particularly when there is an impending drought and safari hunters who deliberately start or leave campfires unextinguished. Accidental fires may arise from lightning or spontaneous combustion during very hot dry summers.

4.2 IDENTIFYING AND ASSESSING BUSH FIRE RISK

This section outlines the bush fire issues in the Nata area, and broadly identifies the bush fire season, weather and other climatic influences, bush fire history, ignition causes and potential bush fire hazards which influence the bush fire problem in the area.

The plan contains a number of strategies that are directed at addressing the risk to community and environmental assets. This is generally achieved through addressing those factors which comprise the risk being the bush fire hazard (principally the fuel), the sources and pattern of ignitions and the vulnerability of the assets at risk.

Identification of the level of bush fire risk within the Nata area involved analysis of the following key components:

- The bush fire issues of the Nata area.
- Human settlement areas
- Bush fire risk
- Economic assets
- Cultural heritage assets
- Environmental assets

5. PROCESS IN THE DEVELOPMENT OF THIS STRATEGY

The Australia/New Zealand Standard AS/NZS 31000: 2009 Risk Management was used as the basis for the risk assessment process. **See Figure 2** for the steps involved.

5.1. COMMUNICATION AND CONSULTATION

Community participation is an integral part of risk management. The following stakeholders were consulted:

- Community
- Community leadership
- Farmers

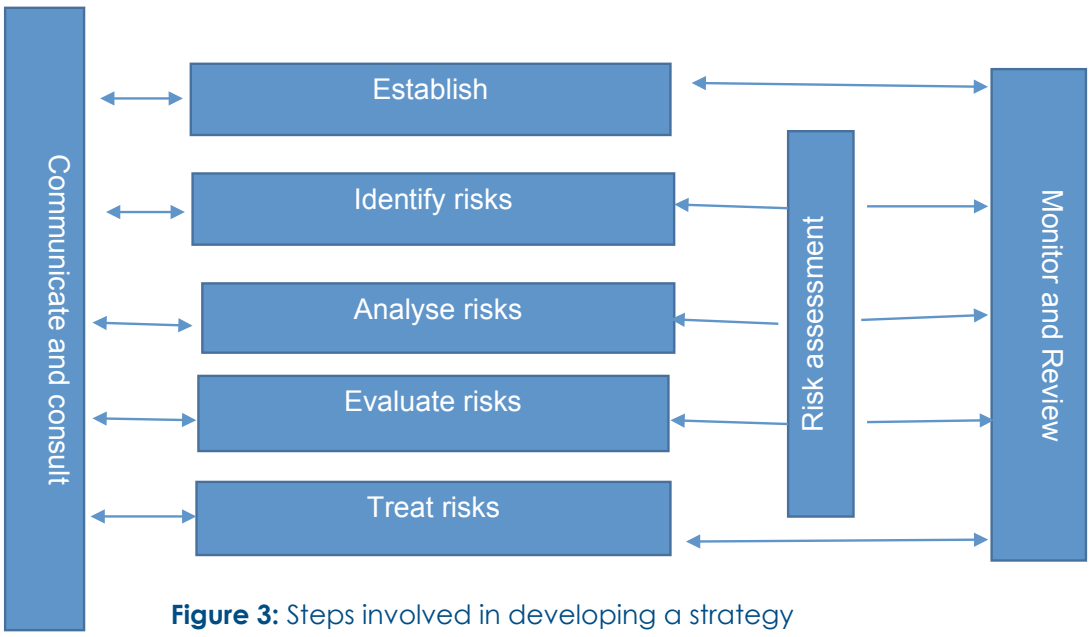


Figure 3: Steps involved in developing a strategy

5.2 IDENTIFYING THE BUSH FIRE RISK

Identifying the level of bush fire risk involved:

- Identification of assets considered to be at risk from fire in Southern Nata area.
- Assessing the likelihood and consequence ratings

5.2.1 Assets Identification

Assets which are believed to be at risk of bush fire in Nata area are identified. The assets are divided into two asset types

a. Human Settlement

The human settlements in the Nata area have the lowest fire risk as compared to other three asset types. This is primarily because the areas around the human settlements have low fuel loads and therefore the likelihood of bush fires affecting human settlement is very low, and the assessment of bush fire risk was conducted in terms of threat to life and property. It must however be noted that some of the fires originate from arable fields and the assets mostly at risk are the perimeter fence of these fields.

b) Environmental Asserts

Nata area is rich with natural resources that comprises of an abundance flora and fauna. These natural resources are very pivotal to the mainstay of the tourism sector in the area. The local community's livelihood is also dependent on the natural resources found in the area. The vegetation cover in the area is a mixture of shrubland and grassland as well as Mopane woodlands. The archeological sites such as the Nata Sanctuary and Pelican Lodge are a few of prestigious tourist attraction sites in the area.

6. ELEMENTS OF THE FIRE MANAGEMENT STRATEGY

6.1 ANALYSIS

It is important to know, where and when most fires start. Information concerning number, place, size and location, influence of fire contributes strongly to a more complete understanding of fire and its causes. Therefore define the problem clearly too then address if effectively using resources most efficiently. To prevent fires, those concerned must know, who or what starts the fires and why. If fires are mostly human made, then education campaigns might be most efficient. If too much fuel (stuff to burn) is the problem then fuel management may be the priority. Depending on vegetation and land use it must be clear which fires are wanted and which are not.

6.2 PREVENTION

It reduces the likelihood and impact of fires- cutting the unwanted ignition sources and decreasing the intensity of fires, while increasing the ability of organizations and communities to deal with fire and fire disasters. Depending on the case, this can involve education and awareness raising (school books, publicity materials, games and other publications), fuel management (reduction, removal, or other manipulation of the fuel for fires and sound and sustainable forest management and enforcement (appropriate laws and regulations, sanctions and supervision)

6.3 PREPAREDNESS

It ensures that fires are not a surprise. Important aspect of preparedness, training and development on fire management and suppression personnel. The installation and maintenance of infrastructure such as access roads and tracks, fire towers and preparing assets and homes. Supported by equipment purchase and maintenance. The on-going monitoring of weather conditions (Fire Danger rating), fuels and ignition sources to provide timely advice and warnings (readiness levels) on possible fires, ensures that resources can be effectively used.

6.4 RESPONSE

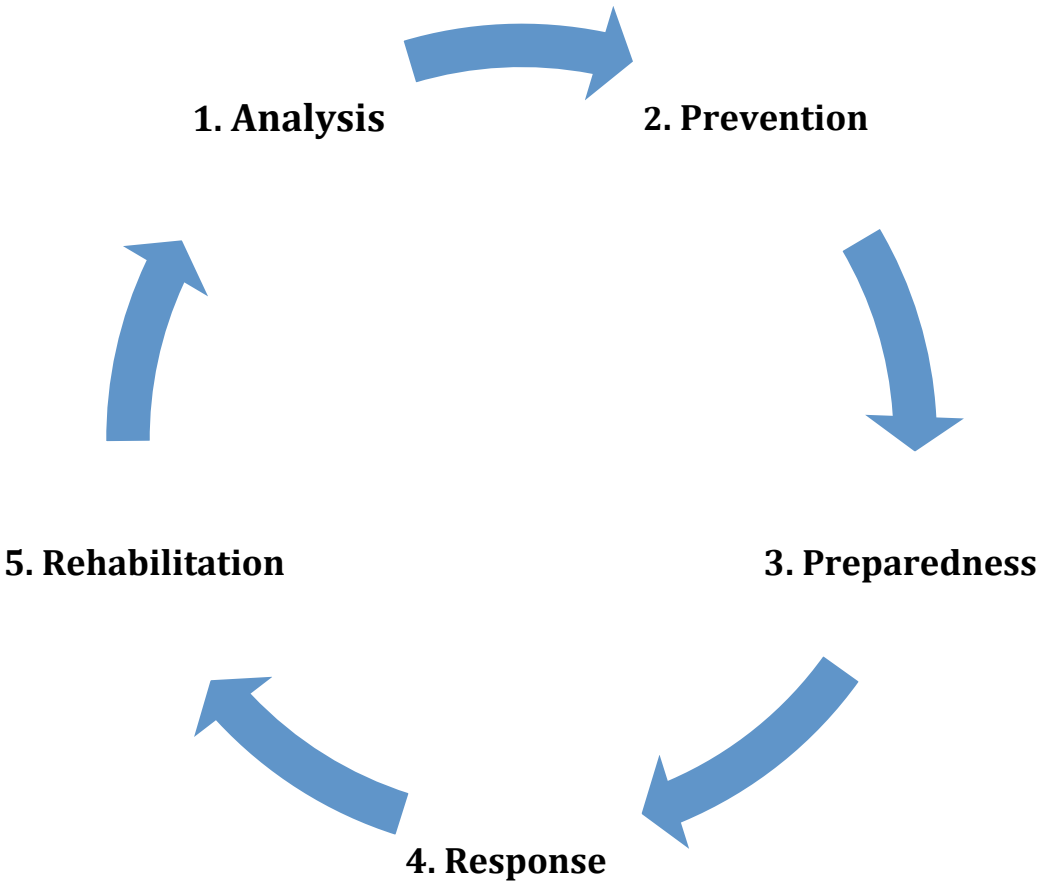
This is commonly referred to as 'firefighting' or 'suppression'. Contrary to common belief, fires are not 'put out' but 'secured' or 'contained'. The usual method is to cut the fire from access to new fuels by creating a fire line around the perimeter of the fire to stop the fire spread. After the fire line is completed, the fire is made safe by dousing and coiling embers and hotspots along the fire line in a process known as 'mopping up'.

All fire lines operate the same principle; removing fuel or making it less flammable. Eventually the fire will burn all of the fuel and go out. By order of effectiveness (from the least, to the most effective) fire lines can be wet (water and additives), dry (mineral earth break) or a combination.

6.5 REHABILITATION/RESTORATION

In its widest sense covers the repair, replacement or rebuilding of assets damaged by fire. This includes assets such as plantations, houses and infrastructure, but also the restoration of the fire damaged ecosystems including the re-establishment of ecosystem function, structure. Productivity and natural fire regimes, all of which are part of the sustainable forest and range management. Similarly, communities need support to recover from the impacts of fire. Restoration can be very important to prevent future fires. Burnt areas may be prone to fire in the years following a fire due to increased fuel and debris from burnt dead plants.

These elements will be repeated, therefore can be termed as the Fire management Cycle.



7. COORDINATION OF ACTIVITIES

Fire management and especially fire suppression activities need clear functions and command lines (comparable to Military forces) therefore DFRR has developed fire management committee/Team in the Districts with respective functions.

7.1 SITUATIONAL ANALYSIS

The Communities and stakeholders were engaged in assessing the current situation and three areas of fused were considered

a) Preparedness, b) Identification of fire prone areas and c) Challenges during suppression

FIRE INFORMATION ANALYSIS	
Result /Output	**Mitigation measures**
1. Fire prone areas were identified as a) Masimo (Mahube, Semoane, Marulamantsi,Fourie Ranches) b) Cattle-posts (Semoane, Marulamantsi, Gumkhwai, Khweenxa ,No. 6,Palamaokue and Xaongara),Ngwasha,17Km Area (Grass Harvesting Site). 2. Ignorance of proper fire management by communities 3. Lack of firefighting skills 4. Causes of fire are improper use a) for agricultural purposes b) veldt product harvesting e.g Thatching grass c) camp fires	- Fire use education - Establishment of Bush Fire Centre in Nata village. - Formation of first response team in Nata Village and concerned villages of Sepako,Manxotae and Maposa. - Education and awareness programs - Training on basic firefighting skills
Preparedness	
Lack of fire management planning - Shortage of resources – transport, firefighting tools.	Fire management planning - Mobilisation of resources - Establishment of Community Based Fire Management Centre - Training of fire management committee and response teams - Procurement of firefighting tools
Suppression	
- Shortage of resources – transport, trained personnel, fighting tools - Operational responsibilities and procedures - inaccessible areas - Unused boreholes posing threats to safety - Fatigue - Threat from animals - Losing direction - Communication challenges – shortage of network - Decision support tools e.g reporting tools Insufficient protective clothing, inadequate firefighting equipment.	- Detection and reporting tools - Establish response Operational structure and procedures - Make a risk assessment for the area - response and coordination plan - training on basic first aid

7.2 COMMUNITY BASED FIRE MANAGEMENT (CBFIM) CENTRE

The Community Based Fire Management (CBFIM) centre will be based in Nata village for accessibility since most of the fires start from the area. Volunteers from the four participating villages will be trained in basic firefighting and firefighting equipment will be procured for the centre to enhance capacity building.

7.3 CHALLENGES TO MITIGATION

Firefighting is proving to be a very expensive exercise internationally – it is also an industry

- Despite emphasis on fire suppression, Botswana is inadequately equipped for fire-fighting both in terms of equipment and skilled manpower – E.g. insufficient protective clothing, inadequate firefighting equipment.
- Communication breakdown is a major challenge.
- Education: It is imperative to merging modern and traditional fire management practices, this requires good orientation and awareness. This requires dispelling negative and wrong perceptions and practices about fire management.

8. COMMUNICATION STRATEGY

Various forms of communication forums and mechanisms shall be used to disseminate information to the intended target groups. Depending on the particular target group, the following shall be organize to maximize coverage:

a) Kgotla meetings
b) Communication materials
c) Training Workshops and Seminars
d) Fire awareness education

8.1 FIRE PREVENTION STRATEGY

This would include all actions and measures aimed at reducing or eliminating the potential for a fire out-break.

The main prevention measures taken are the following:

8.1.1 Law Enforcement

Any person who:

(a) Lights a fire within the State forest or within two kilometers from the forest boundaries, or

(b) Abandons unquenchable fire which has been lit by herself / himself in the State forest or within two kilometers from the State forest boundaries, or

(c) Discards lighted match, cigarette or other object that may cause fire in the forest or within two kilometers from the State forest boundaries, or

(d) Causes fire in State forest or within two kilometers from the forest boundaries as a result of reckless or negligent act or omission to take all necessary precautions, is guilty of an offense and in the case of conviction she / he is subject to imprisonment not exceeding five (5) years.

8.1.2 Information Campaigns

An information campaign aiming at educating the public, particularly young people is organized annually. Moreover, during the fire season messages are broadcasted through radio and television, and informative leaflets to raise public awareness

8.1.3 Picnic and Camping Sites

In order to avoid the risk of uncontrolled fire ignitions by people visiting forested areas for recreation purposes, numerous picnic and camping sites had been established.

8.1.4 Patrolling

Throughout the fire season, regular patrols are organized, mostly along the boundaries of the forest where most fires start. The aims of patrols are public information, enforcement of the law and detection and timely intervention in case of fire.

8.1.5 Fire Danger Mapping

Fire danger mapping is done on a daily basis, using meteorological data that are collected from a network of automatic weather stations installed for this purpose in different locations all over the country and internationally.

8.1.6 Pre-suppression Measures

Includes all actions and measures aimed at reducing the likelihood of spread of a potential fire and at facilitating the efforts of effective fire suppression.

The main pre-suppression measures taken are the following:

i. Fire breaks
Fire breaks are designed to interrupt the continuity of fuels. In case of fire, the fire breaks normally will slow the rate of spread, thus enabling the ground fire fighting forces to reach the head of the fire and suppress it easily and with relative safety.

ii. Forest roads
Within the bush there is a good road network. Forest roads are necessary and extremely important both for forest management and fire protection purposes.

8.2 FIRE RESPONSE STRATEGY (FIRE MANAGEMENT PLAN)

The actions taken in the initial minutes of an emergency are critical. A prompt warning to communities to evacuate, shelter or lockdown can save lives and even property where necessary. A call for help to public emergency services that provides full and accurate information will help the dispatcher send the right responders and equipment. Action by village communities with knowledge of building and process systems can help control a leak and minimize damage to the facility and the environment.

The first step when developing an emergency response plan is to conduct a risk assessment to identify potential emergency scenarios. An understanding of what can happen will enable one to determine resource requirements and to develop plans and procedures.

The execution plan should be consistent with the plan objectives.

1. Perform Risk Assessment
2. Review hazard or threat scenarios identified during the Risk Assessment
3. Assess the availability and capabilities of resources (including people) for incident stabilization, systems and equipment available at your disposal and from external sources.
4. Communicate immediately with public emergency services (e.g., Fire department/ brigade, police and emergency medical services) to determine (i) their response time to the area, (ii) geographic knowledge of the area and its hazards and (iii) their capabilities to stabilize an emergency.
5. Determine if there are any regulations pertaining to emergency planning to the area; address applicable regulations in the plan.
6. Develop protective actions for life safety (evacuation, shelter, shelter-in-place, lockdown).
7. Write and communicate the emergency response plan to other responders' and volunteers.
8. Coordinate emergency planning with public emergency services to stabilize incidents involving the hazards in the area.

Identifying a fire response team

- Communities should identify community fire response team who will work with other departments such as DFRR, DWNP, Police and Tribal leadership.

8.3 FIRE TEAM

- Fire Coordinator
- Crew Leader
- Fire Fighters
- Volunteers
- Police
- Medical Rescue

8. 3.1 Responsibilities and Resources of the Fire Teams

The fire team is made of up of several personnel with a chain of command. The Fire Coordinator oversees all the operations of a fire suppression excursion with the assistance of a Deputy Fire Coordinator. The Fire boss makes sure all the necessary equipment is readily available and personnel, including volunteers, are mobiles and equipped to put out the fire.

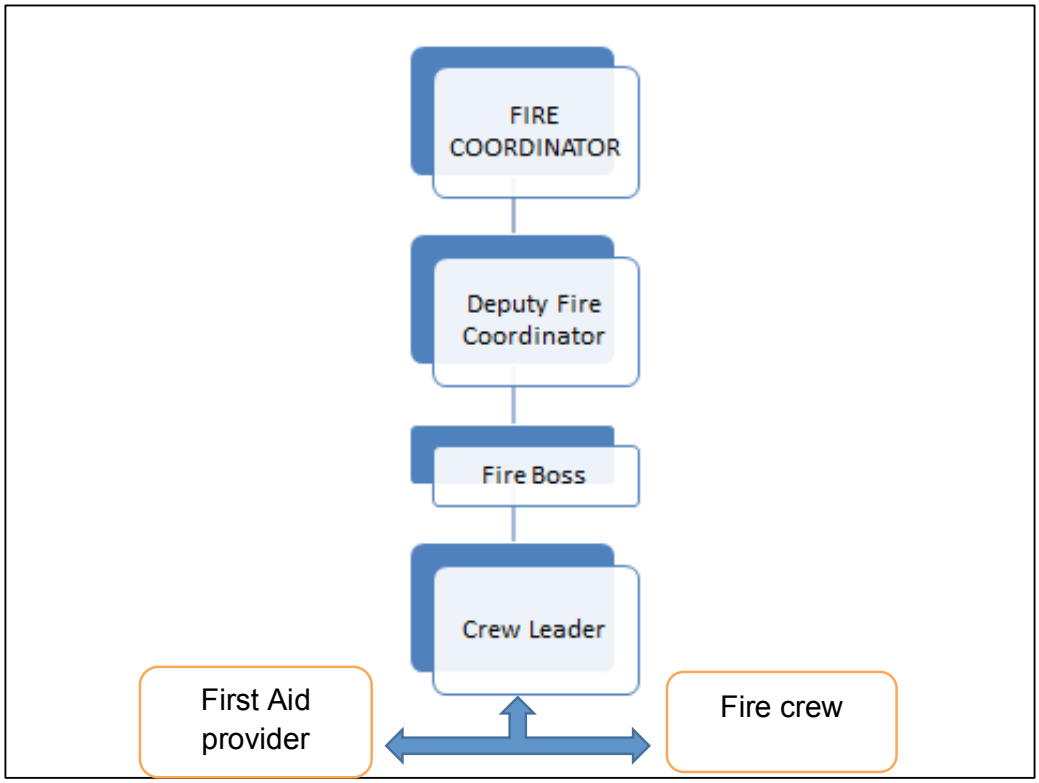


Figure 4: Hierarchy of command in Fire management operations

8.3.2 Procedure and techniques on reporting and handling fire outbreaks

1. Alert the neighbours where there is fire (scene)
2. Always send someone to go and report to the village leadership e.g. kgosi, kgosana and other village elders

3. Those left behind should try to put off the fire while waiting for others, and among those there has to be a crew leader who will be responsible for leading all crews.

4. There has to be a registrar who will be responsible for registering all the people who have been into the scene and involved in suppressing the fire.

5. The reporter has to go and report to

- Kgosi
- Local authorities (Landboard, council, Tribal, ODC)
- Police
- Fire team
- Fire team then alerts DFRR
- Fire fighters
- Kgosi then calls the community and alert them
- NCT

Fire team will go and attend the fire (seek numbers of the people going and their names)

8.3.3 Capacity for managing fires

Resources required for managing fires are;

1. Fire beaters
2. Metal rakes (Fire Rake)
3. Water tanks (Boom Sprayers)
4. First aid kits
5. Snake bite Kits
6. Fire Personal Protective clothing (FPPC)
7. Torches.

8. Fire Extinguishers.
9. Compasses/GPS
10. Fuel Cans
11. Knives
12. Map
13. Drip Torches

8.3.4 Monitoring veld fires

- Compile monthly reports on rangeland status using systems such as MOMS and GIS tools. See sample Annex 1.

9. COMMUNITY ENGAGEMENT

ITEMS	DISCUSSION
Item 1.	**PREPAREDNESS ASPECTS** • The need for public education to members of the community concerning fire sup pression. • It is imperative for the fire committee who are well conversant with fire management issues. • The health state of those participating in fire suppression needs to be monitored through prior medical checks. • There is a greater need to construct of fire breaks between arable and pastoral zones around the villages. • Fire breaks should be maintained time and again. • There should be enough and readily available fire equipment's such as vehicles, overalls, spades, and food in readiness for fire suppression. • Formal approach to training and needs assessment and proper records.
Item 2.	**IDENTIFYING AREAS PRONE TO FIRE; NATURAL & MAN-MADE** The following areas were identified as areas that are prone to fire; • Marulamantsi lands • Semoane lands • Mahube lands • Tsarotshaa lands • Gumkhwai cattlepost • Khweenxa cattlepost • Palamaokue cattlepost • No. 6 Cattlepost • Tsokapshaa Cattlepost • Semataphiri Cattle • 17 Km Area (Grass Harvesting Sites) • Ramotamosa lands • Kamangao lands • Didibakhwe lands • Dzamkwai lands **Preventing fires in these fire prone areas** • The committee suggested that vegetation burning permit should be offered, failure to do so the person liable should be punished. • Educating members of the community on how and when to start and put off fires es-pecially at lands.

Item 3.	CHALLENGES IN MANAGING FIRE
	• Shortage of vehicles to transport people to suppress fire. • Shortage of basic firefighting equipment's such fire beaters. • Communication breakdown (no networks) to inform firefighting team. • Shortage of communication equipment such as satellite phones and GPS units. • No proper roads to access fire prone areas. • Lack of education on basic fire suppression.

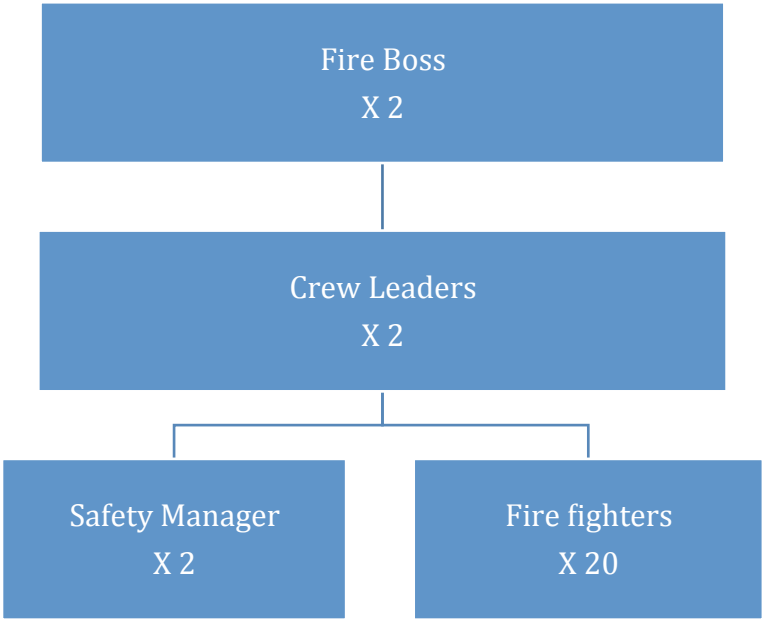
9.1 FIRE MANAGEMENT COMMITTEE (FMC)

The committee will initially be made of eight members, two members from each of the four villages. The membership will change depending on the need. The committee will be overseeing the fire activities in the area which includes

1. Participatory fire risk mapping of the village areas
2. Establishment of the village fire crews and train in firefighting and prescribed burning techniques
3. Development of community prescribed burning calendar
4. Development of annual fire management plan for the area
5. Education awareness campaigns on laws, regulations and wise fire use at community level (public and schools)
6. Reviewing existing village burning regulations and law enforcement mechanism which regulate the use of fire

POSITION	RESPONSIBILITY
Chairman	• To ensure that all his surbodinates perform their fuctions • Inform the stakeholders (VDC,DFRR, District Commissioner) • Call the meetings
Vice Chairman	• Assists the Chairman • Executes duties as assigned by the Chairman
Secretary	• Keep office records
Vice Secretary	• Assist in record keeping
Logistics	• Organise all the operational equipments • Make sure that equipments are maintained • Gather volunteers in cases of fire outbreak
Publicity	• Public awareness
Research	• To research on issues concerning fire • Collect data on fire

9.2 VILLAGE FIRE OPERATIONAL STRUCTURE



9.3 RESPONSIBILITIES OF THE FIRE CREW

a) Fire Boss: coordinates fire operation, determining the strategies to be used, report to Logistics Officer if he would need a re-enforcement after sizing-up. He also looks after the crew in term of feeding and making show water is all ways available. He navigates the way to the fire and back.

b) Crew Leader: leads the crew during operation, determines attack methods based on wind stability and direction. Crew Leader insures the crew is always together during suppression and instruct the crew to pull out in hazardous situations like when wind change direction or fuel load too high. The crew leader also looks after the injured and those set back because of fatigue and report to safety manager.

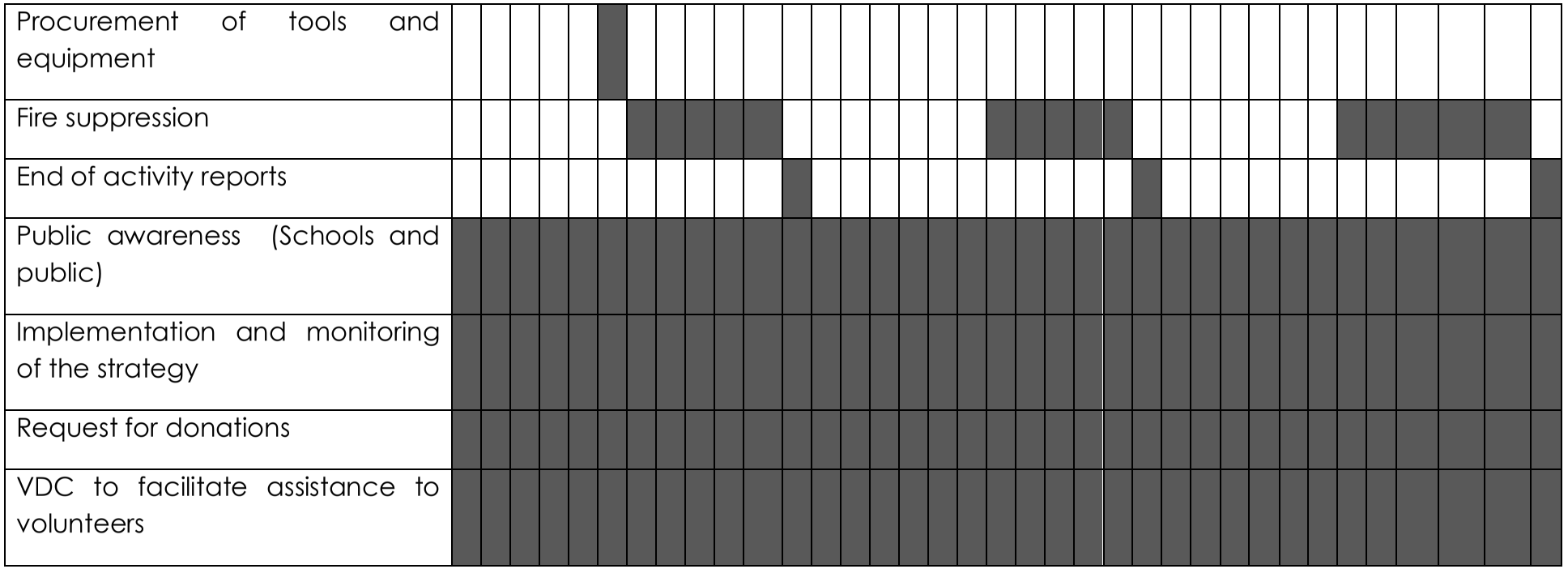
c) Safety Manager: Render first help to the injured before taken to specialist/doctor.

d) Fire Fighters: They fight fire, mop-up and return thing scene to normality.

11. WORKPLAN FOR THE FIRE MANAGEMENT COMMITTEE-NATA

PROJECT TITLE:	**TIMELINE**																																				
NATA FIRE MANAGEMENT STRATEGY	**Years**	**1**												**2**												**3**											
		2019												**2020**												**2021**											
	Months	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Kgotla meetings: Maposa, Manxotae, Nata,Sepako																																					
Identification of volunteers (Nata,Sepako,Manxotae,Maposa																																					
Training of Fire Committee & Team,Nata																																					
Developing Nata Fire Risk Strategy																																					
Capacity building Training in basic fire management for Volunteers.																																					
Establishment of CBFiM centre																																					

11. WORKPLAN FOR THE FIRE MANAGEMENT COMMITTEE-NATA CONTINUES



APPENDIX 1: SOME EQUIPMENTS USED FOR MANAGING FIRES

Resources used in managing fires are;

1. Fire beaters
2. Metal rakes
3. Water tanks
4. First aid kits
5. Fire protective clothing
6. Torches.
7. Fire Extinguishers.
8. Compasses/GPS
9. Knapsacks
10. Boom sprayers
11. Drip torch
12. Knapsacks
14. Drip
15. Fire torches
16. Fuel Cans
17. Knives.
18. Map
19. Vehicles

APPENDIX 2: EMERGENCY FIRE RESPONSE PROCEDURE

The execution plan should be consistent with the plan objectives.

10. Perform Risk Assessment

11. Review hazard or threat scenarios identified during the Risk Assessment

12. Assess the availability and capabilities of resources (including people) for incident stabilization, systems and equipment available at your disposal and from external sources.

13. Communicate immediately with public emergency services (e.g., Fire department/ brigade, police and emergency medical services) to determine (i) their response time to the area, (ii) geographic knowledge of the area and its hazards and (iii) their capabilities to stabilize an emergency.

14. Determine if there are any regulations pertaining to emergency planning to the area; address applicable regulations in the plan.

15. Develop protective actions for life safety (evacuation, shelter, shelter-in-place, lockdown).

16. Write and communicate the emergency response plan to other responder's and volunteers.

17. Coordinate emergency planning with public emergency services to stabilize incidents involving the hazards in the area.

APPENDIX 3: VELD FIRE OUT BREAK MONITORING TOOL

Fire No	Date of Reporting	Date started burning	Date of suppression	Location	Time			Cause					Damage					Area (burnt)			Resources deployed (Number)				
					Morning	Afternoon	Evening	Unknown	Domestic	Agricultural	Road Traffic	Others	Wild animal	Livestock	Vegetation	Poles	Others	Small	Medium	Large	Fire beaters	Knapsack	Boom sprayer	Vehicles	Volunteers
1																								
2																								
3																								
4																								
5																								
7																								
8																								
9																								

LEGEND:
Fire Damage details

APPENDIX 3: VELD FIRE OUT BREAK MONITORING TOOL CONTINUES

Area burnt:	Small = <5 ha
	Medium = 5 - 20 ha
	Large = >20ha

	Livestock Damage						Wildlife Damage										Human Life Loss			
Fire no	cattle	Goats	Sheep	Horses	Donkeys	Others	Elephants	Rhinos	Buffalos	Zebras	Eland	Lions	Hyenas	Birds	Snakes		Females	Males	Disabled	Youth
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				

Name of Reporter:_____

Omang number: _____

Contacts:_____

Signature:_____

CONTACT ADDRESS:

Nata Conservation Trust
P O Box 10, Nata, Botswana
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