

ANNEXURE 13 CASE STUDIES OF FFM IN SADC

Countries	Prevention	Protection	Suppression	Rehabilitation	Cross-border
1. ANGOLA		•			
2. DRC	•	•			
3. ESWATINI	•		•		•
4. LESOTHO	•	•			
5. MADAGASCAR	•				
6. MALAWI	•			•	
7. MAURITIUS		•		•	
8. MOZAMBIQUE	•				
9. SOUTH AFRICA		•			
10. TANZANIA	•		•		
11. ZIMBABWE			•		

ANNEXURE 13.1 ANGOLA

Country	REPUBLIC OF ANGOLA			
Type of case	Selected No. 2	1. Prevention 5. Cross-border	2. Protection	3. Suppression 4. Rehabilitation
Title	Forest fire protection in Cunene Province.			
Location	Angola -Cunene Province			



Lessons learned

Prescribed burning operations for land use managers.

ANNEXURE 13.2 DRC

Country	DEMOCRATIC REPUBLIC OF THE CONGO (DRC)				
Type of case	Selected No. 1	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	Public Awareness on Forest and Bush Fires Services, By NGALAMULUME TSHIABA Jean Paul et NGOY KIBWILA Michel, all EWG – FFM				
Location	Kinshasa – Democratic Republic of the Congo (<i>the map below is showing well the location</i>)				

Contents

Second country of Africa by its surface, the Democratic Republic of the Congo (DRC) with its 2,345,000 Km², has the longest international common border it shared with nine (9) countries¹. Covered by 155 million hectares of forests, 62% of the total area of the national territory; at the global level, the DRC covers 10% of all tropical forests in the world, while at regional level in Central Africa, it occupies 62% of Congo Basin forests². These forests contain a diverse biodiversity as well as local communities and indigenous peoples that are closely linked to this forest ecosystem.

In addition, the DRC is also the first in the ranking of forest countries in the SADC sub-region. By itself he covers 135,000 hectares of forests on the 357,000 hectares possessing the entire sub-region³; as shown below in the table.

Table 1. Forest Cover and changes in SADC regions

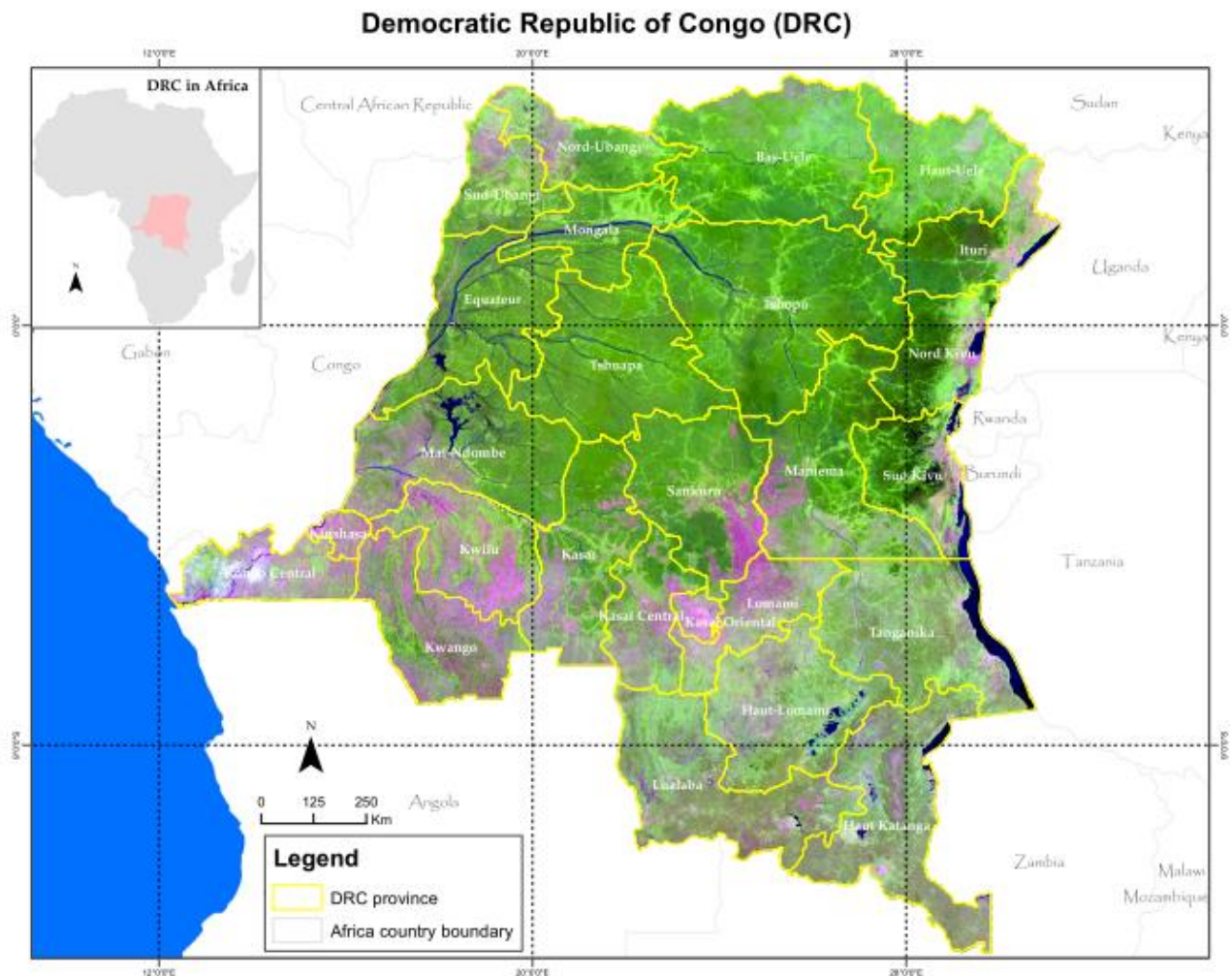
Country	Forest Cover in 1990 (000ha)	Forest Cover in 2000 (000ha)	Forest Cover 2005
Angola	70.998	69 765	59 104
Botswana	13 611	12 427	11 943
DRC	140 531	135 207	133 610
Lesotho	14	14	8
Malawi	3 269	2 562	3 402
Madagascar	-	-	12 838
Mozambique	31 238	30 601	19 262
Mauritius	50	50	37
Namibia	8 774	8 040	7 661
Seychelles	-	-	40

¹ The international boundaries (borders) of the Democratic Republic of Congo: state of play and geostrategic challenges. Printed at Médias Paul, the 10th Street Limete Township/Kinshasa (RDC) October 2012,

² Mayombe Transboundary Initiative. DRC-Angola-Congo-Gabon Quadriparty Committee.

³ FAO (2001), *(FAO 2007, The state of the World's Forest).

South Africa	8 997	8 917 9 203	9 203
Swaziland	464	522	541
Tanzania	39 724	38 811	35 257
Zambia	39 755	31 246	42 452
Zimbabwe	22 239	19 040	17 540
Total	379 614	357 143	352 898



Forest and bush fires are one of the main drivers of forest and protected area degradation⁴, but we can also take profit of it in the case of ecosystems management, therefore maximizing the benefits that can be gained from this practice (fires) necessarily requires a better knowledge of these fires through a good awareness of stakeholders including local populations, in order to involve them in the control process (identification, alert, monitoring and control / management). That why the Ministry of Environment and Sustainable Development (MESD) through the Direction of Forest Management,

⁴ Caillault S., Ballouche A., Delahaye D., 2009. Spatio-temporal organization of bush fires: Comparative approach in Burkina Faso. Geophen Laboratory, UMR 6554 LETG, CNRS / University of Caen Basse-Normandie Esplanade of Peace, 14032 Caen Cedex 18, France, 10 p.

has made recently a study in order to know about the contribution of local populations involvement in the control of forest and Bush fires. But as fires issues on forests seem to be a new topic in DRC, before targeting locals communities, this study has chosen to target mainly MESD Staff in order to identify in it those who will be able so as they can be deployed on field to the local forest populations in the provinces of the country for awareness activities of populations.

Specifics purposes

- Promote some dispositions of the Forest Code, relating to the control of forest and bush fires⁵;
- Inform and to make sensitize the MESD officers and civil servants on the importance to control forest / bush fires, in order to reduce all possible risks related to the using of fires in bad ways;
- Evaluate the feasibility of capacity building training for field-deployable agents to local populations to raise awareness of forest and bush fire control in all country provinces.

Methodology and conclusion

Some workshops with the concerned under the supervision of the experts of the FFM working group were organized from September 2017. Many Directions or Departments (as Technical Department Energy and Wood, Horticulture and Reforestation, Promotion and Extension of Wood, Technology of Wood, Forest Management, Forest Cadastre...) attend those meetings. The EWG experts was inspired by what they learned lastly in Kishugu in July / August (of the same year) and the forest law of DRC, for achieving the study. Some interviews were done with the MESD staff in order to make perfect the study.

By the way, the objectives had been achieved, although the Experts continued until February 2018 to work with MESD staff so as to have a consistent team to better lead this activity at the appropriate time.

Lessons learned

- Involvement of local forest populations in forest fire management to reduce negative fire impacts on forests resources, biodiversity, protected areas, soil protection...;
- Forest and bush fires are an important tool in the management of forest areas (pastures, improvement of soil fertility, weed control ...);
- Possibility of setting up monitoring, control and warning teams by making use of sensitized riparian populations on forest fire services;
- Possibility of applying this last lesson at the level of the sub-region of SADC countries.

⁵ Law n ° 011/2002 of 29/08/2002 concerning the Forest Code of DRC in its chapter 3, article 56.



During a work meeting (in the conference room): Expert EWG talking to the MESD staff on the importance to involve local community in forest fire management through an awareness process.

Experts during a workshop



Country	DEMOCRATIC REPUBLIC OF THE CONGO (DRC)		
Type of case	Selected No. 2	1. Prevention 2. Protection 3. Suppression 4. Rehabilitation 5. Cross-border	
Title	Forest and bush fires protection in Upemba National Park (UNP) from 2001 to 2010, By NGALAMULUME TSHIABA Jean Paul et NGOY KIBWILA Michel, all EWG – FFM		
Location	Kinshasa – Democratic Republic of the Congo (the map below is showing well the location)		

Contents

Natural resources are more and more under increasing anthropogenic pressure, leading to dysfunction of terrestrial ecosystems and loss of biodiversity. Amplified by inappropriate modes and systems for exploiting available resources, these changes have a direct impact on land use and landscape configuration⁶.

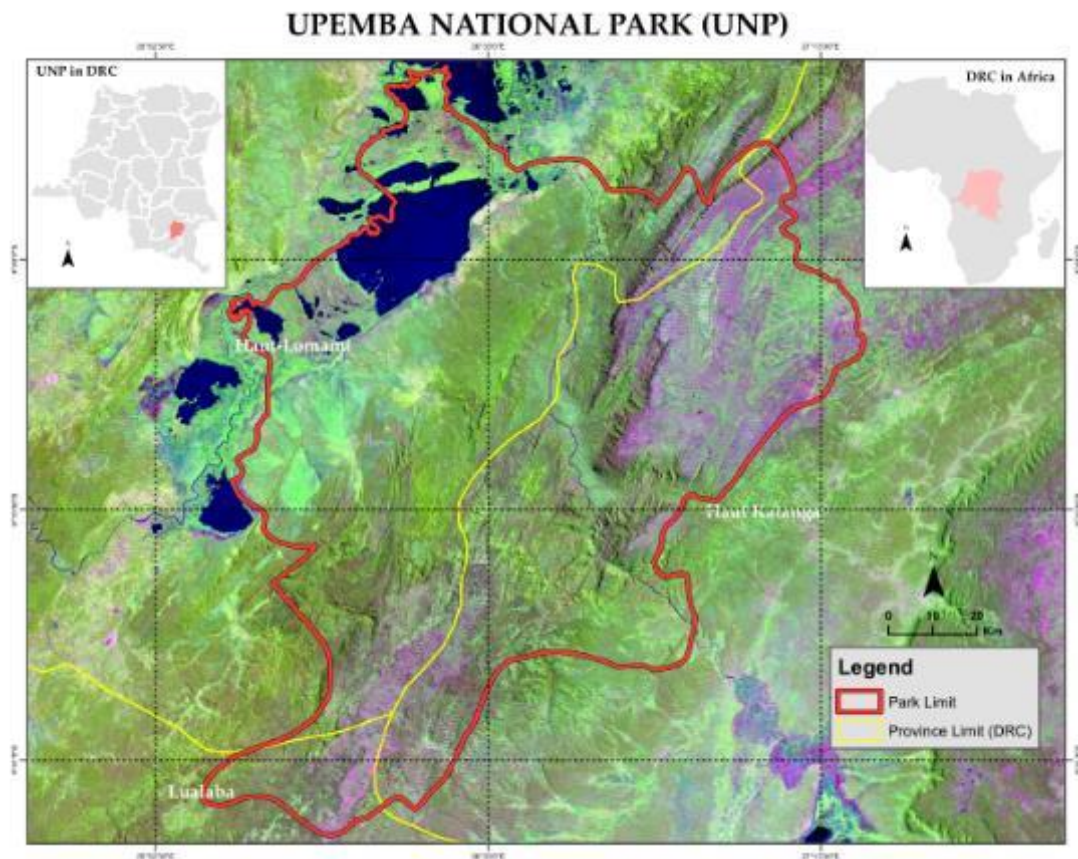
Bushfires are one of the major factors in the degradation of protected areas in savannah areas. However, bushfire can also be used to manage protected areas. However, the optimization of the benefits that can be derived from this practice necessarily requires a better spatial distribution knowledge of these fires in order to orientate better the strategies of their management in the protected areas⁷.

Located between the provinces of Haut-Lomami, Haut-Katanga and Lualaba, the Upemba National Park (UNP) created by Royal Decree of May 15th, 1939, represents the third park created after Virunga (1925) and Garamba (1938). With an area of 773,000 hectares, it used to be an integrated national reserve. The legislation applied in national parks in general and in the Upemba National Park in particular was reviewed by Ordinance N° 69-041 of 22th August 1969 relate to the conservation of nature⁸.

⁶ Bamba I., Mama A., Neuba D.F.R., Koffi K. J., Traore D., Visser M., Sinsin B., Lejoly J. & Bogaert J., 2008: Influence of human actions on the spatio-temporal dynamics of land use in the province of Bas-Congo (Democratic Republic of Congo). Science & Nature, University of Abobo-Ajamé, Ivory Coast, Volume 5: 49-60 pp.

⁷ Luya Wantuadi Y., 2012: Spatial analysis of bush fires in the Upemba, Kundelungu and Bombo-Lumene hunting grounds from 2001 to 2010, Thesis dissertation, University of Kinshasa. Unpublish, 40 Pages.

⁸ Numbi M.M., 2011: Protected Area Management Study in the Democratic Republic of Congo: Case of Upemba National Park. Graduation thesis, Faculty of Agricultural Sciences, University of Kinshasa, Unpublished.



This case study is based on a comparison of the spatio-temporal distribution of bush fires in correlation with the climatic seasons within the UNP, in addition to the determination of the losses of areas of the vegetation cover in terms of seasonal frequencies and percentage, in order to enable SADC countries to set up a strategy to prevent forest and bush fires in the sub-region.

The interest of this study is to provide to Protected Areas Managers and forests in the sub-region of SADC members states, the necessary information they need for using forest or bush fires as a tool of space management and decision-making in land use planning; moreover, the methodology adopted for this case study can be used in the development of strategies for the prevention of forests/bushes fires services and in the reduction of greenhouse gas emissions.

Objectives

The global goal is to analyze the spatial distribution, diachronic and impact assessment of forests/bushes fires on the diversity of Upemba National Park, in a grassland space between 2001 and 2010.

About **specifics aims**,

(1) Determine the strongest periods of fires presence; (2) Propose prevention means of fires risks in this protected area.

Methodology and conclusion

MODIS images covering the study area from the year 2001 to 2010 were used for monitoring and mapping fire points in the study area, using ArcGIS software. Frequency to highlight the seasons of strong presence of fires in the form of a graph have been done in Excel.

The results obtained show that the forest/bush fires regime in the Upemba park is closely linked to the climatic seasons, particularly in the dry season (from May to October), which has a high proportion of fires. During this period, a low water

content is reported on the vegetation cover, which facilitates in some cases, a wide spread of fire.

The most representative months in terms of maximum percentage of bush or forest fires are usually the months of May, June, July and sometimes September in the UNP.

Apart from fires, there is also human presence (localities and cities) within the park with high fire frequency. However, the climatic seasons remain one of the most important parameters that will allow protected area Managers to make better planning land use activities in this protected area, but also to awaken the population conscience on fire using and his interest on the biodiversity conservation.

Lessons learned

- Forest and bush fires can be considered as an important tool in forest management (soil protection, weed control...) and protected areas;
- The involvement of local populations bordering protected areas through awareness-raising activities makes it possible to take advantage of the benefits of fires and limit their negative impacts on biodiversity;
- Contribution of GIS and Remote Sensing in the effective analysis of fire detection data and evaluation of their impacts on forest management (biodiversity);
- Define better technic of dry biomass management during non-rainy seasons in order to reduce the risks of accidental fires.



Experts working

ANNEXURE 13.3 ESWATINI

Country	KINGDOM OF ESWATINI				
Type of case	Selected No. 1,3,5	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	Forest Conservation and Sustainable Management of Forest Resources in Southern Africa Project By Forest Fire Management Expert Working Group (EWG-FFM): JICA Project Support				
Location					

INTRODUCTION

Eswatini is endowed with vast Forests which include man-made plantations and indigenous forests. The Forestry Industry contributes to the gross domestic Products in the country. Despite the tremendous contribution to the national economy, the efforts of the industry are undermined by the high incidents of fires. The causes of forest fires are numerous and varied, but the most common are veld fires, arson, beehives smoking, lightening and others just to name a few.

A small country in Southern Africa, Eswatini is land locked by South Africa to the North, West, Southern boundaries and some parts of the Eastern boundary bordered by Mozambique. During the Dry Season Eswatini experience widespread wildfires countrywide. The Swazi communities lack the knowledge and skills to fight fires. The Firefighting Task has not been fully decentralized to rural communities. Eighty percent (80%) of the fire activity mainly concentrated within plantation forests and sugar plantations. Bushveld and grasslands, also seriously affected. These fires led to a range socio-economic and other impacts including loss of lives, injuries, adverse impacts on health, extensive loss of property and threats to livelihoods. One hundred and sixty-nine (169) households lost their dwellings and property including livestock and estimated 20,280ha in plantation forests amounting to revenue losses of more than E465 Million (US\$ 45 Million). This put at risk hundreds of jobs and the livelihoods of approximately 21 000 people in indirect losses. Other impacts recorded include loss of lives, injuries, negative effects on health, reduced visibility leading to compromised road safety, fire-fighting costs etc.

In this light, the approaches considered for Forest fire management were viewed critically on the basis of the most challenges Eswatini experienced in terms of serious destructive effects, hence; the case studies presented emanated from:

- i. Forest fire awareness raising and education campaigns
- ii. Fire management implementation strategy (Firefighting Eswatini) and
- iii. Cross Boarder fires between Eswatini and Republic of South Africa

1. GENERAL BACKGROUND OF FOREST FIRE MANAGEMENT IN ESWATINI

A. Forest Fire Awareness in Eswatini

CHALLENGES:

- Understanding of the roles and responsibilities to appropriately manage fire throughout Eswatini by; general public, communities, stakeholders and Government institutions
- An integrated fire management approach to balance the beneficial and harmful effects of fire on lives, property, land use, resources and the environment.
- Decentralization of fire management decision-making and implementation to public and private landholders, including the community, on all parcels of land throughout Eswatini.
- Coordination of decentralized fire management programs at local, regional and national levels through participatory and collaborative structures.

AWARENESS OBJECTIVES:

- a. To enhance capacity of fire management personnel in public, communities and private institutions in dealing with fire management in Eswatini;
- b. To build local community capacity to handle and manage fire accordingly, prevent uncontrolled fire and increase the level of preparedness in combating fires.

FIRE AWARENESS ACTIVITIES:

- i. Fire awareness and educational programmes are developed and targeted to specific audiences and communities;
- ii. Developed programmes sensitize the cultural and social norms of the community, including the application of fires to agricultural, forestry, biodiversity and traditional uses or to other basic needs;
- iii. Fire awareness and educational materials are sensitive and reflect local literacy levels, including oral presentation where printed material or local language barriers limit effective communication;

B. Fire management implementation strategy (Firefighting in Eswatini)

CHALLENGE:

- Training and building the capacity of government, public, communities and private landholders, and the community to implement fire management through the Frameworks that would demonstrate how to:
 - i. Minimize the destructive impact of uncontrolled wildfires.
 - ii. Enable the appropriate use of fire; to enhance land use and promote sustainable livelihoods.
 - iii. Maintain and enhance ecosystem function and sustainability through appropriate fire regimes.

FIRE IMPLEMENTATION OBJECTIVES:

- a. Minimize the destructive impact of uncontrolled fires on lives, property, resources and environment.
- b. Enable the appropriate use and management of fire to enhance land use and promote sustainable livelihoods.
- c. Maintain and enhance ecosystem function and sustainability through appropriate fire regimes.

d. Facilitate participatory fire management by public, private and community landholders.

IMPLEMENTATION MANAGEMENT ACTIVITIES:

- i. Train Regional-level Fire Management Facilitators/Trainers from key government institutions to implementation National Fire Strategy.
- ii. Identify fire management Focal Areas to implement National Fire Strategy.
- iii. Established and or train fire management brigades (Fire Protection Units) in the pilot Focal Areas to implement a Fire Management Program.
- iv. Develop, produce and distribute a multi-stakeholder Fire Management
- v. Procure basic fire management and personal protective equipment
- vi. Coordinate and support fire management brigades to plan, implement and monitor Fire Management Programs in the pilot Focal Areas.

C. Cross-border fires between Eswatini and Republic of South Africa

CHALLENGES:

- Cross-border agreements between the two countries; Eswatini and South Africa
- Immigration procedures effective during firefighting operations.
- Harmonization of policies including laws on Cross border Fire agreements to include the operations of Fire Protection Associations in both countries.

CROSS-BORDER FIRE OBJECTIVE:

To encourage the Eswatini Government to develop and/or strengthen bilateral, regional and international cooperation with neighbouring countries in veld fire management.

CROSS-BORDER FIRE ACTIVITIES:

- i. Encouraging the use of common terminology, systems and standards to enhance international cooperation;
- ii. Promote an ongoing exchange of knowledge, technology and resources to facilitate rapid international response to fires;
- iii. Participate in international organizations, networks, fora and activities to enhance domestic and international capacity and rapid international response;
- iv. Use available guidelines and examples of successfully implemented agreements as a framework for the development of binding and non-binding international instruments.

2. CASE STUDIES OF FOREST FIRE MANAGEMENT IN ESWATINI:

CASE STUDY 1: ON CROSS-BORDER FIRES IN ESWATINI

The Forest Sector in Eswatini contributes tremendously to the National Economy. The effort of the Forestry industry is undermined by the high incidents of fires. The root causes of the Forest Fires are numerous and varied but the most common causes are veld fires including cross-border, arson, bee smoking, lightening and others just to name but a few.



Figure 1 : Borderline between Eswatini and South Africa.

The consequences of the fire damage amongst the many negative impact to the industry threatens long term sustainability and viability, reduced timber supply, increased costs, and insurance premiums, reduced profitability, job losses to neighboring communities and countrywide, furthermore these results in; low economic growth, diminishing tax base, export returns, foreign exchange earnings, GDP and capita earnings in the long-term.

Due to increase in forest fires, the forestry industry might not be able to meet timber supply required by the markets. This may lead to the Companies having to import some timber from neighbouring countries and hence incur huge costs, and alternatively, which could be the last resort, the companies are forced to fell trees before maturity which is not acceptable.



Figure 2 : Fire Crew burning Firebreak next to a borderline between Eswatini and South Africa

In every fire season, Eswatini has continuously experienced cross border fires from South Africa which usually come from the western boundaries of which most prevailing winds come from that direction. Usutu Forest Products Company which is presently owned by Montigny and previously owned by Sappi Forests has experienced massive cross border fires. In 2008 the plantation was ravaged by fire where 40% of the timber was lost. Sappi was a subscribing member of Fire Protection Association (FPA) in South Africa in Warburton (Umpiluzi FPA).

Whenever there was a Fire, aerial resources from Warburton Research would be dispatched with ETA of 15 Minutes. They also had agreement to burn along the borderline between the two countries, but due to the width of the Firebreak, the fire used to jump the firebreak. Whenever there was a fire closer to Eswatini borderline the agreed procedure was to call SA-FPA to help extinguish the Fire, NB: This agreement was localized and not nationally applying. Sometimes due to severe drought and high vegetation cover during dry season, fires become severe across the borders.



Figure 3 : Mopping up after a Cross-border fire

In 2014, Management transformation from Sappi to Montigny Investment implicated some changes to the New Company. As such, Cross border agreements were not renewed therefore, no more burning of firebreaks around the borderline next to the Plantation. The need to have special agreement/policies for cross-border movement of fire-fighting equipment and personnel for emergencies were not being sustained. Time delays caused by Eswatini Government and South African Immigration procedures during fire occurrence posed great challenges.

Formulation of cross-border/cross boundary firefighting agreements, Establishment of local and national firefighting association could be major fire management logistics to be linked with external fire Protection Forces. The Ministries of Foreign affairs between the two countries would have to be met to reach an agreement. The cross- border fires cut across all sectors of the Swazi society (Forestry, Pasture management, agriculture as well as individual households).

CASE STUDY 2: ON FIRE FIGHTING (FIRE MANAGEMENT IMPLEMENTATION STRATEGY) IN ESWATINI

Presently the bush fires, wild and unwanted fires are not detected early enough to be successfully controlled before causing severe socio-economic and environmental impacts. With the introduction and capacity building of the Fire-brigades is intended to manage bushfires, naked and unwanted fires by containing these at incipient stages with minimum impact using available resources. A Pilot Project through FAO was developed manage fires in selected focal areas where Communities surrounding Forest Plantations, conservation management areas and Cattle Fattening Ranches were trained on firefighting.

After completing the Course/training, the trainees are given firefighting gear in; Personal Protective equipment (PPE) and Personal Protective Clothing (PPC) but due to Shoe-string budget, Eswatini Government provided the firefighting gear to selected communities at 12 Tinkhundla Constituencies at focal area levels under pilot project. The Fire Training Included; awareness, Fire management site planning, detection, communication, accessibility, prevention, protective clothing, firefighting techniques and use of equipment and the science of fire.



Figure 4 : Fire Fighting in a Forest in Eswatini

In Eswatini, Forest Plantations are owned by Private Companies. The Forest Companies have their own Fire Fighting strategies which include firefighting, prevention, detection and awareness. Firefighting includes Control rooms, ground resources, Fire trucks with powerful fire engines and aerial resources as well as investigation after a fire including the use

of Forest Rangers and sniffer dogs for some companies.

CASE STUDY 3: ON FIRE AWARENESS IN ESWATINI

Awareness activities of Integrated Fire Management:

The awareness activities required to be undertaken at all levels beginning from the national level filtering down to focal areas, unlike traditional method used in 1999 to 2004 which was solely intended for a particular independent targeted community. Forestry Companies, Eswatini Government, Community Chiefdoms and other forest owners were involved in raising awareness on Firefighting and Prevention. Fire awareness education intended to Communities and schools on dangers of fire extended to all land parcels in the country. The public and communities were being educated on the forest act, grass fire act, fire management and impact of Fire on the Environment.



Figure 5 : A Forest Fire in Eswatini

Implicated fire causes, impacts and traditional fire management activities as follows:

Lack of awareness in Communities was established behind causes of increased in Fires from communities to plantations and rangelands or vice-versa. This has led to destruction of forests and ecosystems leading to poor living and health risks. More fire education and awareness campaigns to communities and schools required. They needed to be educated and sensitized on both forest and veld fires. Awareness education extended over public radio broadcast, where the Forestry Department is allowed program slots of 15 minutes every Tuesday to air Forestry Issues. Moreover, fire awareness, Schools visits, community meetings, pamphlets, newspapers story plays and number fire soccer tournament campaigns were used. On the other hand; the role of fire services, Nature conservation Agencies such as; Eswatini National Trust Commission (SNTC), Livestock and Range Management in their fire use and prevention measures were added means.

In some communities certain people irresponsibly start fires even on high Fire Danger Index (FDI), without knowing the

implications. The Forestry Companies have also adopted the use of toll-free numbers to encourage communities to report fires to the Control room without any cost implications.

Bee hives hunters are encouraged to report beehives by giving them R30.00 per bee hive as a reward including the honey.



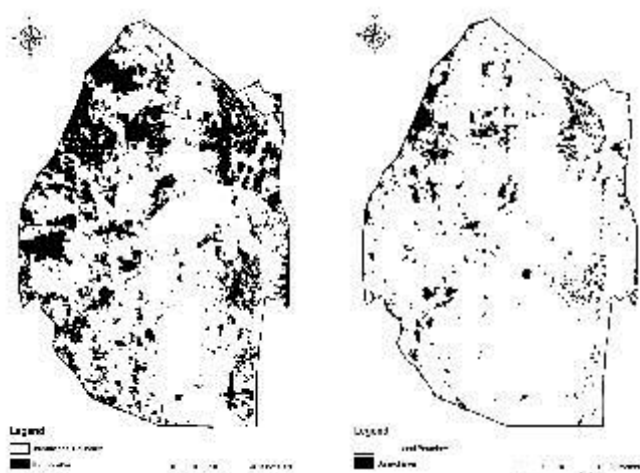
Figure 7: Fire break making in Montigny Company Eswatini



Figure 6: Grass fire management in Eswatini

3. IN CONCLUSION: OUTCOMES AND LESSONS LEARNED

Out of integrated fire management strides were made by; awareness raising and education, as well as implementation of fire management to communities nationally, in selected project areas in the four regions mainly around the forest plantation areas at Nhlanguano, Mhlambanyatsi, Piggs Peak and conservation areas at Shewula / Mhlumeni. The project further supported and empowered communities through community fire brigades with fire equipment, skills and techniques to prevent, manage and suppress forest fires and implemented establishment of fire breaks and controlled burning in these project areas. The Ministry further extended the implementation of fire prevention and fire management to other areas such as Mbabane, Maphalaleni, Mafutseni, Ngwempisi, Mangcongco, Manzini and Dwalile in 2015 to 2017. According to data from Satellite imageries by (Dlamini, 2017), showed the comparison of the burnt area on the Map of Eswatini in hectares in 2017. It was indicated/demonstrated that the period 2016/17 in (figure 8-II) drastically improved for better of the burnt area compared to 2012 to 2014 per (figure 8-I).



Figures (8- I & II): The burned area by comparisons in various locations for Eswatini

Table 1: The burned Area (hectares) in past years for Eswatini

YEAR	BURNED AREA (HA)
2001	52923.1
2002	85948.35
2003	80974.53
2004	70642.78
2005	87408.98
2006	40864.82
2007	152572.3
2008	118695.1
2009	56837.5
2010	111306.2
2011	88924.39
2012	91021.33
2013	91934.06
2014	96357.7
2015	51872.72
2016	39237.53
2017	44425.75

These efforts have resulted in drastic reduction of the fire incidences in the whole country as revealed by satellite data that showed that after the 2007 and 2008 devastating fire incidences (over 100,000 hectares burned), resulted in the closure of one pulp mill at Sappi Usutu in Bhunya and a saw mill at Peak Timbers at Piggs Peak, fires started to steadily decline over the last 5 years (2013-2017). For example, according to (table 1) of the area burned in 2012 – 2014 was just above 90,000 hectares, and in 2017, 44,425 hectares was burned. Other factors such as weather and climatic conditions during the period may have had an influence also.

ANNEXURE 13.4 LESOTHO

Country	KINGDOM OF LESOTHO				
Type of Case	Selected No. 1	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
		5. Cross-border			
Title	Forest Fire Awareness: A Case Study of Ts'ehlanyane National Park in Leribe District Lesotho				
Location	Ts'ehlanyane National Park in Leribe District				

Contents:

Forest fires represent a serious problem in Lesotho, given the way in which they destroy natural renewable resources and their economic, social and environmental impact. It has been repeatedly emphasized that, forest fires and burning constitute significant causes of deforestation and the destruction of forests. Lesotho is divided into ten districts and forest fires vary tremendously from one district to another due to natural variations in climate, vegetation, landforms, land use, education and the behavior of the human population. Ts'ehlanyane National Park is located in the northern region of Maluti mountain at the foot of Holomo pass. It lies in the subalpine belt between 1900 and 3000m above sea level. It is in the north eastern periphery of the eastern alpine belt of Lesotho hence falls within the Transfrontier Conservation and Development Area of the Drakensberg –Maluti Mountain shared between Lesotho and South Africa.

Ts'ehlanyane is an indigenous forest and the dominant species is *Leucosidea sericea*, the species composition is a mixture of small evergreen trees and shrubs. Some species that are common throughout the valley are *Rhamnus prenoides*, *Celtis kraussiana*, *Olea Africana* and *Giggeleria Africana* and others are very few and scattered such as *Buddleia salvifolia* and *Buddleia loricata*.

Lessons learned

- Training of local fire management units on prescribed burning leads to fire control techniques such as the preparation of fire breaks or fire lines as strategic points or encouragement of grazing to reduce fuel loads in critical fire areas.
- Introduction of forest fire awareness programmes through public gathering, at schools and on national Radio Slots helped in the reduction of forest fire cases.



Fire inside one of the Nature reserves in Lesotho. The common causes of fire in Lesotho are through cigarettes smoking, conflicts among herders over grazing and regeneration of green grass through removal of moribund.





Training session for herders on forests and rangelands fires detection, prevention and protection.

Country	KINGDOM OF LESOTHO			
Type of Case	Selected No. 2	1. Prevention	2. Protection	3. Suppression 4. Rehabilitation 5. Cross-border
Title	Forest Fire Protection: A Case Study of Ts'ehlanyane National Park in Leribe District Lesotho			
Location	Ts'ehlanyane National Park in Leribe District			

Contents:**Lessons learned**

- Introduction of compensation or incentive schemes for the local people play a pivotal role in the protection of forest fire.
- Silvicultural operations in forest management practices such pruning, thinning, weeding as well as establishment of barriers, referred to as **fire belts** help in the prevention of forest fire. These fire belts must be constantly monitored to ensure that they are in good conditions, which requires the collaboration of forestry technical staff and other relevant stakeholders.
- According to Forest Act, 1998, fires in woodlots are forbidden and culprits have to pay a fine for damage caused, therefore, there is a need for law enforcement to capacitate local authorities in the protection of forests.

 <p>Fire Belts</p>	<p>Evergreen indigenous trees commonly used as fire breaks in plantations. Inside this reserve, fire belts are constructed to prevent fire incidence.</p>
	<p>Results of good forest management plan (Sustainable forest management).</p>

ANNEXURE 13.5 MADAGASCAR

Country	REPUBLIC OF MADAGASCAR				
Type of case	Selected No. 1	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	Prevention of forest fires				
Location	Protected Area Menabe Antimena (APMA), District Morondava et Belo sur Tsiribihina, Region Menabe, Madagascar				

Contents

The Protected Area Menabe Antimena (APMA), with an area of 210,312 hectares, located in the center-west of Madagascar was created in 2006, but received its final protection decree on April 28, 2015 (Decree No. 2015- 762). With about 100 000 hectares of deciduous dry forest, 3 000 hectares of lake and 25 000 hectares of mangroves. Menabe is well known for its high rate of species endemism and its exceptional concentration of baobabs, attracting more than 3 000 tourists a year.

Currently, APMA is in a very critical situation as a result of accelerated deforestation caused mainly by slash-and-burn for agriculture.

Over the past five years, the rate of deforestation has increased dramatically from 2% to ~ 4% / year. Compared with annual deforestation rates in 2010-2014, the area burned in 2017 is almost the double with 5027 322 hectares of deforestation (source: WWF 2018, NAP Menabe Antimena Overflight Analysis Report).

If deforestation continues with this current rate and speed, most native species of Menabe will soon be extinct. The prediction says that the Menabe Forest would disappear in 25 to 35 years if no action is taken.

For many years, measures have been taken to combat this scourge to ensure the integrity of this APMA. They prove to be insufficient in view of the increase of the immigration of people coming from the South of Madagascar, in search of work and who are very skilful for clearing and maize cultivation. In addition, under the effect of a 100-150% increase in the price of peanuts offered by foreign operators, and the increasing demand for maize by national operators, there has been a massive intensification of peanut and maize cultivation in the area.

Preventive fight is an integral part of these measures. In the case of APMA, it consists of:

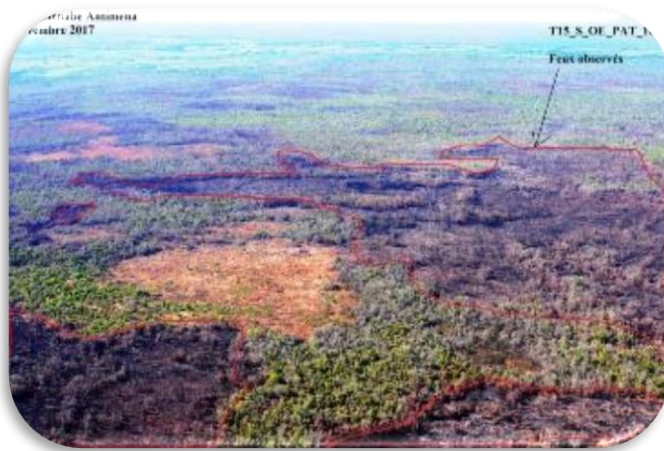
- Implementation of 17 Contracts of Forest Management Contracts. Each community has a VOI (Vondron'Olona Ifotony), which means basic communities, following the decree n ° 2000-027 of January 13th, 2000 relative to the basic communities in charge of the local management of the renewable natural resources. The VOI have at their disposal 168 patrol agents called KMMFA to conduct weekly forest patrols and to monitor biodiversity and threats.
- Training and / or capacity building of local stakeholders in fire management (technical prevention and active fight)

- Intensive awareness, information and education at all levels, reinforced by the development and dissemination of tools or communication kits (educational aspect)
- Development and vulgarization of legislative and regulatory frameworks governing forest fires and bush fires (dissuasive aspect)
- Establishment of “DINA” (collective agreement) at the level of municipalities or fokontany (level under municipality)
- Intensification of law enforcement through the implementation of joint control mission in areas affected by clearing
- Annual revitalization of the different structures such as KMMFA and VOI
- Set up anti fire devices (Control line, pruning, cleaning ...)

Lessons learned

- Intensive awareness keeps a very important role in forest fire prevention.
- Deforestation in APMA is linked to other factors that should not be neglected, such as immigration, population pressure, literacy rate, tribe, etc. The involvement of other sectors is necessary
- Commitment and accountability of decision-makers and elected officials are needed
- The active participation of the local population is crucial
- The motivation and the equipment of VOI and KMMFA are more than indispensable for them to be well treated and respected in their workplace.
- The establishment of local firefighting structures is an integral part of prevention. It is essential because it helps to empower the population and promote local policy to reduce the cost and time of interventions
- Firefighting requires a significant mobilization of human and materials resources

Photos



APMA seen from above: Fire observed



Forest burned for maize cultivation



Forest converted to maize cultivation



KMMFA members in Kiboy



Awareness meeting: Speech of the President of VOI in Kiboy village



Intervention of a member of VOI during an awareness meeting in Kiboy village



Speech of a villager's representative during an awareness meeting
in Ampataka village



Massive descent for awareness in The Commune of Tsimafana: Mr
Prosecutor's intervention



KMMFA control mission

ANNEXURE 13.6 MALAWI

Country	REPUBLIC OF MALAWI				
Type of case	Selected No. 1, 4	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	5. Cross-border				
Location	In Plantations and Forest Reserves (MALAWI)				

Contents**AWARENESS**

In Malawi several methods are used to alert people of the dangers of forest fires. Among them are;

- ♣ **Ministerial Fire Campaign Launch:** every year the Minister of Natural Resources launches a fire campaign where different people are informed of the dangers of setting forest fires and also involvement in fighting fires when they occur. These meetings are patronized by different people such as politicians, forestry staff, other governmental and nongovernmental officials, school children, community members, timber producers, judiciary, police, the media so that the message goes wide.
- ♣ **Posters and billboards:** these are erected in different places in and around the forests to warn people not to set forest fires either knowingly or unknowingly.
- ♣ **Community members meetings:** forest staff conducts meetings with community members surrounding forests to discuss about the dangers of forest fires to their own lives and the nation at large. They are also urged to take part in fire fighting if it occurs.

NOTE: All these methods are applied after weeding in the forest and along fire breaks have been done. Also early burning along fire breaks is done by forestry staff to reduce fire occurrences or fires moving from one area to another in case of occurrence.

Lessons learned

- Although the above methods are used to alert people of the dangers of forest fires, fierce fires still occur mostly in plantations. It has been learnt that most of those fires are arson (deliberately) by people, some hunters and smokers when they pass through the forests (**see Figure 1**)
- Use of contractors to do weeding and other silvicultural operations in the forest has proved to be beneficial because the people that are employed assist in making others aware of the dangers of fires. Another benefit with this system is that large areas of forests are weeded which could hardly have been done by government staff since there are very few private forests.
- Fires in forests between and among countries (Transboundary fires) are difficult because these require agreements between or among countries and this involve another ministry (Foreign Affairs). For Malawi there are no such agreements making it difficult to prevent or fight Transboundary fires.

REHABILITATION

It is mostly the mandate of the Department of Forestry to rehabilitate areas that were affected by fires. However, the National Forest Policy (2016), promotes involvement of different stakeholders such as private sector, NGOs, local communities, etc. to participate in forest management (see Figure 2).

- ◆ **National Forest Season:** this season runs between 15th December to 15th April every year and it is launched by the State President (see Figure 3). This originated from the World Forest Day that is normally observed on 21st March every year, but Malawi decided to observe a season from December because normally rains tends to be less or there is none at all in Malawi for tree survival. With this political will, different stakeholders participate in rehabilitating bare areas or those that were affected by fires by planting or encouraging natural regeneration. Also, with the season, it has been observed that survival rate has improved as people devote ample time to managing the trees.
- ◆ **Using contractors:** a contractor is selected through competitive bidding and employs people from the surrounding community to the forest that he/she is going to work in. These contractors are involved in different silvicultural activities from seed raising to fire break maintenance. All this is done to ensure that more areas are covered, and fire occurrences are reduced. This system has proved to work well although fires are still experienced due to other reasons as stated above.



Figure 1 Young Pine trees that were destroyed by bush fires in Viphya Plantation



Figure 2

Minister of Natural Resources inspecting Pine trees planted by a private sector (Total Land Care) in a fire ravaged area



Figure 3

The State President of Malawi inaugurating National Forest Season which runs between December 15 and April 15 each year

ANNEXURE 13.7 MAURITIUS

Country	REPUBLIC OF MAURITIUS			
Type of case	Selected No. 2	1. Prevention Rehabilitation 5. Cross-border	2. Protection	3. Suppression 4.
Title	Wildfire Protection			
Location				

Wildfire Protection

Gabriel Island is an open Islet Nature Reserve of 42 ha. It is situated approximately 11 km offshore from the northernmost tip of the Mauritius mainland. It has enormous potential value as a long-term reserve of native and endemic plants and animals living in a relatively pristine and unadulterated environment.

Gabriel Islands can be accessed by boat or helicopter. The lagoon near Gabriel Islets hosts a largely healthy and diverse shallow water coral community and its beach has become a popular recreational and tourists destination including local boat owners and tourists' operators. Every day around 100 to 150 visitors have access to the island.

The mean annual rainfall is in the range of 600-900 mm and the condition on the island is very dry.

As tourists increasingly look for what they perceive as pristine and wilderness areas and like to enjoy safe and clear water lagoon with white sand beach, the numbers of visitors on the island is increasing day by day.

On the other hand, the dry condition prevails on the island, the increase in tourist's activities and the Global warming, are combination factors which are increasing the risk of fire. Consequently, a mechanism of detection and protection has been set up to limit the risk of fire on the island and to other nearby offshore islets that may jeopardize the restoration programme which started in the year 2016.

Accordingly, the under mentioned strategies, supported by legislation, have been put in place for its protection against wildfire:

- (a) A field station has been constructed on the island to accommodate officers for controlling access day and night and to enforce law;
- (b) No night staying is allowed on the island;
- (c) No fire lighting is permitted on the island;
- (d) On site boat owners and tourists' operators are being sensitized on wildfire risks and other issues;
- (e) Sign boards have been fixed on the sites to warn visitors on do's and don'ts;
- (f) Weeding of noxious growth, which is also a source of fire, are done on a regular basis.

In addition to the above precautionary measures, the Forestry Service has planned to create firebreaks and to fence part of the island in order to have a close control on visitors. Moreover, a sufficient quantity of fire extinguishers and fire swatters will be stored in the Field Station and readily made available for any intervention in case of any wildfire on any of the nearby islets.

Country	REPUBLIC OF MAURITIUS				
Type of case	Selected No. 4	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	5. Cross-border				
Location					

Mauritius is a small tropical volcanic island of about 1,865 km² situated in the West Indian Ocean, 800 km off the East coast of Madagascar. There has been no large-scale wildfire in Mauritius which pose a threat for the environment, infrastructures and inhabitants. The wildfire occurs sporadically mostly on fire-degraded mountain slopes occupying the western rain shadow side of mountains in the North-Western part of Mauritius and on two offshore islets.

The Signal Mountain's slope facing the City of Port Louis is one of the fire hotspots and covers an extent of 144 ha. The mountain is an emblematic figure for Mauritius because of its timeless beauty and historical importance. The mountain was covered with native forest in the past. Formerly, slaves sneaked through the passes connecting Port Louis to Moka, to escape their masters. Signal Mountain was used by settlers to control the arrival and departure of boats in Port Louis. Gradually with the development of the city, which is also the Capital of Mauritius, people from countryside had migrated to that region, resulting to the conversion of nearly one third of the slope into residential area. As the remaining unoccupied forest area provided plenty of fodder, domestic livestock were brought and left straying on the land by residents. It was presumed that the fire has been deliberately lighted by livestock owners during the dry season to enhance the grasses quality. Consequently, the fire frequency has increased so much that resulted to land degradation and loss of all native species and it prevented the regeneration of trees on the slope.

From 1994 to 2003, an average of 29.6 ha is burnt annually (see Table 1 below)

Table 1: shows frequency and extent burnt from 1994 to 2003

Year	Frequency	Extent Burnt	Remarks
1994	2	50	
1995	1	20	
1996	1	30	
1997	1	10	
1998	2	40	
1999	1	26	
2000	2	30	
2001	1	15	
2002	6	49	
2003	2	26	

In 2002 the Forestry Service, with the financial assistance from International Organisation, (e.g. UNDP) carried out a rehabilitation work over an area of 20 ha on the slope where there were scattered African exotic species, having

the ability to resist fire. The area was fenced and fire breaks of 15m in width on a length of 4265 running metres were created. Native species were introduced on the site among other existing fire resisting exotic species. As the regions is semi-arid with less than 600mm annually, the plants were introduced in pits with growing medium combined with water-retaining granules. Nevertheless, the plants had to be watered daily until established (despite of the abrupt slope). Watchmen were employed nights and days to watch over the area in order to prevent vandalism and browsing of saplings. As regards to the firebreaks and fencing, they are still being maintained up to now as a protection against fire.

1. Photo showing the condition of the slope in 2003

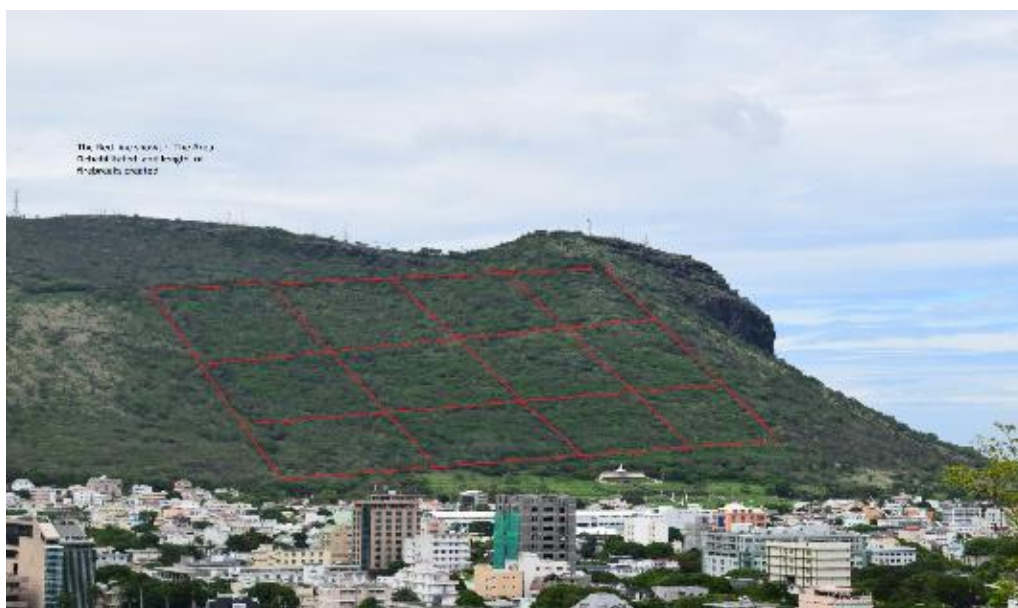


After seventeen years of rehabilitation work, the area is now covered with trees of 2m to 4m height. The plantation consists not only of planted trees but also of trees which have regenerated naturally. Consequently, the project can be considered as a “local example of success”.

2. Photo showing (i) security fencing and (ii) height of trees on the area



3. Photo showing area rehabilitated with a well-established plantation (photo taken in January 2018)



Despite fire outbreaks outside of the controlled area but no wildfire has been recorded within the area protected by fence and firebreaks since year 2002 and up to now. Details of fire outbreaks outside of the managed area (Rehabilitated Area) are as follows:

Years	Frequency	Extent	Remarks
2004	nil	Nil	
2005	2	30 ha	
2006	1	25 ha	
2007	2	40 ha	
2008	5	44.4 ha	
2009	4	80 ha	
2010	11	88 ha	
2011	4	60 ha	
2012	7	48.5 ha	
2013	3	77 ha	
2014	2	6.5 ha	
2015	6	50.5 ha	
2016	4	25.5 ha	

Referring to the above table it can be observed that there is an increase in the extent burnt annually since 2004. It might be due to the fact that the land is severely degraded and is overgrown with grasses which is easily prone to fire. The causes of such fire are unknown, but it is believed to be men made or accidentally. In long term the Forestry Service has planned to rehabilitate a large area on the mountain but funding for the capital-intensive project will be a big challenge.

ANNEXURE 13.8 MOZAMBIQUE

Country	REPUBLIC OF MOZAMBIQUE				
Type of case	Selected No. 1	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
		5. Cross-border			
Title	Early warning				
Location	Mozambique				

Contents

The Basic Information comes from the Information System for the Fire Management (FIRMS), is available free of charge Subscription, in a file format text that is submitted to an automated processing.

The FIRMS data has different levels of reliability, but for the production of this bulletin, they were considered only Data with a confidence level equal to or greater than 70% of Range of 0 to 100%.

This set of data represent points of incidence of Heat generated by the sensors (Channels 31 and 32) of the satellites AQUA AND EARTH of MODIS, does not allow to make estimates of area, But it is quite useful as warning information to communities.

Supporting the data processing is produced a Bulletin with Tables of statistical data of fires by Administrative Posts, with subtotals, provincial, national summary and Protected Areas to provide the Community and later dislocation to the site of the fire to collect the causes of them.

Lessons learned

It is possible to provide daily information to communities and prevent fires, having a daily monitoring system of fires, I have learned daily to be able to have a more effective monitoring system



ANNEXURE 13.9 SOUTH AFRICA

Country	REPUBLIC OF SOUTH AFRICA			
Type of case	Selected No. 2	1. Prevention 5. Cross-border	2. Protection	3. Suppression 4. Rehabilitation
Title	Reducing veldfire risk			
Location				

REDUCING VELDFIRE RISK

What is fire?

- It is a chemical reaction in which organic substances are transformed into simpler inorganic compounds
- The elements that must be present for a fire to occur are:
 - oxygen
 - heat
 - fuel.

Veldfires

- It is impossible to exclude oxygen from fires.
- Heat is considered a constant.
- However, a reduction in fuel will reduce the total energy output.
- Fuel is anything capable of burning and sustaining combustion in the present of oxygen when heat is applied to it.

Vegetation as fuel

- Shrubs and grasses.
- Bark, especially if it is loose, fibrous or stringy.
- Litter (dead leaves, twigs and bits of bark found on the ground).

Veldfire behaviour

- Veldfires all start small but their rate of spread and heat generated (intensity) depends on the weather, the terrain and the condition of the available fuel.
- The more intense the veldfire the more difficult it is to control.

Fire intensity

- $I = H * w * R$

Where

- I = Intensity (kW/m)
- H = Heat (KJ/kg)
- w = Weight of fuel (tons/Ha)
- R = Rate of spread (km/hr)
- The only aspect that can be influenced is the amount of fuel present.

Characteristics of veldfire

- Veldfire will in general:
 - spread faster uphill than downhill
 - spread with the wind rather than against it
 - spread faster where the vegetation contains quantities of dead plant material
 - spread faster in fine fuels
 - spread faster where the vegetation canopy is intertwined
- Doubling the fuel load will double the rate of spread, resulting in the intensity of the fire increasing fourfold.

Examples of fire intensity

7.5 tons per hectare	300 kW/m
15 tons per hectare	1 300 kW/m
30 tons per hectare	5 200 kW/m

- Fuel levels of 7.5 tons per hectare are relatively easy to control.
- In fully cured (dried) grass, the flame height will be 2 metres.

Radiant heat

- This is the heat generated by a fire.
- This heat affects you well before the flames reach you.
- If you are not protected, radiant heat can kill you by causing heat stroke.
- Radiant heat only travels in straight lines.

What can you do to reduce your exposure to veldfire?

Some questions to ask yourself:

- Do you live in a veldfire-prone area?
- Have you identified and dealt with high fire risks around your property?
- How will you stay informed of fire conditions on high fire risk days?
- Do you have an adequate and reliable source of water?
- What assistance can you expect if there is a veldfire?
- If you decide to evacuate, what route will you use and what will you take with you?
- If you decide to stay, do you know how to protect yourself from radiant heat?
- Do you have appropriate clothes ready for everyone if decide to stay?

Where your house is located on your property is important

- Some parts of your property will be safer.
- Flat ground is safer.
- Gentle slopes are safer than steep slopes.
- The bottom of a slope is safer than the top of a slope.
- Properties situated next to dense vegetation and / or on ridges are at greater risk

Why do houses burn?

- Burning embers landing on or near the house.
- Radiant heat ahead of the fire.
- Direct contact from flames.

The main source of ignition in a house is burning embers.

- Houses do not have to be specially built to protect you from a fire.
- No one building feature will guarantee safety.

Fuel reduction

- Reducing fuel will reduce the threat.
- Reduce fuels ahead of the fire season.
- Reduce fuel for at least 20 metres around buildings
- Beware of 'fingers' of vegetation that penetrate your property.

Firebreaks

- Firebreaks are areas of reduced fuel allowing access of fire fighters and equipment to attack an oncoming fire.
- Do not rely on a firebreak to stop a veldfire.
- The effectiveness of a firebreak depends on its positioning and on regular maintenance.

Methods of preparing firebreaks

- Ploughing.
- Grazing.
- Mowing and slashing.
- Herbicides.
- Burning.

Incorporate existing features into firebreaks.

Landscaping a garden for fire protection

- Plant screening trees.
- Build stone walls as a radiant heat shield.

- Position lawns and other low fire risk features between houses and where a veldfire is most likely to approach from.
- Maintain green lawns, cultivated soils or gravelled areas beneath trees.
- Remove dead trees, branches and leaves.
- Prune lower branches to avoid continuous fuel from ground to tree canopy.
- Remove trees close to house or overhanging or touching a house.
- Ensure trees are a safe distance from buildings and power lines.
- Avoid dense clumps of trees and remove highly flammable trees.
- Maintain building protection zones around all buildings.

Veldfire survival plans

- Your plan should cover both staying and defending your property or leaving it ahead of the veldfire.

Staying?

- What actions will you take before the veldfire arrives?
- Where will you shelter when the fire front passes?
- What actions will you take after veldfire passes?

Leaving?

- Where will you go?
- How will you get there?
- What will you take?
- What will you do with your pets?
- When will you return?
- What will you do when you return?

Protecting farm livestock

- Plan to use fallow fields, well grazed fields or areas with bare ground.
- Where possible have shade and water available for valuable stock, especially breeding stock.
- Protect your fodder reserves.

Preventing fires on a farm

- Remove branches that could cause power line short circuits and check electrical installations regularly.
- Restrict the use of farm machinery on days when the fire danger is high.
- Take great care when using welding, cutting and grinding equipment.
- Establish firebreaks between your land and roads or railways.
- Adopt safety standards for smoking, burning rubbish and disposal of hot ash.
- Make sure all fires are extinguished properly before leaving – never leave a fire unattended.
- Have your own well-maintained firefighting equipment on a farm.
- Train your staff in firefighting techniques.

Stages of a veldfire

- Embers and smoke.
- Fire front.
- Final stage.

What you should do when veldfire approaches

- Make decisions early – carry out the planned response, that is, to evacuate or to stay?
- Dress in protective clothing.
- Move livestock to safer locations.
- Listen to radio for news.
- Wet garden and house especially on the side of the approaching fire.
- Plug gutters and fill them with water
- Fill baths, buckets and dust bins with water in case the water supply fails and have mops handy.
- Seal any gaps between doors and floor using wet towels or similar items.
- Close up the house and screen off the windows.
- If you decide to stay, go indoors when the fire arrives and remain there until the fire front has passed.
- Take fire hoses and other firefighting equipment indoors with you.
- Patrol the house interior including checking the roof cavity and extinguish any small fires immediately.
- Remain vigilant after the fire front has passed.

Useful firefighting equipment

- Hoses.
- A water pump – petrol or diesel (electricity supply may be disrupted during a fire).
- Ladders.
- Fire beaters, rake-hoes and shovels.
- Torch plus spare batteries.
- Protective woollen blanket.
- Towels.
- Buckets (preferably metal) and mops.
- Knapsack spray.
- Suitable protective clothing.
- Gloves.
- Sturdy boots or shoes and woollen socks.
- Hat with a wide brim.
- Goggles to protect eyes from smoke.
- Long sleeved shirts and trousers.
- Large handkerchiefs to cover nose and mouth.

- Wet towels for neck.
- Water bottles.

NB: All protective clothing should be made of natural fibres.

Checklist of steps to be taken before the fire season

On your perimeter:

- reduce fuel loads
- pay special attention to fuel load management in down-slope areas
- construct firebreaks adjacent to the property.

Building maintenance:

- clear leaves and debris from gutters
- secure any loose roof tiles
- remove inflammable and dry vegetation from under decks and against walls and pillars
- seal roof vents, eaves and floor vents with wire gauze screening
- check that hoses are long enough to reach all sides of the house
- consider removing branches or trees that overhang buildings.

Garden maintenance:

- slash long grass and undergrowth
- remove dead and dry branches from trees.

Water supplies:

- ensure that your water supply will be sufficient and reliable in the event of a veldfire
- consider the placement of garden taps
- install a sprinkler system in your garden and on your roof.

Equipment:

- consider acquiring portable petrol-powered pumps in addition to any electric pumps. electricity supplies can fail during a veldfire, rendering the pump useless
- check that all your firefighting equipment is in working order
- install hose fittings that are fire-proof.

Livestock:

- prepare and maintain fuel-reduced areas into which livestock can be moved in a veldfire

Checklist of steps to be taken during the fire season

Early warning systems:

- be aware of weather conditions associated with high fire danger in your region (temperature, wind speed, direction and relative humidity)
- be aware of the daily fire danger rating during the fire season
- know what radio station will carry news of veldfires.

Communications:

- compile a list of phone numbers you may need during a veldfire
- make sure your property can be easily located by the fire brigade.

Buildings:

- remove hanging baskets with dry material from the building
- check gutters and roof comers for the accumulation of leaves
- remove inflammable materials such as woodpiles that are in close proximity to buildings
- store fuels and paints in a single place away from the house.

Garden:

- keep lawns short and green
- cut grass and other vegetation under screening trees
- remove dead leaves and dry vegetation and litter from the garden.

Water supplies:

- check water levels in reservoirs and water tanks daily when the fire danger is high
- attach hoses to taps when the fire danger is high.

Equipment:

- store fire beaters, rakes, spades, buckets, hoses, mops and other firefighting equipment in a single easily accessible place
- check pumps daily when fire danger is high.

Survival plan:

- rehearse family emergency plan evacuation plan
- include your pets in your evacuation plan
- ensure that all your family members and staff know about how to stop, drop and roll if their clothing catches

Fire

- establish a safe meeting place for your family outside your house
- store protective clothing for the entire family in one easily accessible place
- ensure that enough drinking water is available.

ANNEXURE 13.10 TANZANIA

Country	UNITED REPUBLIC OF TANZANIA				
Type of case	Selected No. 1	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	Wild fire awareness in Tanzania By Kekilia Kabalimu, Tanzania Forest Services, Ministry of Natural Resource and Tourism				
Location					

MNRT_TFS AND INTERGRATED WILDFIRE MANAGEMENT

- Tanzania has been adapting the Participatory Forest Management (PFM) approaches since 1990s by broadening and improving strategies to involve stakeholders in achieving sustainable forest management.
- Community Based Fire Management (CBFiM) is one the PFM strategies that have being developed in ensuring Sustainable Forest Management (SFM) and sustainable land management in the country in collaboration with key stakeholders.
- In this regard, the active involvement of local communities into fire management is crucial for successful community based natural resources management.
- Use of earth observation for early wildfire detection and monitoring introduced from 2011 with support from SADC-AMESD-THEMA
- In recent years, the MNRT_ Tanzania Forest Services (TFS) Agency has realized that a broader and more comprehensive approach is needed to reinforce PFM efforts by developing Integrated Fire Management (IFM) approaches in achieving sustainable land management in the country.
- IFM approaches include collection of information, prevention, preparedness and suppression. The Ministry of Natural Resources and Tourism has been facilitating different training events on forest management and conservation particularly on PFM including demonstrating its success in various stages of designing and implementation.



TRAINING AWARENESS THROUGH EXHIBITIONS AND USE OF GPS/AFIS FOR EARLY WILDFIRE DETECTION FOR STAFF AND STAKEHOLDERS

Country	UNITED REPUBLIC OF TANZANIA		
Type of case	Selected No. 3	1. Prevention 5. Cross-border	2. Protection 3. Suppression 4. Rehabilitation
Title	Wild fire detection in Tanzania By Kekilia Kabalimu, Tanzania Forest Services, Ministry of Natural Resource and Tourism		
Location			

INTRODUCTION

Early warning systems for disaster management is necessary world-wide for life, infrastructure and costs serving. The early detection and warning systems require technical and management skills investment to ensure its operationalization.

Tanzania, established early wild fire detection and warning systems to combat wild fires from the protected areas.

BEFORE AMESD_MESA

- Fire events reported after the large areas burnt.
- Fire management plan missed correct data for planning.
- Early warning fire index was not available for early warning.
- Education on fire protection and use of equipment to combat fire was weak.
- Strong collaborations among the institution were not there.
- Lack of communication between Institutions and Stakeholders.
- Inadequate awareness on climate change due to the fire occurrences.
- Fire tower was used for reporting fire incidences.



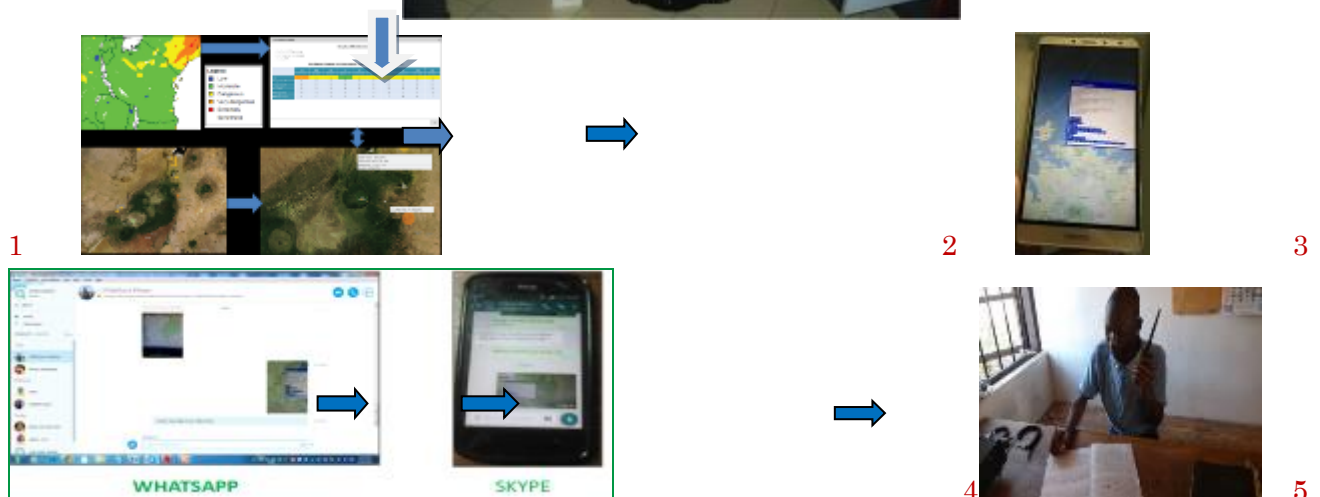
DURING AMESD_ MESA

EARLY WILDFIRE DETECTION AND MONITORING

Ministry of Natural Resources and Tourism is responsible for the conservation of natural ecosystems encompasses national parks, forest and game reserves which are highly susceptible to annual wildfires. Recently, Ministry introduced early fire detection systems to reduce the threat to protected areas. The established infrastructure combined with appointment of Field Officers responsible for quick fire suppression in protected Areas.

The Satellite receiving station mounted at the Ministry Headquarters, allow the officer responsible for early detection to communicate with Field Officers and within 15 minutes reported wildfire need to be combated. This is only possible when the field teams are in standby based on every day Fire danger index for early warning

HOW FIRE DETECTED AND REPORTING





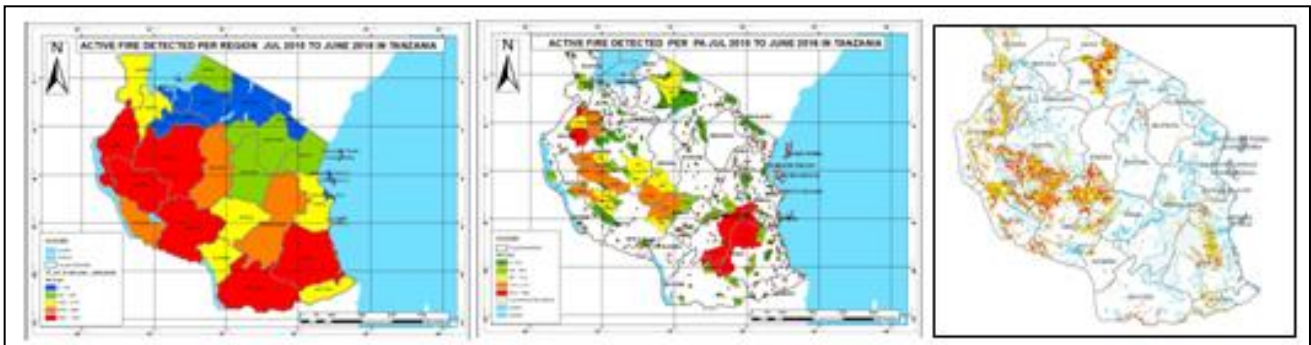
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ACTIVE FIRE AND BURNT AREA DISTRIBUTION MAPS



ANNEXURE 13.11 ZIMBABWE

Country	REPUBLIC OF ZIMBABWE				
Type of case	(Selected No.) 3	1. Prevention	2. Protection	3. Suppression	4. Rehabilitation
Title	Community Fire Brigade Establishment				
Location	Hwange District				

Contents

Forest fire is an increasing contributory factor to the loss of forests in Zimbabwe. Though the extent of damage is not recorded, vast areas of forest are affected by fire every year. Forest fire is not limited to the woodland and grassland areas, but its incidence is also increasing in the gazetted forest areas, where it causes serious ecological, social and economic damages. This has brought a growing concern from the government and necessitated development of effective strategies to combat fire hazards. Thus, with the full consent of the local people, a Community-Based Forest Fire Management Program, which can accommodate both the interest of communities and the need to conserve the natural resources, was recommended to overcome the negative effects of forest fire. Apparently, a national fire strategy was developed and a fire management task force has been established at national and local levels. Hwange District of Mat North Province is piloting this programme with communities adjacent to Sikumi Forest Reserve at ward sixteen, Jwape. Local residents living adjacent to Sikumi forest land were trained to enhance their skills in fire prevention and fighting forest fires. Community Fire Brigades were established. One hundred and fifty members have been trained so far selected from four wards bordering Sikumi Forest. The community fire brigade is a group of able-bodied volunteers selected among the community and trained on how to prepare for the fire season. They mobilize the community to undertake all fire season pre-suppression measures like fire guard construction/burning and early block burning were need be. They were supported with firefighting tools such as fire beaters, knapsack sprays and blowers through Forestry Commission by World Wide Fund for Nature. The fire brigades were also trained to be trainers as they are responsible for community fire awareness campaigns. The training also included how to defend their properties when bush fires threaten.

Lessons learned

Though the fire season has not ended the frequency and number of fires has drastically been reduced at Sikumi Forest. The wider part of the community has been reached by the fire brigades and made aware of the dangers of forest fires and they are now involved in pre-suppression measures and are taking an active role in fighting forest fires. Hwange has been a hot spot in terms of occurrence and frequency of forest fires over the years but this has since changed after the establishment of the community fire brigades.



Participants on community fire management training and their Trainers



Fire guard burning by participants during one of the training sessions. Demonstration on how to use a blower



Early block burning



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