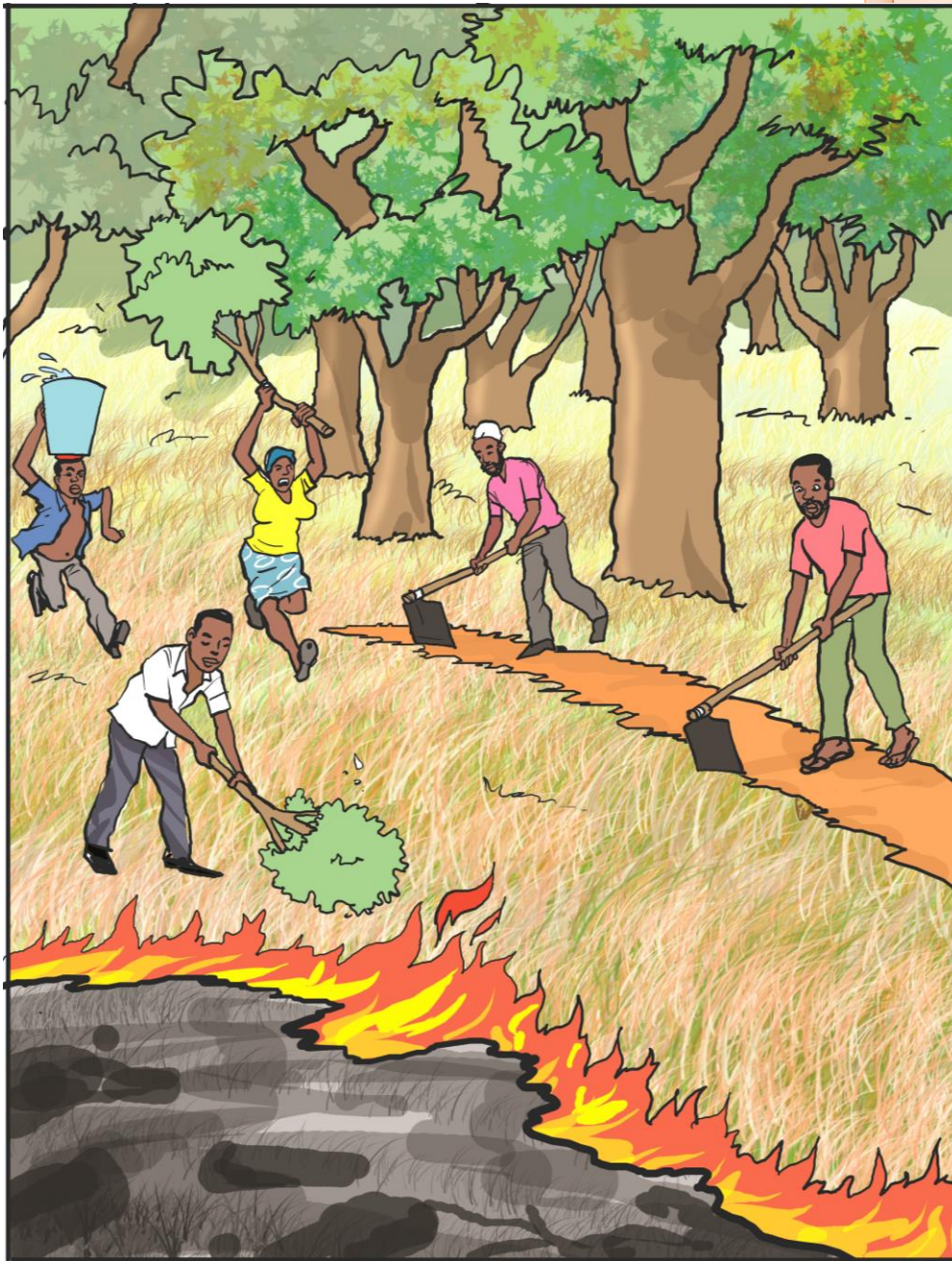


2013

Community Based Fire Management -CBFiM

Best practice examples in the SADC region



Report prepared

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Graphic Courtesy Tanzania Forest Services

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ABBREVIATIONS AND ACRONYMS

CBFiM	Community Based Fire Management
CBNRM	Community Based Natural Resource Management
CBO	Community Based Organisation
CD	Capacity Development
CSIR	Council for Scientific and Industrial Research
EMA	Environmental Management Agency
FAO	Food and Agriculture Organization of the United Nations
FMA	Fire Management Areas
FFA	Forest Fire Association
FTI	Forestry Training Institute
GFMC	Global Fire Monitoring Center
GIZ	Gesellschaft für Internationale Zusammenarbeit (GmbH)
GOFC-GOLD	Global Observation on Forest and Land Cover dynamics
GoT	Government of Tanzania
GWFN	Global Wildland Fire Network
IFM	Integrated Fire Management
KRST	Khama Rhino Sanctuary Trust
MODIS	Moderate Resolution Imaging Spectroradiometer
MoU	Memorandum of Understanding
MNRT	Ministry of Natural Resources and Tourism
NGO	Non Governmental Organization
NPC	Non-Profit Company
PFM	Participatory Forest Management
SADC	Southern African Community
SAFNet	Southern African Fire Network
SFM	Sustainable Forest Management
TFCA	Transfrontier Conservation Areas
TFS	Tanzania Forest Services
TRICO	Trilateral Cooperation
ToT	Training of Trainers
UNDP	United Nation Development Programme
ZFC	Zimbabwe Forestry Commission

Table of Contents

ACKNOWLEDGEMENTS	3
ABBREVIATIONS AND ACRONYMS	4
1 BACKGROUND	6
2 INTEGRATED FIRE MANAGEMENT	7
2.1 Community Based Fire Management	8
2.2 Cross-Border Fire Management	9
3 CBFIM CASE STUDIES IN THE SOUTHERN AFRICA REGION	11
3.1 Namibia – Caprivi Region.....	11
3.2 Zimbabwe– IFM Strategy of Manica Province	14
3.3 Botswana – Khama Rhino SanctuAry.....	17
3.4 FireWise Concept: application in South Africa and Tanzania	24
3.4.1 FireWise South Africa	24
3.4.2 FireWise Tanzania.....	25
4 CROSSBORDER FIRE MANAGEMENT EXAMPLES	27
4.1 Swaziland – South Africa	27
4.2 Maloti Drakensberg Park World Heritage Site Joint Fire Management Plan.....	27
5 CONCLUSIONS AND RECOMMENDATIONS	29
5.1 CBFiM in Protected and Transfrontier Conservation Areas.....	31

1 Background

Fire has been used in the Savannah ecosystem of Africa for millennia to prepare land for agricultural and pasture management purposes as well as for hunting, pest control and various other land management reasons. For rural people fire is a viable economic tool to attain of land management objectives and local communities often have traditional knowledge on how to manage and prevent fire. In the past, fires set by local people have contributed to the creation and preservation of ecosystems and biodiversity across the African Savannah. Today, however, the balance between people, fire and the natural environment has been upset due to changing demographics and unsustainable land management practices and conflicting policies. In addition the breakdown of traditional knowledge used in natural resource management as well as impractical no-burn policies and permit systems led to indiscriminate use of fire, which are often secretly set late in the season leading to more damage than early season fires. In a changing environment and climate these fires increasingly get out of control and are detrimental to ecologic and economic assets and also threatening rural livelihood opportunities.

Although there is growing concern over the perceived rise in the frequency of fires in the region sustaining and maintaining ecosystems as well as related land management and livelihoods goals, appropriate fire management practices need to consider both the beneficial and damaging effects of fires. The large role of humans in determining the frequency, intensity and distribution of fire in the landscape implies that local communities have an important role to play in the management of fires. The different backgrounds of rural and indigenous communities suggest that there is great variety in the knowledge and skills on how to manage and control fire used for the management of natural resources. Community Based Fire Management (CBFiM) recognizes the positive, potential role that local communities can play in fire management to prevent, control or utilize fire. It is an approach to the management of fire in the landscape that adequately includes communities in decision-making about the role, application and control of fire.

The present document intends to provide an overview of CBFiM case studies in the SADC region, however will not repeat findings and insights of other reports, in particular the FAO Forestry Paper 166 “Community-Based Fire Management, a review¹”, which the author strongly encourages to read. The present report relies on the existing knowledge and definitions of CBFiM and expands with existing case studies and the potential of CBFiM as part of an enhanced Integrated Fire Management (IFM) approach in a given land management area of interest including Transfrontier Conservation Areas (TFCA).

¹ <http://www.fao.org/docrep/015/i2495e/i2495e00.htm>

2 Integrated Fire Management

Traditionally fire management is rooted in forestry and thus had until recently considered firefighting as a top priority to protect forest resources. However fire management is not only a technical aspect of fighting (forest) fires, but rather a socio-economic, cultural and political challenge. It requires an effective network of partners, agreements and cooperation strategies to achieve the balance between economic development, environmental (forest) protection and conservation. Technology transfer and training in technical fire management is only one aspect to face the fire problem. It is the complexity of socio-economic, cultural as well as land-use policies and conditions that lead to an increased fire problem. Fire is not only essential for rural people in the different land use and management systems, but also the drivers and supporting policies behind the use of fire make it necessary to have a closer look at the design of the interventions to reduce the negative impacts of fire. The concept of Integrated Fire Management (IFM) offers a holistic framework for managing fires in the various ecosystem types² while providing associated co-benefits for local communities and sustains ecosystem services. IFM considers the various actors in fire management in an integrated manner.

Definitions of Integrated Fire Management range from integrating and mobilising community participation to fire management efforts and integrated planning of key agencies to more complex frameworks. In these frameworks the technical elements of fire management such as prevention, preparedness, suppression and recovery are interlinked in a continuous cycle of activities supported by the findings of fire science and fire information as well as social, economical and political interactions. Myers (2006)³ defines fire management as a “range of possible technical decisions and actions available to prevent, maintain, control or use fire in a given landscape”. The sole reliance on sophisticated fire management technologies will unlikely solve the world wide increase in the fire problem. Thus the holistic integration of the ecological and socio-economic role of fire as well as the cultural necessities of using fires defines the meaning of Integrated Fire Management.

Other common work definitions highlight that IFM involves the coordination of actors and stakeholders in the implementation of fire management principles such as prevention, preparedness, suppression, fire utilization and research. Indeed fire management is a cross sectoral issue, where it is important to involve the various relevant stakeholders comprising government agencies, private sector and local communities for the implementation of the necessary technical, logistical, operational and social programs striving to balance between developing and conserving natural resources and managing unwanted fires.

The importance of the participation of various land management actors and local communities is reinforced by a country’s vastness and its limited accessibility of government infrastructure. So for any IFM approach to be successful, the involvement of local communities is crucial with consideration of rural socio-economic conditions and the necessary enabling policy, legislation and regulatory framework at the respective administrative levels.

² Fire dependent (Savannah), fire sensitive (tropical rainforest), fire independent (deserts)

³ Meyers, Ronald L. (2006): Living with Fire – Sustaining Ecosystems & Livelihoods through Integrated Fire Management. The Nature Conservancy

2.1 COMMUNITY BASED FIRE MANAGEMENT

In the context of power and revenues decentralization and increasing local autonomy in natural resource management in many SADC countries, the implementation of integrated fire management can significantly be strengthened by including a commitment to support community-based fire management and the positive, potential role that local communities can play in fire management. Community Based Fire Management can be considered as a subset of a Community Based Natural Resources Management (CBNRM) framework, which recognises the rights of local people to benefit from the sustainable management and use of natural resources. CBNRM is linked to land use and access rights over natural resources, devolved and collaborative management and sustainable use of natural resources. CBNRM gives communities full or partial control over decisions regarding natural resources, such as water, forests, pastures, communal lands, protected areas, and fisheries. The extent of CBNRM control can range from community consultations to joint management or to full responsibility for decision making and benefit collection, using tools such as joint management plans, community management plans, stakeholder consultations and workshops, and communal land tenure rights.

Community Based Fire Management (CBFiM) is part of an overall community-based resource strategy adhering to the same common principles. CBFiM is an approach to the management of fire in the landscape that adequately includes communities in decision-making about the role, application and control of fire. By enabling local people to build upon their knowledge and expertise related to fire control and prevention, CBFiM has the potential to be an important avenue for effectively managing fires that are increasingly having a negative impact on livelihoods and ecosystems in the region. Communities are often in the best position to manage or prevent fires at local level. Many communities already manage fires effectively and often have extensive knowledge about fire management that is well adapted to the local environment and sufficiently regulated and enforced by community structures.

However, for communities to play a positive role in fire management, they need to have control over natural resources and their management. Local people will only participate in fire management activities if the values (e.g. natural resources) they protect or manage are of benefit to them, i.e. if they own or are allowed to use them. Therefore the promotion of CBFiM should be undertaken as part of a broader commitment to increasing local/decentralised control over natural resources and related management.

Communities are part of an integrated approach to fire management that still needs the involvement and commitment of all parties managing land, particularly the government and the private sector. Building up structures of CBFiM is a long term development and participatory process that needs political commitment and well-defined roles and engagement of various actors in the field of fire and land management. This is particularly important not to overburden impoverished communities with resources and equipment and related responsibilities.

In summary Community Based Fire Management aims:

1. to identify and organize communities to manage and use fire for their own benefit and minimize the negative impacts of fire for improved natural resources management
2. to develop effective partnerships with other relevant stakeholders such as government departments, private sector, NGOs or neighbouring communities with regard to fire and natural resource management

3. to support communities develop, regulate and enforce community fire management structures and regulations
4. to create awareness, knowledge and skills about fire and the safe use of fire to improve natural resources income;
5. to develop fire free alternatives and income possibilities;

2.2 CROSS-BORDER FIRE MANAGEMENT

When referring to cross-border, transboundary or border fires in a narrower sense, one tends to refer to fires, which went out of control on either side of a country's border directly or indirectly affecting natural resources, human life and assets across those borders. Several countries have entered into bi- or multilateral agreements with the major aim to efficiently and effectively share resources not only in cross-border fire situations but for fire emergencies situations and respective suppression efforts. These agreements facilitate mutual cooperation between national fire management agencies and offer a framework for providing and receiving assistance in a fire emergency that exceeds a country's fire pre-suppression and suppression resources. The general procedures laid out in such agreements cover responsible parties and contacts, information for customs and immigration departments, costing and reimbursement issues of personnel and equipment including aircrafts, invoicing, payments and situation reporting. In order for effective and efficient exchange of technical or human resources the "interoperability" of the cooperating agencies and organisations must be given at various levels such as training, communication, information and reporting levels and standards.

In a broader sense, cross-border fire management is not necessarily confined to national borders but may refer defined geographic areas, different administrative and/or land use boundaries within a country requiring partnership agreements for co-operative and joint fire management planning and implementation. Prominent examples of rather complex and comprehensive agreements for international and inter-agency fire management cooperation are provided by the National Mobilisation Guide of the National Interagency Coordination Centre of the United States⁴.

In addition cross border fire management also aims at international cooperation and networking in fire management including sharing of scientific and technical expertise, best practices and experiences. Such exchange is facilitated by two existing voluntary global networks: 1.) Under the International Panel on Global Observation of Forest and Land Cover Dynamics (GOF-C-GOLD⁵) the Southern African Fire Network (SAFNet⁶) fosters collaborative efforts in fire monitoring and management through the enhanced use of remote sensing and other geospatial information technology. 2.) Under the Global Fire Monitoring Center (GFMC) the Global Wildland Fire Network (GWFN⁷) operates as a "Thematic Platform" under the United Nations International Strategy for

⁴ <http://www.nifc.gov/nicc/mobguide/>

⁵ <http://gofc-fire.umd.edu/>

⁶ <http://safnet.meraka.org.za/>

⁷ <http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html>

Disaster Reduction (UNISDR) to promote international cooperation in wildland⁸ fire management. In the light of increasing fire severity and activity, fire management agencies are challenged by changing fire regimes, increasing fuel loads and expanding wildland-urban interface amplified by climate change. This in turn leads to increased costs for fire suppression. Thus the more systematic and efficient sharing of scientific and technical expertise, solutions and resources, including transboundary cooperation becomes more important. On global and regional level the transition from informal information exchange to formalized cooperation promoting greater inter-agency collaboration (national and international) needs to be advanced. Currently there are no ***internationally accepted*** protocols on standard methods and procedures for countries that provide and receive assistance in wildland fire emergencies to enable inter-operability, efficiency and safety of cooperating parties⁹.

Successful cross-border fire management leads inevitably to the major principle of Integrated and Community Based Fire Management that is a collaborative network of partners, agreements and cooperation strategies to achieve the balance between economic development, environmental protection and conservation. Without the coordination and assistance from partners the ability of a single entity to implement integrated fire management programs is limited. Hence partner agreements are pre-requisites for successful implementation of integrated and community based fire management in cross-border areas.

⁸ In this document we use the terminology wildfire according to the following definition: Three distinct types of wildland fire have been defined: (a) wildfire: an unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out; (b) prescribed fire: any fire ignited by management actions to meet specific objectives; and (c) wildland fire use: The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans (NWCG, 2006, <http://www.nwcg.gov>).

⁹ Goldammer, J.G. 2013. International protocols and agreements on cooperation in wildland fire management and wildfire disaster response: Needs, current status, and the way ahead. Chapter 23 in: Vegetation Fires and Global Change. Challenges for Concerted International Action. A White Paper directed to the United Nations and International Organizations (J.G. Goldammer, ed.), 313-341. A publication of the Global Fire Monitoring Center (GFMC). Kessel Publishing House, Remagen-Oberwinter, 398 p. (ISBN 978-3-941300-78-1).

3 CBFiM case studies in the Southern Africa Region

The following case studies were collected as a desk top study and range from examples on Integrated Fire Management where CBFiM is part of, and/or elements of CBFiM such as knowledge and awareness creation in various set ups of land use and management or other administrative boundaries. The case studies are summarized but can be obtained in the original and full version.

There might be other examples of CBFiM in the Southern African region, however many may need to be assessed and documented first to complete the picture of best practices of CBFiM in southern Africa. The following examples were readily documented and digitally available.

3.1 NAMBIA – CAPRIVI REGION

Robin Beatty and Integrated Rural Development and Nature Conservation (IRDNC)

The Caprivi Region is a 300km finger-like projection of semi-arid tropical savanna of northeast Namibia in sub-Saharan Africa. Annual rainfall is highly variable with an annual average of 600-700mm with distinct wet and dry seasons. As a fire dependent ecosystem it has evolved through the human use of fire that continues today in the form of traditional burning. The population (~100,000) lives a predominantly rural existence where subsistence farming and natural resources are important sources of livelihoods. The majority of the Region is communal land (71%) with natural resources including grazing for livestock, agriculture, building materials (timber and thatching grass), firewood, medicinal plants, wild fruits and honey.

Uncontrolled wildfires affect over 50% of Caprivi every year and this pattern has not changed over the past 20 years. Uncontrolled wildfires have obvious immediate consequences, particularly as a hazard to natural resource availability, life and property. However, fire plays a far more complex role in the ecology of the landscape, land use and its sustainability. Long-term secondary effects involve changes in vegetation that negatively impact community livelihoods through degradation of natural resources that reduce land use productivity and opportunities. This leads to increased hazard risk and vulnerability of the Caprivi community as well as reduced livelihood resilience to subsequent fire disasters.

Widespread use of slash-and-burn agriculture to prepare land for crops is ubiquitous throughout the region. Coinciding with late dry season weather conditions and fuel characteristics mismanaged crop field fires lead to extensive uncontrolled wildfires that negatively impact community livelihoods. The Caprivi Region Integrated Fire Management Program (Caprivi Program) commenced in 2006 and represents an ecosystem-based fire disaster risk reduction program. It provides an opportunity for communities with minimal capacity and resources to minimize the negative effects and maximize the benefits of fire without costly machinery or resources. Focusing on controlled burning to manage wildfires, land use and environment enables communities to improve their livelihoods through improved land use and reduced wildfire and secondary disasters.

Fire as a Resource

The Caprivi Program aims to establish fire management on communal land that complements the environment, land use, resources and capacity of communities. The approach is based on integrating existing community skills, knowledge and institutional structures with sustainable fire management strategies and ecological requirements. It is implemented through a fire management strategy based

on controlled burning; decentralised fire management decision-making and implementation by the community; and integrating CBFiM into regional fire management.

Controlled Burning

Managing Fire as a Resource focuses on the benefits of fire as opposed to its negative impacts as past prevention and suppression policies. The Caprivi Program is centred on controlled burning to manage wildfires, land use and the environment. Based on holistic management principles the strategy integrates traditional burning practises, contemporary land use and environmental requirements.

Land use productivity and sustainability is enhanced through use of controlled burning to improve grazing, natural product harvesting and agriculture. The timing, intensity and frequency of burning is prescribed to specific land use objectives in specific areas. Typically implemented in the early dry season (April – July) this creates an extensive mosaic burn pattern. This minimizes the occurrence and extent of wildfires by reducing and fragmenting fuel loads. Infrastructure and sensitive resource areas are protected by strategic reduction of fuel loads around these assets. The environment is enhanced through reduction of fire intensity and diversification of fire regimes to enhance habitat and biological diversity.

By controlling when, where and how fires occur communities minimise negative effects and maximise the benefits of fire without costly machinery or resources. Using fire behaviour, local knowledge of the area and strategic implementation safe and efficient controlled burning is achieved with minimal equipment (matches / drip torch / fire beater). Firebreaks are limited to implement controlled burning around infrastructure. Firebreak networks are no longer required with existing roads and tracks providing sufficient access for implementation of controlled burning.

Decentralisation of Fire Management to the Community

The Caprivi Program decentralizes decision-making and implementation through community specific fire management programs. The programs enable communities to acquire the rights and responsibilities of fire management in their area of authority. An implementation process based on existing legislation and regulated by a government authority guides coordination of fire management within communities.

Communities register a fire management area encompassing their area of authority. Each community elects a fire management brigade, a functional group that develops and implements a fire management program on the community's behalf. The brigades are trained in the process of implementing a fire management program with emphasis on managing people as much as managing fire. The Traditional Authority administers the brigade and arbitrates on fire related disputes within the community.

CBFiM program planning involves comprehensive community coordination, liaison and awareness. Stakeholder meetings, 'door to door' consultation and field surveys are used to identify land use requirements, priority resource areas, infrastructure, fire history and hazards. A strategic fire management plan centred on community land use objectives details the timing, location and methodology of operational activities. The plan is submitted to the regulating authority as an application for a permit to burn.

CBFiM implementation is coordinated within the community though continual liaison and awareness by the brigade. Conveying individual role and responsibilities in community fire management and

notification of program activities are priorities. Community participation in operational activities of the brigade is encouraged to extend fire management skills and knowledge to the community.

Controlled burning is implemented in the early dry season when weather conditions and fuel characteristics lead to low intensity fires of limited extent. Implementation includes firebreak maintenance; infrastructure and resource protection burning; controlled land use and mosaic burning; and wildfire management.

Integrating into Regional Fire Management

CBFiM programs are integrated into regional fire management through structured collaboration and coordination with neighbouring communities, national parks and gazetted forests. Community brigades develop collaborative strategies with fire managers in areas that share a common boundary with their fire management area. Alignment of fire management objectives, shared resources and workloads facilitates effective fire management with the least effort and resources. Importantly, boundary firebreaks, requiring considerable resources to construct and maintain, are no longer necessary using this approach.

Implementation of the CBFiM Program has established an ecosystem-based fire disaster risk reduction program that has brought multiple functions and services to communities in Caprivi. The approach has established fire management on communal land that has brought tangible livelihood benefits to communities through improved land use, reduced uncontrolled wildfires and improved environmental management. Strategies centred on controlled burning, capacity-building community and collaborative fire management between neighbours enable this to be achieved over large areas without costly machinery and resources.

Integrating traditional institutional structures and knowledge with existing community skills into CBFiM is essential in developing community fire management ownership. Community specific programs further contribute to a sense of ownership through recognition of cultural diversity and community value in regional fire management. Community ownership facilitates responsibility at leadership, brigade and wider community levels.

Effective CBFiM programs are driven by the ability of individual community members to control fire management and improve their livelihood through enhanced land use. By basing implementation of fire management on existing skills, knowledge and community institutional structures programs are accessible and controllable by individual community members. Their brigades possess the necessary skills, knowledge and equipment to independently plan and implement fire management safely and efficiently. Individuals control fire management by directing the brigade's activities within their resource areas. Settlement of fire related disputes is commensurate with individual resources and arbitrated locally through a process accessible and open to individual contribution.

Effective and sustainable CBFiM programs require a long-term development process to build fire management skills and knowledge and collective fire management responsibility in communities. The operational relationship between brigades and community evolved primarily through personal experience. Benefits of controlled burning were demonstrated in the first year through tangible livelihood improvements. Widespread reliance on brigades was experienced in the second year with uncoordinated use of fire ceasing. Wildfires from uncontrolled slash-and-burn agriculture remain a challenge to the programs. Brigades do not suppress uncontrolled fires from these sources in an effort to build collective fire management responsibility throughout the community. Land use improvements following three years of implementation stimulated proactive participation of the

wider community in operational activities. CBFiM program sustainability relies upon extension of fire management skills, knowledge and responsibility to the wider community enabling independent fire management in the future.

Similarly, institutionalizing the Caprivi Program CBFiM decentralization within government authorities also requires a long-term development process. Lack of knowledge and skills has developed a strong scepticism by authorities in the ability of communities to safely implement controlled burning. Deeply entrenched beliefs in fire prevention and suppression policies together with loss of authority are also challenging issues. It is important to capacity-build government personnel alongside the community to facilitate the sustainability of this approach.

Integration of CBFiM into regional fire management through neighbour collaboration and coordination establishes effective fire management over large areas of differing land tenure and use. Regional fire management is composed of property specific programs coordinated as an adaptable and robust program driven by grass roots level decision-making and implementation.

3.2 ZIMBABWE– IFM STRATEGY OF MANICA PROVINCE

FAO/Robin Beatty

The Manicaland Province Integrated Fire Management Strategy 2009 - 2011 (Manicaland Strategy) was developed by the Zimbabwe Forestry Commission (ZFC), Environmental Management Agency (EMA) and Food and Agricultural Organization of the United Nations (FAO) as a component of the Zimbabwe National Fire Protection Strategy 2005. The Manicaland Integrated Fire Management Strategy 2009 – 2011 is an adaptation of the existing fire management approach centred upon the Plantation Timber Industry and the Caprivi Strategy 2007 – 2011 (see section 3.1). In the following the parts that are concerned with fire management at the community level are excerpt.

Within the private plantation forests the Manicaland Strategy focuses on fire management aimed at preventing and suppressing fire. Within other areas of the Province on using **Fire as a Resource** with **controlled burning** an effective tool in managing Wildfires, Land Use and the Environment. Through controlled burning land managers take control of **When, Where** and **How** fires occur and manipulate the system to achieve desired objectives.

In addition to integrating management of wildfire hazard, land use and the environment, the Manicaland Strategy integrates fire management between communal, state, leasehold and private land through empowering the people managing the land at the ground level. As the majority of Manicaland is communal land the strategy hinges upon the community. To accomplish this integration the **Organisational Structure** utilises the existing provincial and district administrative system in partnership with traditional leadership. Fire management activities are coordinated and integrated through the existing development committee administrative system where relevant stakeholders convene:

6. **National Fire Committee** - oversees the implementation of the Manicaland Strategy.
7. **Manicaland Provincial Fire Committee** - represents the coordinating unit and integrates fire management throughout the Communal, State, Leasehold and Private Lands within Manicaland.

8. **District Fire Committee** - represents the operational fire management unit of the Strategy and assists in the planning, development and implementation within the Communal, State, Leasehold and Private Lands. The ZFC District Forest Officer and EMA District Ecosystem Protection Officer are the **Fire Management Facilitators** responsible for the coordination and implementation of fire management within their respective district. The Fire Management Facilitators provide the primary communication link between the **Land Managers** of Communal, State, Leasehold and Private Land and the Development Committees

Devolving ownership and responsibility of fire management to the land manager is essential to accomplish ground level implementation. Structured on Fire Management Areas (FMA) the strategy accommodates for the diversity of landscapes, communities and land use of different areas.

To regulate fire management activities on **communal land** in Manicaland the Strategy employs a **Permit to Burn System**. The Committee of Seven, a representative group of community members and traditional leaders concerned with natural resource management, appoints a **Ward Fire Management Brigade (Brigade)**. One member of the Brigade is appointed the **Fire Controller** who is responsible for all fire management activities. The Brigade is responsible for the planning, development and implementation of Fire Management within their community, registers the area as a **Fire Management Area**, and prepares a **Fire Management Plan** to acquire a **Permit to Burn** from the ZFC to implement controlled burning within that area. The Fire Management Facilitators assist this process through capacity building and resource availability.

The **Land Manager** or **Ward Fire Management Brigade** coordinates and liaises with all of the people living or utilising resources within their respective Fire Management Area. The Fire Controller is responsible for communication of fire management related issues to the Area people, ZFC and EMA District Fire Facilitators and the neighbouring Communities / Landholders

An **Awareness Program** raises understanding of the Manica IFM Strategy and its objectives. The Campaign targets misconceptions of forest and veld fires in Zimbabwe and raises understanding of the Fire Management Strategy through providing appropriate information. Changing perceptions of forest and veld fire issues is a key element of the Strategy. Importantly, the Campaign focuses on the benefits of managing fire to land managers as opposed to threat of punishment through law enforcement if fires are mismanaged.

Training and Skills Transfer Program consists of three successive levels of training. The Fire Management Facilitators implement the Training and Skills Transfer Program. The Fire Management Facilitators require **Level I** and **II** training from a Fire Management Specialist. The Ward Fire Management Brigades, State and Leasehold Land Managers are required to attend **Fire Management Training Level I**. **Fire Management Level I** provides basic fire awareness and fire management techniques. The Program consists of a general theory component and a Practical Demonstration. The Practical Demonstration involves community participation in operational aspects of Fire Management including the use of equipment and techniques in:

- Manual Construction and Maintenance of Fire guards;
- Controlled Burning; and
- Fire Suppression.

Skills and knowledge in fire management activities can only be acquired through first hand experience and the majority of training is carried out with ongoing practical fire management implementation.

Fire Management Implementation: Implementation of the Strategy is centred upon controlled burning. Strategic buffer zones of burnt areas are established around infrastructure and boundaries. A patchwork mosaic of burnt and unburnt areas is then created throughout the landscape to reduce wildfires, enhance land use and biodiversity. Implementation is carried out by the Community, State, Leasehold and Private Land Managers operating on the ground level. Fire management activities of each Fire Management Area are implemented in accordance with the Fire Management Plan and the Permit to Burn. The Fire Controller from each Fire Management Area or Land Manager leads and coordinates the burning operations. The Fire Facilitators provide technical and resource assistance when requested or required.

Controlled Mosaic and Land Use Burning: Completion of the protection, boundary and internal buffer burning enables controlled burning to be implemented safely in other areas where fire can be used to maintain and enhance land use and biodiversity. Controlled mosaic burning is implemented in the afternoon to create a cool fire regime. This strategy creates an extensive mosaic of burnt and unburnt patches throughout. Follow up visits to areas burnt during this period is undertaken with additional burning carried out to increase the mosaic pattern as required. The existing roads and tracks are used as initial access to implement controlled burning. The patchwork mosaic burn pattern is extended throughout inaccessible areas by foot.

In the **event of a wildfire** the Ward Fire Management Brigade or Fire Controller is responsible for the first assessment of the wildfires and determine if it is a hazard to life and property; threat to land use; or threat to environment. The Fire Controller has reliable knowledge and understanding of the area, particularly previously burnt areas, for the safe and efficient management of the wildfire.

Conflict resolution: Devolving ownership and responsibility of fire management to the Land Manager is essential to accomplish ground level implementation. The “Permit to Burn System” represents a process for the wider community and traditional leaders to take ownership of fire management in their area. Ownership of fire management brings many benefits to the individual, through enhanced livestock grazing, natural product harvesting (thatching grass, timber), habitat and wildlife management, and reducing wildfires on a landscape scale. Ownership also involves assuming the responsibility of issues and conflicts of fire management.

It is important that the individual within the community takes ownership of fire management to ensure all other members of the community act responsibly with fire. Issues and conflicts are first dealt with at the Fire Management Area level. The Ward Fire Management Brigades and Fire Controllers mediate the resolution process and the Traditional Leadership arbitrates settlement.

Conflicts unresolved at the Fire Management Area level or conflicts between neighbouring areas can be brought to the district level through the District Fire Committee. The Fire Management Facilitators mediate the process at this level. Conflicts unresolved at the district level can be brought to the provincial level through the Provincial Fire Committee. The ZFC Provincial Manager and EMA Chief Provincial Environment Officer mediate at this level.

Monitoring at Community level: A post fire season workshop at community level was carried out to assess community attitudes towards the program and review fire management objectives. Key members of the community, particularly the TL, are invited together with the Fire Controller and

relevant stakeholders. This provides for community and stakeholder input and development of future Fire Management.

3.3 BOTSWANA – KHAMA RHINO SANCTUARY

Robin Beatty/UNDP

The Khama Rhino Sanctuary (KRS), located in the Central District of Botswana, was established in 1992 as a community based wildlife conservation, tourism and education project. The fenced Sanctuary covers approximately 4300 hectares of semi-arid Kalahari Sandveld and Hardveld is centred on the Serowe Pan, which was a traditional hunting area teeming with wildlife. More recently it is used for livestock grazing for the community of Serowe, Paje and Mabeleapodi.

The Sanctuary is managed by the Community Based Organisation (CBO) - Khama Rhino Sanctuary Trust (KRST) whose overall objective is to develop and manage the Sanctuary to provide the communities of Serowe, Paje and Mabeleapodi with sustainable livelihoods through generating revenue and providing employment from tourism and other renewable resource activities within the Sanctuary.

Established for White Rhinoceros (*Ceratotherium simium*) conservation, the Khama Rhino Sanctuary has been highly successful with the management of a current population of 37 animals from an initial four translocated in 1992. With 17 years of protection and development the Sanctuary represents a quality habitat accommodating over 35 species of mammals including the reintroduction into Botswana of the Critically Endangered Species such as the Black Rhinoceros (*Diceros bicornis*) as well as Giraffe, Eland, Gemsbok, Impala, Blue Wildebeest; over 230 species of bird; and a rich diversity of reptiles and invertebrates.

Issue of Fire in Khama Rhino Sanctuary

The issue of fire in the Khama Rhino Sanctuary is characteristic of many areas of Botswana and provides an excellent case study to explore the effects of how fire influences wildfire hazard, land use and the environment in more detail. Intensive grazing pressure in and around the Pan has in the recent past reduced grass diversity and cover over the years. The limited grass cover has reduced the frequency and intensity of fires, which has favoured the growth of the understorey of shrubs. Combined with intensive prevention and suppression fire management approach of the Sanctuary the frequency of fire over the past 20 to 30 years has been minimal. The fire history of the Sanctuary has resulted in the following issues.

Wildfire Hazard has significantly increased with the build up of fire fuel loads after the good rainfall seasons in 2008 onwards and no pre-suppression and preparedness measures were in place to pre-empt these fuel loads prior to the fire season. Combined with fire suppression measures these high fuel loads significantly increase the likelihood and intensity of wildfires. This is highlighted by the wildfire entering the Sanctuary on the northwestern boundary in August 2008 that burnt approximately 1387 ha (32%) of the Sanctuary. As the only significant fire event in recent years the intensity of the fire in some areas was such that well established trees up to 6m tall were reduced to the ground with future growth limited to coppicing from the root level. Grass tussocks were also reduced to a small proportion of productive shoots. Over time infrequent wildfires of this intensity may lead to land degradation.

In addition land use of the Sanctuary has also been affected by extensive bush encroachment occurring through the low frequency of fire. Fire plays an important role in selective pressure on the growth and development of the vegetation community structure. Infrequent fire enables the shrub layer to dominate the grass layer for space and light. The majority of the Sanctuary's high value wildlife are grazers and depend on quality grass availability year round. Lack of fire affects the quality of grazing with the build up of moribund or old grass, which impedes new grass growth through shading and physical obstruction. Grazing wildlife prefers and selects grass tussocks without moribund material that affects foraging efficiency. Bush encroached areas also have limited visibility and diminish the tourism value of the Sanctuary by reducing viewing opportunities of the Sanctuary wildlife.

The current fire regime in the KRS has lead to relatively homogenous ecosystems with reduced spatial and temporal habitat variability. Reduced habitat diversity equates to reduced biodiversity.

Khama Rhino Sanctuary Integrated Fire Management Program 2010 / 2011

As a CBFIM initiative the Integrated Fire Management (IFM) Program of the Khama Rhino Sanctuary enabled the KRST to effectively manage wildfires, land use and the environment for the benefits of the Sanctuary and the community. Integrating adjoining neighbours including communal, leasehold and state lands developed the capacities of the surrounding community to maximise the benefits of their areas through the CBFIM initiative.

Organisational Background and Capacity Building

The Khama Rhino Sanctuary Trust established in 1992 is a representative and accountable legal community trust with the overall objective to alleviate poverty and provide sustainable livelihoods to the communities of Serowe, Paje and Mabeleapodi through generating revenue and providing employment from tourism and other renewable resource activities within the Sanctuary. The main objectives are to:

1. Develop and manage the Khama Rhino Sanctuary on behalf of the community.
2. Protect and nurture the endangered rhinoceros and all other fauna and flora within the Sanctuary.
3. Maintain and enhance the bio-diversity within the Sanctuary.
4. Generate revenue for the local community from tourism and other uses of the Sanctuary's renewable resources.
5. Provide environmental education to Botswana and general public.
6. Facilitate and support research relating to nature conservation in general and rhinoceros in particular.
7. Facilitate the publication of relevant literature and to maintain archives and libraries.

The President of Botswana , Lt. Gen. S.K.I. Khama, Paramount Chief of the Bamangwato is the **Patron** of the Trust. The Trust is governed by a **Board of Trustees** of nine people elected every two years by the communities of Serowe, Paje and Mabeleapodi. The **Management Committee** includes all Board

of Trustee members and the Sanctuary Manager, Education Officer and the Assistant Manager. There are 37 community members employed as administrative and operational **Staff** at the Sanctuary.

For over 17 years the KRST has been successfully managing and operating the Sanctuary as a highly successful conservation project and quality eco-tourism destination of international standard. External funded projects have over the years provided the majority of infrastructure development and capacity building within the Sanctuary.

Project Objectives and Intended Results

The primary objectives of the project was to develop and implement an Integrated Fire Management Program including a CBFiM initiative that enables the KRST to effectively manage wildfires, land use and the environment of the Khama Rhino Sanctuary in order to maximise the benefits of the Sanctuary to the community. Integrating adjoining neighbours including communal, leasehold and state lands aimed at developing the capacity of the surrounding community to maximise the benefits of their areas through the CBFiM initiative.

Extension of fire management by the Botswana government to the community has typically involved awareness campaigns on fire prevention, employing communities to construct and maintain cutlines and mobilising community workforces to extinguish wildfires. Fire management **ownership** rests firmly within the Government of Botswana and fire management within communities is driven by external decisions and resources. Communities have little to no involvement in the decision making process of how fire is managed on their land. The direct benefit of this approach is often limited to the employment opportunities available to a small proportion of the community to construct and maintain cutlines. Dependent on external Government funds and capacity to implement this throughout the vast areas of Botswana many communities frequently experience the impact of uncontrolled fires on their livelihoods. The disempowered communities have little opportunity to rectify the fire management and achieve the benefits derived from managing fire appropriately.

Effective CBFiM requires an approach that is driven internally by the requirements of the community. To achieve **ownership** in fire management it must be entrusted to the community so they decide how fire is managed on their land. The livelihood benefits achieved from the fire management approach to the individual community member becomes the internal driver of the management. To sustain such an approach the fire management strategies need to incorporate activities within the capacity and resources of the community. Expensive machinery and intensive labour costs to construct and maintain cutlines as a fire management activity is not achievable by communities.

The Khama Rhino Sanctuary has the advantage of a community based conservation project operating in a relatively small area with uncomplicated land use objectives and user groups. The KRST has excellent management and operational capabilities to develop and implement a CBFiM initiative and provide an excellent opportunity to pilot the technical aspects of managing fire within the Sanctuary. However, the disparity of the Sanctuary to a typical rural community scenario in Botswana provides a challenge in linking the relevance of the Project to other areas. To provide this link it was essential to collaborate with the Sanctuary's adjoining communities, leaseholders and land administrators throughout the Project. The Project then represented the typical scenario of Botswana where communal land adjoins a variety of other land tenures that need to manage fire collaboratively. Collaborative fire management through building partnerships is the most effective strategy to minimise the negative effects and maximise the benefits of fire with the least effort and resources.

Adopting this strategy will empower the community and other stakeholders through greater community participation in the design, implementation and monitoring of the CBFiM approach, capacity building and extending project benefits to a wider community as well as facilitate involvement and contributions from other stakeholders.

Project Results and Implemented activities

The intended results of the Khama Rhino Sanctuary Integrated Fire Management Program 2010 / 2011 were to:

Establish Fire Management Brigades in:

1. Khama Rhino Sanctuary and Neighbouring Properties
2. Deliver a Fire Management Training and Skills Transfer Program to:
 - (i) Khama Rhino Sanctuary Fire Management Brigade
 - (ii) Neighbour Property Fire Management Brigades
3. Develop a Khama Rhino Sanctuary Integrated Fire Management Strategy 2010/2011
4. Integrating Wildfire Hazard Reduction, Enhancing Land Use and Enhancing Environment
5. Collaborating with Neighbouring Communal, Leasehold, State Land
6. Procure Fire Management Brigade Equipment
7. Implement the Integrated Fire Management Strategy through annual action plans in:
 - (iii) Khama Rhino Sanctuary
 - (iv) Neighbouring Communal / Leasehold / State Land
8. Monitor Fire Management Implementation
 - (v) Khama Rhino Sanctuary
 - (vi) Neighbouring Communal / Leasehold / State Land

Fire Management Brigade Establishment

The KRST Project Facilitator coordinated the appointment of Fire Management Brigades in the Khama Rhino Sanctuary and neighbouring properties. Each Fire Management Brigade consists of one fire Controller and four fire Officers.

The KRST selected the Khama Rhino Sanctuary Fire Management Brigade from existing staff members. In the neighbouring communal areas the respective community through the Traditional Leadership selected their Fire Management Brigade from community members residing in the area. Equitable representation is necessary from each village area. The Community Fire Management Brigades received remuneration on a piecework basis for their participation during the development and implementation of the Project.

In Neighboring State, Leasehold or Private land the respective Manager will select their Fire Management Brigade and contribute their services in-kind to the Project.

Fire Management Training and Skills Transfer Program

The training and skills transfer program consisted of a training and skills transfer workshop and continual “On the Job Training”. The workshop delivered to the Khama Rhino Sanctuary and neighbouring areas fire management brigades and consist of a theory component involving:

1. Fire Issues in Botswana
2. Lessons from other CBFiM Programs
3. Integrated Fire Management Strategy
4. Fire Management Brigade Selection / Role and Responsibility
5. Fire Behaviour
6. Fire Management Planning
7. Fire Management Implementation
8. Fire Management Monitoring and Reporting
9. Dispute Resolution.

Other stakeholders were invited including key community members and government departments, particularly Department of Forestry and Range Resources/ Ministry of Tourism, Environment and Wildlife/Agricultural Resources Board. A fire management specialist was contracted to deliver the technical aspects of the Fire Management Training Workshop.

Fire management skills and knowledge cannot be transferred from a book or a training workshop. ***On the Job Training*** of the fire brigades in all operational aspects of fire management is required, including the use of equipment and techniques in:

1. Fire Management Planning (Coordination and Liaison)
2. Firebreak Establishment and Maintenance
3. Controlled Burning
4. Wildfire Management
5. Monitoring and Reporting.

Delivery of “On the Job Training” was carried out throughout the duration of the project. The contracted fire management specialist delivered training at strategic phases of the fire management implementation component.

Integrated Fire Management Strategy Development

The KRST project facilitator developed the 2010 / 2011 Khama Rhino Sanctuary IFM Strategy including neighbouring properties in April 2010. Development of the plan involved a desktop study; consultation, liaison and field surveys of the neighbouring properties and relevant institutions. Information derived from the training and skills transfer program provided the basis of the development of the strategy. Elements of the strategy incorporated:

1. Baseline Survey and Review of Community and Infrastructure, Services, Administration, land use, satellite imagery derived fire history and underlying fire causes.
2. Lessons from other Community Based Fire Management Programs
3. Integrated Fire Management Strategy (objectives / Fire Management Approach / Organisational Structure)
4. Planning (Fire History/Fire Management Zone Analysis/Fire Management Requirements)
5. Implementation (Coordination, Liaison and Awareness / Training & Skills Transfer Program Firebreak Establishment & Maintenance / Permit to Burn Acquisition / Resource and Infrastructure Protection Burning / Controlled Mosaic & Land Use Burning / Wildfire Management)
6. Monitoring (Vegetation Monitoring / Community Perceptions Monitoring / Satellite Monitoring)
7. Reporting (Fire Management Report)

A draft was circulated to relevant stakeholders and finalisation of the strategy was carried out in conjunction with the contracted fire management specialist and relevant government departments, particularly DFRR Fire Management Section.

Fire Management Equipment Procurement

Fire management equipment for the Khama Rhino Sanctuary and neighbouring fire management Brigades were procured by the KRST Project Facilitator with guidance from the contracted fire management specialist and DFRR Fire Section in April 2010.

The equipment required to implement the fire management activities safely and efficiently included:

- 40 Pairs Personal Protective Equipment (PPE)
- 100% cotton overalls and hat
- Safety Glasses
- Leather non-steel cap boots

Fire Equipment	
Matches	20 x Slasher
15 x Drip Torches	20 x Shovel / Spade
50 x Fire Beaters	20 x Fire Rake
15 x 20l Knap Sack Spray Unit	1 x Bakkie Skid Unit (500l Tank, Pump and Hose)

Fire Management Implementation

The KRST Project Facilitator coordinated and integrate the Fire Management Implementation carried out by the Khama Rhino Sanctuary and Neighbouring Fire Management Brigades. Guidance will be provided by the contracted Fire Management Specialist and DFRR Fire Section throughout the duration of the Project Activity.

The Fire Management Brigades carried out the activities specified in the Integrated Fire Management Strategy 2010 / 2011 within their relevant areas. Collaborative implementation is the focus with the coordination of activities and sharing of skills and knowledge. As detailed above the Fire Management Implementation constitutes the On the Job Training of the Training and Skills Transfer Program.

Fire Management Monitoring

The KRST Project Facilitator will coordinate and integrate the Fire Management Monitoring implemented by the Khama Rhino Sanctuary and Neighbouring Fire Management Brigades. Guidance will be provided by the contracted Fire Management Specialist and DFRR Fire Section throughout the duration of the Project Activity.

1. . Vegetation Monitoring (March 2010) – Fire Management Brigades: vegetation Community Structure monitored through fixed site data collection and photographic records.
2. . Satellite Monitoring (monthly from June – October 2010) – DFRR in-kind
3. Mapping of the timing and distribution of fires
4. Fire history Map 2010.
5. Community Perceptions (October 2010) - KRST
6. Post fire season workshop involving key members of the communities / stakeholders and the Fire Management Brigades at Khama Rhino Sanctuary
7. Two day workshop with KRST providing in-kind logistic support, accommodation and catering services.

Fire Management Report Development

The KRST Project Facilitator collated the fire management reporting of the Fire Management Brigades in Khama Rhino Sanctuary and neighbouring areas. The fire management report evaluated the fire management implementation and monitoring activities specified in the Integrated Fire Management Strategy 2010 / 2011. Guidance was provided by the contracted fire management specialist and DFRR Fire Section throughout the development of the report.

3.4 FIREWISE CONCEPT: APPLICATION IN SOUTH AFRICA AND TANZANIA

The FireWise concept originally developed in Northern America, is a community-based fire management element that works to create awareness of the dangers of wildfire and train community members on fire management and prevention skills. FireWise' priority is to protect life, livelihoods and the environment before a fire starts and to help communities develop a fire management plan in case of fire occurrence. A key aspect of the FireWise concept is that the initiative is community-based and community-driven, focussing on improving cooperation and coordination around fire management. To be effective, FireWise requires a genuine participatory process from the first step. In 2006 the "Working on Fire" programme of South Africa adopted the US American FireWise model. In 2011 it was introduced and modified in Tanzania.

3.4.1 FIREWISE SOUTH AFRICA

The South African FireWise Communities Programme seeks to protect people and property from wildfire risks by encouraging local solutions for wildfire safety and involving homeowners, community leaders, planners, developers, firefighters, and others in this effort. The overall goal is to enhance the sustainability and protection of life, livelihoods and the environment through integrated fire management in order to contribute to economic empowerment, skills development, social equity and accelerated service delivery. The FireWise Communities Programme teaches people how to adapt to living with wildfire and encourages neighbours to work together and take action now to prevent losses. The program wishes to create a paradigm shift from fearing fire to living with fire in a safe way.

Each FireWise community establishes a local committee that is responsible for conducting a fire risk assessment and putting together a fire management plan. This plan sets out measures to reduce the risk of uncontrolled fires such as where firebreaks should be established, what vegetation clearing is needed and how to improve access, for example, which access roads need widening. A fire management plan considers tools such as controlled burning, early season burning, mosaic burns etc. The approach emphasizes community responsibility for planning in the design of a safe community. It is the community who is responsible for effective emergency response, and the individual within the community who is responsible for safer home construction and design, landscaping and maintenance.

Awareness is a key aspect of a FireWise programme. Each community should hold a FireWise Open Day once a year to raise community awareness on fire management issues. The time and effort put in to a FireWise programme by the community is valuable and the committee may keep track of it for their own assessment and measurements of behavioural change. It is also important to give recognition to a FireWise community when they have completed their fire risk assessment and fire management planning. This can be done through awarding a FireWise Plaque in recognition of their status.

The voluntary FireWise Community aims to:

1. improve safety in the wildland/urban interface by learning to share responsibility,
2. create and nurture local partnerships for improved decision making, and
3. encourage the integration of FireWise concepts into community and disaster alleviation planning.

The FireWise Community beneficiaries are primarily recruited and paid as fire prevention workers rather than fire fighters and this is reflected in the type of training and equipment supplied. Each voluntary FireWise Community is represented by an elected FireWise Committee, consisting of responsible community members and partners such as local government representatives. The South African Forest Fire Association (FFA) Non-Profit Company (NPC) provides training and support, along with the necessary equipment, to enable communities to create a FireWise environment.

FFA NPC is part of a Government job creation programme established by the Department of Environmental Affairs and Natural Resource Management. The funding for FireWise incentive-based projects is provided as part of the Expanded Public Works Programme. FFA NPC manages these funds and is responsible for the roll-out of the projects which create part time work opportunities in particularly high risk fire-prone communities.

3.4.2 FIREWISE TANZANIA

Tanzania has been adapting 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 of the PFM strategies that are developed in ensuring Sustainable Forest Management (SFM) and sustainable land management 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.

In recent years, the Tanzania Forest Services (TFS) Agency has realised 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. Despite the gained experiences and demonstrated success stories of PFM in the country approaches, aspects of CBFiM have not yet been well developed and applied to communities adjacent to forests.

Within the framework of the German Cooperation (GIZ) supported Trilateral Tanzania – South African Fire Management Coordination Project support has been provided to enhance integrated fire management at national and local level in Tanzania. It aimed to mitigate the negative impacts of the unwanted fire incidents, while at the same time educating selected communities in the use of fire as a tool for natural resource management. Based on experiences drawn from the successful South African “Working on Fire” and “FireWise Programme different activities and training measures suited to raising awareness and increasing fire management skills were identified and carried out. The project focused on the introduction and training in the concept of “FireWise” and the development of an adapted FireWise curriculum suiting the socio-economic and cultural conditions of the use of fire in Tanzania’s rural areas.

The Trilateral Cooperation Fire Management Project introduced FireWise South Africa (SA) by carrying out several training packages and assessing the SA FireWise model for application in the Tanzania socio-economic context and environment. Within a reiterative and multiple stage process involving stakeholders from various land management agencies (Forestry, Wildlife, Agriculture and Livestock, Universities, NGOs) a modified approach of FireWise appropriate to the rural context of Tanzania was

developed. The manual intends to guide and assist mainly extension officers and natural resource committee members to teach and train local communities being FireWise. The three days training is structured as the following:

1. Positive and Negative Impacts of Fire
2. Fire Triangle
3. Community and the Use of Fire
4. Community Participation in Fire Management
5. Responsibility of Communities in Fire Management
6. Development of a Fire Management Plan
7. Identification of Fire Risk Areas

In addition, the manual is accompanied with extensive graphical extension material for fire awareness creation and education to local communities considering the level of education and rate of illiteracy in communal areas. The guideline is designed to empower different stakeholders/extension workers from the land management agencies or NGO's who need to facilitate training about fire management at the village level. Many sessions in the manual have been prepared in a way to enable participants to acquire the skills and understanding about principles of the Community Based Fire Management and to take them forward within their communities and respective environmental committees. The FireWise training is usually followed by a basic fire fighting training for communities.

4 Crossborder Fire Management Examples

No crossborder CBFiM best practice is documented so far. The documented cross border example relates to an official MoU between Swaziland and South Africa to prevent catastrophic fire events such as 2007 and 2008, where significant losses in plantation and natural timber with associated reduction in the forest industry productivity and employment were experienced.)

The second example is a joint fire management of the Maloti Drakensberg Park World Heritage Site intending to provide guidance for protected area managers with regard to the application of fire in the Sehlabathebe National Park (SNP) and in the uKhahlamba Drakensberg Park World Heritage Site (UDP WHS). No reference is made with regard to CBFiM.

4.1 SWAZILAND – SOUTH AFRICA

A Memorandum of Understanding (MoU) between Swaziland (Ministry of Tourism and Environmental Affairs) and South Africa (Department of Agriculture, Forestry and Fisheries) on the cooperation in the management of wildfires and other forestry development issues exists. This MoU is not specifically on Community based fire management but to expand and continuously explore best strategies for co-operation between the countries in the following areas: a.) Measures to facilitate the sustainable means of combating cross border wild fires and integrated fire management; b.) Sharing of available resources; c.) Technical and scientific information exchange in forestry management issues; and d.) Measures to facilitate Sustainable Forest Development, Forests Conservation and Protection.

4.2 MALOTI DRAKENSBERG PARK WORLD HERITAGE SITE JOINT FIRE MANAGEMENT PLAN

The Maloti-Drakensberg Park is a transboundary site composed of the uKhahlamba Drakensberg National Park in South Africa and the Sehlabathebe National Park in Lesotho. The management plan intends to provide a background to fire management, synthesise of current thinking and to function as a guide for protected area managers with regard to the application of fire in the Sehlabathebe National Park (SNP) and in the uKhahlamba Drakensberg Park World Heritage Site (UDP WHS). The park fire management goals are relevant to

1. Biodiversity aspects such as the promotion of habitat heterogeneity through mosaic burning, target species conservation, restoration of degraded habitats, management of alien species through burning regime
2. Water and erosion management by maintaining good vegetation cover and controlling the timing and extent of fires
3. Protection and management of cultural heritage by fire breaks and vegetation management, as well as other protection efforts
4. Maintaining Wilderness aspects as far as possible such minimal mechanical and visual impacts, wildland fire use (lightning) where appropriate etc.
5. Infrastructure protection through fire break and fuel load management
6. Maintenance of long term research trials
7. Conservation and species management targets

The plan further outlines the summary of the ecological impacts of fire, whereby fire is considered not only the most important ecosystem driver requiring management to maintain a certain area specific biodiversity. Management is also considered inevitable in a human dominated landscape to ensure biodiversity conservation which includes that fire is a natural feature for the flora and fauna evolution either tolerating it or making use of ecological fire free niches. Therefore the management approach lies in the application of fire to mimic “natural” fire effects as far as possible at the same time maintaining and protecting fire sensitive habitats. Management goals are preliminary guided to maintain the full variety of habitat types and hence high biodiversity ranging from fire dependent to fire sensitive areas. Patch mosaic burning is applied to resemble various fire regimes (varying frequency, time-since-last-burn, season extent of burn etc.) thus various vegetation succession stages within the landscape. In summary, management regimes need to be tailored according to the environment, risk management requirements and resources at hand. More importantly is to clearly identify biodiversity objectives for the park, to then develop appropriate fire regimes to assist in meeting, or at least not compromising, these objectives. The success with which these objectives are met needs to be monitored and fed back into developing adaptive management strategies. The starting point of this monitoring needs to include establishing baseline information against which to measure our conservation success. Considerable research is also required to improve the understanding of fire effects on the biodiversity and ecosystem process of the bioregion. This research needs to combine with the monitoring to revise objectives and update management interventions¹⁰. To achieve the full complement of biodiversity the four principles variability (apply fire at different times and intervals rather than monotonously), responsibility (frequent or repetitive burning during the growing season will not be permitted), flexibility (preferred biennial burning but prevailing conditions and objective allow flexibility and patchiness (patch mosaic burning at landscape and local level, clean burns of large areas avoided) have been adopted.

The plan further outlines aspects of fire history, legislation, fire management applications, fire behaviour aspects. The section “Fire Management Operation” guides on planning (inspections, workshops, meetings, compartment burning), preparedness (equipment maintenance, fire danger, communication procedures, safety, budget processes, competencies and training, fire break maintenance, risk management and more. Under “Management of Fire” the control of wildfires (suppression) and the application, planning and methods of scheduled fires (prescribed or controlled fires) is outlined in detail. The descriptions are detailed Standard Operating Procedures (SOP). The section “Monitoring, data management and Auditing” guides on mapping, forms, responsibilities, reporting as well as evaluation processes. The plan is appended by various fire management forms.

The fire management plan does not outline any community based fire management approaches or community development processes with regard to fire management.

¹⁰ Summary of the Fire Best Practice for the Maloti Drakensberg Bioregion (Uys et al. 2006),.

5 Conclusions and Recommendations

The presented case studies reveal that the design and implementation of a CBFiM programme can bring tangible livelihood benefits to communities through improved land use and natural resource management. As the majority of southern Africa is communal land a community based fire management has the potential of improving livelihoods and managing ecosystem services over vast areas and at the same time reduces unwanted wildfires, environmental degradation and conflicts with other land management units.

CBFiM is part of an overall CBNRM and Integrated Fire Management strategy. It promotes a reduction in the annual area burnt and a shift to a predominantly early dry season fire regime. This reduces wildfire hazards and enhances community livelihoods through improved land management. CBFiM is based upon a common set of processes and tools of CBNRM tailored towards fire management. The CBNRM's principles ensure that local communities' livelihood needs are met by the sustainable management of natural resources through the controlled and sustainable use of fire as a tool.

Prescribed or controlled burning– the practice of burning deliberately - is used for conservation reasons, removal of old growth, suppression of bush encroachment, stimulation of the growth of grazing grass and removal of fuel loads with the aim of pre-empting dangerous wildfires at the peak of the fire season. Land use productivity and sustainability is enhanced through the use of controlled burning to improve grazing, natural product harvesting and agriculture. The timing, intensity and frequency of burning are prescribed to specific land use objectives such as the promotion of growth of thatching grass, medicinal and food plants including fruit, nuts and honey. Harvesting can be facilitated by improving access, visibility and removal of old or unwanted growth. Typically implemented in the early dry season this creates an extensive mosaic burn pattern, minimizing the occurrence and extent of wildfires by reducing and fragmenting fuel loads. Infrastructure and sensitive resource areas are protected by strategic reduction of fuel loads around these assets. The environment is enhanced through the reduction of the fire intensity and a diversification of fire regimes increasing habitat and biological diversity.

Sustainable resource management depends very much on whether the community can benefit from practicing good management and whether the better managed resources have tangible value for the community. A sense of ownership over a resource is often a strong incentive to sustainably manage and protect it. In most cases environmental degradation or over-exploitation of natural resources is closely linked to weak or poorly defined property rights, i.e. weak incentives for sustainable natural resource management. Land tenure systems or property rights are a common challenge for many CBNRM/CBFiM programmes in southern Africa. There are successful other alternatives to privatisation of land and natural resources such as the collective/community ownership over resources. CBFiM programmes promote the empowerment of communities to develop and implement fire management plans, acquire new skills and knowledge thereby improving livelihoods through enhanced land and resource management. Understanding controlled burning -when, where and how fires occur- allows communities to minimise negative effects and maximise the benefits of fire without costly machinery or equipment and facilitates ownership over resources.

For CBFiM to be successfully implemented the organization of a community based fire management group is required. Such a group can be formed around existing Community-based Organisations (CBO) which manages a particular resource. Integrating such active community specific programs contributes to understanding local ownership structures and decision making processes while

providing information on other stakeholders relevant to build up community fire management structures. Through such existing groups the establishment of specific community fire management brigades can be facilitated.

Seeking participation in CBFiM is seen as a long-term development process by building up fire management skills, knowledge and collective fire management responsibility in communities. The establishment of community fire management brigades play a crucial role to develop community fire management ownership based on traditional knowledge and skills. The brigades will be capacitated to independently plan and implement fire management safely and efficiently. Joint development of a community fire management plan defines the natural resources to be managed guided by individual or community needs. It further identifies and involves other relevant partners and stakeholders sharing, managing or adjoining the same resource. In this planning process fire or land management related disputes can be discussed openly and solution agreed upon. This is particularly important where community livelihood needs may be in conflict with conservation goals. Integration of CBFiM into regional fire management through neighbour collaboration and coordination establishes effective fire management over large areas of differing land tenure and use.

A CBFiM structure at community level will have operational procedures and processes, rules and regulation. In addition to incentives for effective fire management, sanctions for unsound management are equally important. Use of legal sanctions is crucial in preventing uncontrolled fires. In general, community developed and enforced fines and other penalties often work better than government legislation in discouraging people from breaking rules about fires. If fires are not managed well by local people with vested interests, it will be necessary to change undesirable practices by providing incentives and supporting alternative livelihood strategies. This requires gearing efforts towards land management and income generating strategies that provide the necessary economic incentive and opportunity of enterprise activities without the use of fire.

Ultimately continuous training, awareness raising and education, the transfer of knowledge and lessons amongst several CBFiM approaches are fundamental to further develop understanding and knowledge about CBFiM as part of an overall Integrated Fire and Natural Resource Management strategy.

To repeat the previous summary Community Based Fire Management aims:

1. to identify and organize communities to manage and use fire for their own benefits and minimize the negative impacts of fire for improved natural resources management
2. to develop effective partnerships with other relevant stakeholders such government departments, private sector, NGOs or neighbouring communities with regard to fire and natural resource management
3. to support communities to develop, regulate and enforce community fire management structures and regulations
4. to create awareness, knowledge and skills about fire and the safe use of fire to improve natural resources income;
5. to develop fire free alternatives and income possibilities;

5.1 CBFiM IN PROTECTED AND TRANSFRONTIER CONSERVATION AREAS

The vision of cross-border collaboration gives effect to the stated objectives of the Southern African Development Community (SADC), which aims at promoting synergy in regional initiatives for economic, social and conservation benefits over the subcontinent. The establishment and development of Transfrontier Conservation Areas (TFCA) as a vehicle for conservation and sustainable use of biological and cultural resources has the objective of facilitating and promoting regional peace, co-operation and socio-economic development. It taps on the notion that nature knows no boundaries. The establishment, development and management of transfrontier conservation areas forms part of broader aims of trans-boundary ecosystem management, integration of conservation with development, promoting regional cooperation and socio-economic development in the Southern African sub-continent. Furthermore the TFCA programme forms an integral part of New Partnership for Africa's Development (NEPAD), which also aims to bring Africans together.

Community involvement is key to the success of the TFCA programme. It is anticipated that these transfrontier parks and transfrontier conservation areas will provide jobs and revenue generating opportunities for many local people living within and around them. Improving the lives of rural communities will in turn further contribute towards biodiversity conservation by demonstrating the economic and social advantages that can be achieved through wildlife conservation.

Specific case studies of CBFiM examples in transfrontier conservation or protected areas in Southern Africa are lacking or not yet documented. However key principles of collaborative management of natural resources remain the same irrespective of the area. Important element for successful development and implementation of CBFiM in TFCAs are effective partnership agreements and joint integrated fire and natural resource management planning regardless whether cross border or not. Community fire management objectives should be in line with natural resource management objectives and be in accordance with conservation and biodiversity goals. These management objectives need not contradict conservation and biodiversity management goals but become integral of them.

Of particular importance is the jointly developed fire management plan in TFCAs as it can be assumed that a relationship of trust between park management and community members must first be created. The overarching perception of communities being the main driver of the fire problem led in many countries to the prohibition of the use of controlled fire and fire is often strictly illegal. In addition there are often strict regulations prohibiting humans inside conservation areas. This created stalemate situation with regard to community-based fire management approaches as inter-alia conflicting laws and policies created different realities on the ground. Hence no clear policies, regulations and guidelines to work with communities inside the conservation areas exist and current often initiatives lack policy backing and institutional support. Therefore locally developed joint fire management plans and related agreements are instruments of trust building and mutual understanding of the needs of the stakeholders involved. On this basis sharing of resources and workloads with residents, neighbours and government agencies enables effective integrated fire and natural resource management in and around conservation areas.