

Sustainable Forest Management in a Changing Climate  
FAO-Finland Forestry Programme – TANZANIA

## Indigenous Knowledge, Practices and Customary Norms of Fire Management In Tanzania - A Study in Nine Villages



Dar es Salaam  
2013









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# 1 Introduction

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The FAO-Finland Programme is supporting Tanzania in its efforts towards developing and implementing national efforts on integrated fire management as a key factor to reduce deforestation and forest degradation. All stakeholders<sup>1</sup> see the fire situation in Tanzania as complex, difficult, widespread and of significant concern. The detail of the fire situation in Tanzania needs to be examined and properly described. This study was intended to establish a thorough understanding on the existing indigenous knowledge, practices and customary norms (IKPC) on fires in Tanzania in order to establish a basis for how, when, where and why communities in the nine study sites use fires. The study conducted in nine villages from nine districts and regions, respectively. The study covered the northeastern, central, western, and southern parts of Tanzania.

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<sup>1</sup> Public and private institutions, local communities and development partners



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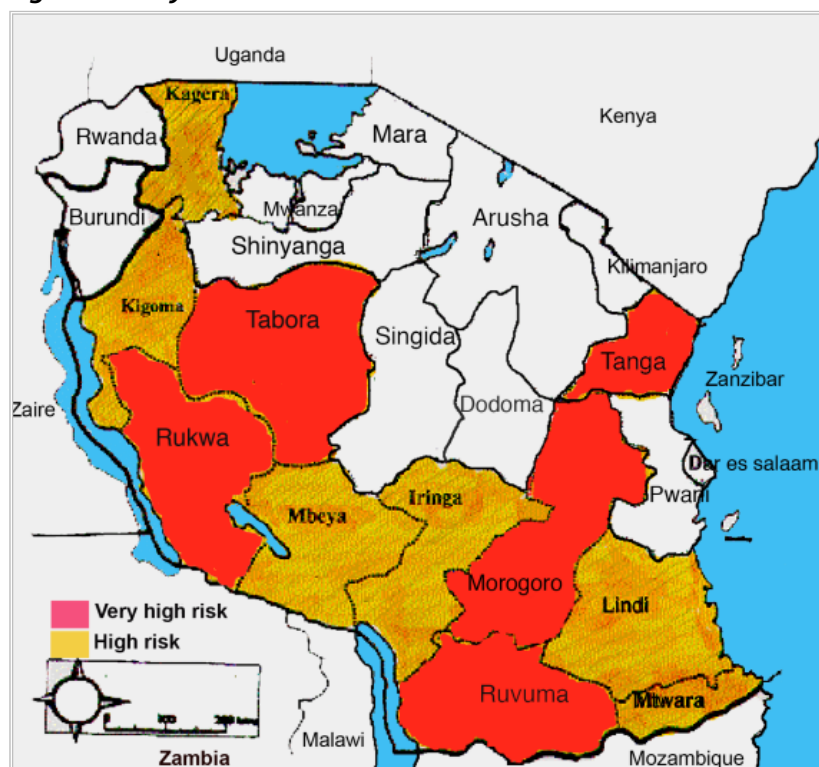


# 2 Methodology

## 2.1 Selection of the study area

The selection of the study sites was based on spatial distribution [northeast, central, west, southern, and south] in Tanzania (Figure 1 and Table 1). Proximity to the National Forest Monitoring and Assessment (NAFORMA) plots was another criterion for selecting the study area as was the site being within an area of high fire activity and physically accessible. A Geographical Information System (GIS) was used to aid selection of the study area where layers of the areas that burn frequently [very high risk and high risk<sup>2</sup>], villages [and their respective districts and regions], and NAFORMA plots were overlaid for visualization before selection was made. The areas that met all the four criteria constituted the study site. The nine sites represented at least nine tribes<sup>3</sup>: *Zigua* in Mzeri (Handeni District), *Luguru* in Kisaki Kituoni (Morogoro Rural), *Ha* in Kifura (Kibondo District), *Nyamwezi* in Ipole (Sikonge District), *Fipa* in Kizungu (Sumbawanga Rural), *Ngindo* in Mirui (Liwale District), *Ndendeule* in Luhimba (Songea Rural), *Safwa* in Mbonile (Mbeya Rural) and Hehe in Magunga (Iringa Rural).

**Figure 1 Study Sites**



<sup>2</sup> Fire risk is based on historical fire occurrence. white areas indicate regions with very low fire occurrence

<sup>3</sup> These were the dominant tribes. other tribes exist in the villages because of in-migration of people to these villages from other parts of tanzania.

**Table 1 Study sites**

Village	Ward	District	Region
Mzeri	Msima	Handeni	Tanga
Kisaki	Kisaki	Morogoro Rural	Morogoro
Kizungu	Muze	Sumbawanga Rural	Rukwa
Kifura	Busagara	Kibondo	Kigoma
Ipole	Ipole	Sikonge	Tabora
Mirui	Mirui	Liwale	Lindi
Luhimba	Gumbiro	Songea Rural	Ruvuma
Mbonile	Ulenje	Mbeya Rural	Mbeya
Magunga	Maboga	Iringa Rural	Iringa

## 2.2 Data collection

Data were collected in all nine villages using multiple methods. These methods included Focus Group Discussions (FGD), in-depth Interviews, village meetings and stakeholder consultation. The multiple nature of the methods employed enabled comparisons among villages and fact checking. The methods sought to gather information on the fire *context* [sources of fires and fires in a village or ward, its spatial and temporal extent, impact on lives and property, fire spread pattern and frequency]. In addition, information on fire *prevention, suppression and controlled use of fire* [knowledge practices and customary norms] was sought.

Seven elderly individuals who were knowledgeable of the fire situation in their area and knew the customary norms well were selected deliberately for in-depth interviews in each village. Both male and female were considered for the in-depth interview. Selection of the Focus Group Discussion participants included an equal number of males and females of variable age groups. The village meeting involved all villagers. All information from village meetings, in-depth interviews and Focus Group Discussion sessions were documented.

## 2.3 Data analysis

Interviews and village meetings data were collated into similar themes to allow comparisons of common and different aspects across villages. The major themes were fire context, fire prevention, fire suppression and controlled use of fire in the communities. Subthemes were generated from the data to capture knowledge of the communities on fire context, practices and customary norms. Informative verbatim quotes were identified and noted from the transcripts to illustrate fire context, practices and customary norms. In addition, key issues that were similar or different across the nine study sites were identified and documented.



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# 3 Results and Discussion

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## 3.1 Results

### 3.1.1 Fire context

#### 3.1.1.1 Sources of fire, seasonality and frequency

Fires in the study sites are human-induced because they start with a human activity, which includes the use of fire. The activities include farm preparation, honey hunting/harvesting, charcoal making, burning of grazing land, illegal loggers that set fire for their use but leave it unattended when they are done with the logging and children playing with fire. Other causes are -<sup>4</sup>(fires for tourism-related hunting, illegal loggers set fire to identify trees for logging easily and see forest patrolling officers at a distance so they may evade them. Occasionally fire is used for fortune telling<sup>5</sup>, *Kulaguzilaumulilo* in *Ha*. When an individual sets the forest vegetation ablaze and the fire burns for a long time it was indicative of that individual's longer lifespan.

Fires are used to scare away snakes and wild animals or at least clear the vegetation around households so it is easier to spot and elude any approaching dangerous wildlife. Livestock keepers set fire to allow grasses to regenerate, *Nfulumeda* in Nyamwezi, so their livestock will have fodder. While all these fires might serve their purpose when properly controlled, they may cause a lot of damage and be even dangerous once they go out of control developing into wildfires.

Fires are common in the dry season (*Kiangazi* in Kiswahili) which is late May through November and occurs every year. In some areas, it is a common phenomenon such that if you do not harvest on time [before the peak of the fire season] and your crops burn in the farms you "need to blame yourself". An elderly respondent in Mirui, Lindi region when expressing the commonality of fire incidents in the village said: "Every year fire must burn, when it is a dry season they [the people] must set fire." The villagers in Magunga village Iringa region argued that "it is impossible to avoid using fire in preparing farms because it is difficult work to do so given the nature of vegetation [tall grasses, bushes and trees] in the area". In Mbonile an interviewee pointed out that it was a waste of time burying crop residues [e.g. maize stubble] in the farm because the cold weather does not facilitate fast decomposition of the buried residues. He said: "Listen to me...I experimented it myself, I slashed maize remains [stubble] after harvesting the maize, buried them [stubble] only to find that they had not decomposed when I farmed the area in the following season."

Large areas of forest in all the nine sites burn every year. It was difficult to estimate the area that burns. However, focus group discussions and village meetings indicated there was variations in the extent of forest areas that burn in each village (Table 2). As an example of the magnitude of fire incidents in the villages, the Focus Group Discussion in Luhimba village revealed that "during the dry season people burn haphazardly, the whole forest area is always on fire."

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<sup>4</sup> While prescribed burning is allowed in game reserves, villagers argued that some tour operating companies have been the source of fires that burn the game reserves and the village land. This observation is highly contested.

<sup>5</sup> This practice was noted in Kifura village, Kibondo District, Kigoma region.

**Table 2 Annual estimates of the area that burns**

Village	Ward	District	Forest and farmland area that burn/year (ha)
Mzeri	Msimba	Handeni	*
Kisaki	Kisaki	Morogoro Rural	*
Kizungu	Muze	Sumbawanga Rural	>8658.36 <sup>+</sup>
Kifura	Busagara	Kibondo	10,000
Ipole	Ipole	Sikonge	313,750
Mirui	Mirui	Liwale	20 800
Luhimba	Gumbiro	Songea Rural	1000
Mbonile	Ulenje	Mbeya Rural	17
Magunga	Maboga	Iringa Rural	1000

Note: \* means they could not estimate the area, <sup>+</sup> larger than the size of the village

### 3.1.1.2 Fire patterns and damage caused by fires

It is common in six villages<sup>6</sup> that fire may start in the village and spread to other villages and vice versa. An exception was in Mbonile, Mirui and Magunga villages. In Mbonile, the village is surrounded with rivers and streams, which makes it difficult for fire that starts from the village or other villages to cross the rivers and spread to other areas. In Magunga, the prevailing easterlies allow for fire that starts from the villages in the east to torch Magunga. Likewise, fire that starts in Magunga spread to other villages in the west. Similarly, the easterlies affect fire pattern in Mirui because fire that starts in the forests in the east spreads to the Magunga village and other villages west of Magunga. The easterly winds are common in the dry season [fire season], June-November.

Fire related damage varies in magnitude across villages (Table 3). However, what is common is that fire has damaged crops in farms, houses, trees and occasionally lives. It was difficult for respondents to recollect all damage over several years in the past. A few interviewees remembered salient fire events that caused damage to the community.

<sup>6</sup> These villages include Luhimba, Mzeri, Kisaki kituoni, Kifura, and Ipole.

**Table 3 Fire damage in the study sites**

Village	Ward	District	Damage on crops and planted trees (TSh.)	Damage on houses and household items (TSh.)	Loss of lives
Mzeri	Msima	Handeni			
Kisaki	Kisaki	Morogoro Rural			
Kizungu	Muze	Sumbawanga Rural	-Farm with maize 535,000 (2010)	-1 house and property 500,000 (2011)	
Kifura	Busagara	Kibondo	A banana farm 100,000 (2010)	-A house and property 200,000 (1990s) -a house and property 84,500 (2002) -A house and property 200,000 (1970s) -All houses in a sub-village 2,000,000+(1993)	-A child (2009) -An elderly woman (1994)
Ipole	Ipole	Sikonge	-A Farm with cassava 210,000 (2010)	- A house 145,000 (2010)	
Mirui	Mirui	Liwale			

**Table 3 Fire damage in the study sites (cont)**

Village	Ward	District	Damage on crops and planted trees (TSh.)	Damage on houses and household items (TSh.)	Loss of lives
Luhimba	Gumbiro	Songea Rural	-Mixed crops in farms 105,000 (2010) A peas farm 690,000 (2011) - A 3 ha Cassava farm 105,000 loss (2009)	-2 houses and property 2,200,000 (2011) -3 houses 700,000 (2010), -Store house 1,000,000 (2010)	
Mbonile	Ulenje	Mbeya Rural	- A farm 900,000 (2004) -Two farms 900,000 (2009) -Ulanzi [bamboo] farm	-A house 900,000 (2009) - A house 632,000 (2010) - A house 200,000 (2011)	

Village	Ward	District	Damage on crops and planted trees (TSh.)	Damage on houses and household items (TSh.)	Loss of lives
			269,000, pyrethrum farm 14,400,000, and maize farm 2,250,000 (2011) -Pine trees 250,000 (2011) -Pine trees 900,000 (2009)		
Magunga	Maboga	Iringa Rural	<i>Ulanzi</i> farm 12,230,000 (2009) - <i>Ulanzi</i> farm 10,125,000 (2010) -maize farm 1,295,000, trees 250,000 (2010)	-A house 200,000 (1992) - A house 200,000 (2007) - house 450,000 (2006) -A house 500,000 (2010)	

### 3.1.2 Fire prevention

#### 3.1.2.1 Knowledge

The causes of fire in Mzeri, Kisaki, Kifura, Kizungu, Ipole, Mirui, Luhimba, and Magunga are similar because fires in the area are started by humans. The villagers in the studied sites use fire because it is a cheaper option than alternatives. The causes of Fires include, but are not limited to, hunting of small mammals [rats, rabbits], getting rid of bushes and tall grasses along paths [particularly if a path is through the forest], and preparation of farms<sup>7</sup> including dry season gardening [*finyungu*] as it was observed in Magunga village, Iringa. Other reasons included illegal loggers using fire in the forest and leaving it unattended, and honey harvesting. Livestock keepers burn so they may have new grasses for their livestock [*Nfulumeda* in *Nyamwezi*]. However, at times people just burn for no reason, it is just habit [as observed in Luhimba], an elderly interviewee said:

*"Setting of fire to the forests is just a habit of the people [in this area] when a person sees dry grass he/she will start saying If I set fire in this areas it is perfect.... setting of fire in the farms when preparing a farm is the cheapest way to run farm operations....hunters also use fire."*

<sup>7</sup> Preparation of farms is the major source of fire that run out of control and burns the forests

A similar habitual torching of the forests was noted in Mirui where fire events are common such that it has been culturally embedded in a greeting. When it is a fire season, an interviewee said, we greet “did fire pass well in your area?” An elderly respondent echoed the commonality of fires in the village by elaborating that “most fires start in the forest or *Jangwani*<sup>8</sup> when the fire reaches our village we also burn [*tunautimua*]”. Using backfires allows it to continue burning to other areas while avoiding the damage it would have caused on farms, lives and property.

### 3.1.2.2 Practices

To prevent fire from causing loss of lives, damaging crops and property the local people traditionally have been practicing different farm and household fire prevention measures. It is common in all nine study sites that local people use fire breaks to prevent fire from burning property, farms and other vegetated areas [e.g. grasses for thatching] that may be destroyed if they are allowed to burn. While firebreaks are called different names (Table 4) because of tribal differences, they still serve the same purpose in all the study sites. Firebreaks are created using a hand hoe, machetes, and *Nyengo*. To create a firebreak vegetation is removed from a stretch of land about 2.5 to 3 Meters around farms and property, so when fire occurs in the area it does not cross the firebreak and cause damage to farms and other property.

**Table 4 Fire preventive practices**

Village	District	Practices			
Mzeri	Handeni	Prescribed burn <sup>9</sup>	-Forbidding fire in sacred groves -Educating children not to play with fire	-Firebreak	Traditional medicine ( <i>Kuzinga</i> ) in <i>Wazigua</i> tribe
Kisaki	Morogoro Rural		-Forbidding fire in sacred groves -warning children not to play with fire	Firebreak ( <i>Mikuza</i> ) <i>Waluguru</i> tribe	
Kizungu	Sumbawanga Rural	Prescribed burn	-Forbidding fire in sacred groves -Educating children not to play with fire	Firebreak	
Kifura	Kibondo		-Forbidding fire in sacred groves -warning children not to play with fire	Firebreak ( <i>Insekele</i> )	Traditional medicine
Ipole	Sikonge	Prescribed burn (kubhabhilila)	-Educating children not to play with fire	Firebreak (kuselela)	
Mirui	Liwale	Prescribed burn ( <i>Kubabakyia/Kubhabhulila</i> ) <i>Wangindo</i> tribe	-Forbidding children from setting fires ( <i>Kunkela buya</i> ) -Removing fuel around a place one wants to set fire ( <i>Kupyagila</i> ) - Educating children not to play with fire ( <i>Kabolanga</i> )	Firebreak ( <i>Likwembo</i> )	
Luhimba	Songea Rural	Prescribed burn	-Educating children not to play with fire	Firebreak ( <i>Kutindikiha/Kukwala</i> )	-Traditional medicine

<sup>8</sup> The wangindo tribe in Mirui uses the word *Jangwa* to mean the forest. It, however, means desert in Swahili.

<sup>9</sup> Prescribed refers to burning of vegetation near farms and property around the village soon after the rain season so is little fuel to burn during the fire season there, which stops wildfires from entering the village when they occur.

		( <i>kubhab hulila</i> ) Wanden deule tribe		<i>lila ndiila</i> )	( <i>Lubhego</i> ) - <i>Moto wa Kihami</i> <sup>10</sup>
Mbonile	Mbeya Rural	Prescribed burn	-Forbidding fire in sacred groves ( <i>Iganjo</i> ) -Educating children not to play with fire	Firebreak ( <i>Bhooya</i> ) in <i>Wasafwa</i> tribe	
Magunga	Iringa Rural		-Forbidding fire in sacred groves -Educating children not to play with fire	Firebreak	

### 3.1.2.3 Customary norms

Traditional rules of behavior that the community has had in preventing Fires are listed in Table 4. These norms happen to be a result of a long time of experimentation, adjustment and change by the people.

## 3.1.3 Fire suppression

### 3.1.3.1 Knowledge

The local people understand that when there is fire that is a threat to the village and its property and lives something must be done to suppress that fire. Traditionally Fires are collectively fought only when the fire poses a threat to property and lives. If fire in the forest does not present a threat to life and property it is left to burn until it runs out of fuel or stops due to weather and natural firebreaks like rivers and rock outcrops. People gather after an individual who spots a fire incident makes a shout for help.

### 3.1.3.2 Practices

Collective action to fight Fires is common in all the nine sites studied. A shout that means danger is echoed, e.g. nkoondoo (*Zigua*) and Hiiihiiii (*Hehe*). Similar shouts [with variations in tone] are practiced in *Ngindo*, *Nyamwezi*, *Luguru*, *Ha*, *Safwa*, *Ndendeule*, and *Fipa*. The shout from the individual is propagated by other members of the community through repeated echoing of the same shout until every member in the village is aware of the danger and then is supposed to act accordingly.

In response to fire incidents villagers, particularly males come with hand hoes, *nyengo*, (Figure 3) and Machettes or pangas. Females come with buckets and any other utensil with water, or for fetching water if there is a water source nearby a burning area. To put out fire, tree branches from trees that do not burn easily are used as fire beaters. The *Hehe* in Magunga use *Melesi* and *Kihongole* vegetation species (Figure 2) as fire beaters. Whenever the fire is difficult to contain in a particular spot, villagers go ahead of the fire direction where they create a fire break. Depending on the size of fire and the type of fuel, sometimes counter fires are lit to avoid the spread of fire if that fire cannot be put out by beating it with tree branches.

<sup>10</sup> *Moto wa kihami* was fire that a traditional medicine man prepares once a year. Each villager would get the fire from the traditional medicine man. This fire was strictly not to be shared among households as calamities could befall the contravening household. A few individual still use this fire.

Figure 2 Species used as fire beaters



Figure 3 A hand hoe and Nyengo used in fire management



### 3.1.3.3 Customary norms

Traditional rules of behavior that the community has had in fighting Fires include a collective response to fire incidents. Non response of an individual to a fire incident is punitive and punishments range from a verbal warning from the elders committee or a chief as in the *Safwa* and *Hehe* tribes or a village leader. In the *Safwa* community, for example, an individual who violates customary norms such as non-participation in fighting fires, accidental torching of forests and farms is obliged to present himself/herself to the chief and before the committee of elders where "he/she bows to the ground to plead for forgiveness". An interviewee remarked that " you do not wait for the chief and his committee of elderly to start asking around who did it, for your safety and your family's safety you better avail yourself to the chief immediately after the incident, if you do not miserable incidents will befall you."

Villagers treated sacred groves in Mbonile, Mzeri, and Magunga village as such. They would not burn a sacred grove because this is a place believed to host gods. Sacred groves are respected because whenever the village is in difficulty [experiencing droughts, floods, diseases outbreak, etc] the villagers led by the chief and village elders perform rituals in the sacred groves<sup>11</sup>.

Parents or elders in the family or clan sit [mostly in the evening] with the youth to warn them about playing with fire when performing assigned duties such as taking out livestock for grazing or when playing. Male children [during livestock rearing] and female children [during cooking practice or *Madange* in *Ndendeule*]. Warning children about fire handling is called *Kabolanga* in *Ngindo*. Similar customs are practiced in Nyamwezi, Ha, and the rest of studies tribes in the villages.

### 3.1.4 Controlled use of fire

In all the nine villages villagers use fire. The time of the year and purpose of use of fire varied across villages depending on the climatic characteristics of each agro-ecological zone. In Iringa and Mbeya fire is used in preparing farms before the rain season starts in late November-Early December. Also, fire is used for preparing gardens [*finyungu* in *Hehe* or *Madimba* in *Ndendeule* ) in valley bottoms as observed in Magunga and Luhimba villages.

It was observed that before using fire for preparing a farm area a fire break is made [*kutindikiha* in *Ndendeule* and *kusesa ibhoya* or *Ilyeso* in *Safwa*] around the farm using hand hoes, machetes, and *Nyengo*. Table 3 lists other tribal names for a firebreak.

To control fire from spreading during fire use in the farm, villagers have a tendency of collecting felled trees, brush, grasses and crop and putting them in stacks before burning (figure 4). Burning is done very early in the morning and late evening. Consistently villagers in the nine study sites said:

*"when you burn early in the morning or late evening the wind is not too strong to enable fire to escape, the vegetation is not too dry to burn haphazardly because the air is humid ... burning is against the wind so the fire will burn slowly, that way it is easy to control."*

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<sup>11</sup> Sacred groves have big trees and other vegetation that show no indication of degradation or char



**Figure 4 Collecting stacks before burning**



### 3.1.4.1 Knowledge

In depth interviews revealed that the knowledge of controlling fire existed in the study sites. Traditionally the villagers know that fire burns too hot and spreads faster and runs out of control when one burns at noon or in the afternoon. One old lady in Magunga said, “ if you burn at noon the heat from fire is intense you cannot go near it, so if it happens that fire escapes it is impossible to put it out with tree branches[ as fire beaters].” Similar arguments were presented in the rest of the study sites.

Seasonality was crucial in preparing farms using fire, it was noted that farm preparation time is during the dry season, June through November.<sup>12</sup> It follows that felled trees and brush [in new farms] and crop remains [in farms that are already in use] are dry enough to burn to ashes during the farm preparation season. However, the farm preparation season coincides with the fire season in all study sites.

### 3.1.4.2 Practices

The Focus Group Discussion, village meetings and in-depth interviews in all nine villages showed that it was a common practice to put out fire after cooking, regardless of the location, whether at home or in the farm or forest. If it was necessary to keep fire burning throughout the day or night so it may be used later one would take a burning wood [*kijinga* in *Swahili*] and bury it under hot ashes. The rest of the burning wood are extinguished completely. Similarly, if setting fire in the forest for warming [when harvesting honey], there is a tendency of getting rid of the vegetation and all biomass around a place where fire is set [*kupyagila kukungiumoto* in *Ngindo*] in order to minimize the risk of fire spreading to other parts of the forest.

Live tree branches [fire beaters, *Mapukutu/mafukutu* in *Ngindo* and *Ndendeule* or *Amatwata* in *Safwa*;] are cut and put on standby just in case fire escapes from the intentionally controlled burned area.

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<sup>12</sup> Slight variations exist because of differences in agro-ecological zones and its concomitant climatic characteristics

An individual who would damage other people's property would be mocked in local dances [songs] so he/she changes his/her bad behavior. This was more significant in Mirui where the *Ngindo* tribe dominates.

### 3.1.3 Customary norms

It was reported that before setting fire to stacks in the farm in Ipole, Kifura, Kizungu, Mirui, Mbonile, Mzeri, Kisasi, Luhimba and Magunga an individual was supposed to inform his/her neighboring farm owners. Informing neighbors was crucial so they may burn at the same time and just in case fire runs out of control, collectively villagers would help each other to put out fire.

A unique observation regarding use of fire was in Mbonile village. The chief would instruct his subordinate during the season for preparing farms to lead in the use of fire. The chief and his medicine men observe environmental signals such as wind direction, humidity in the air and flowering of some plants as indicators for the nearing rain season. Farms need to be prepared before the onset of rains. The Focus Group Discussion session reported that:

*"When it is a farm preparation season under the order of the chief, the chief's subordinate [also medicine man] will perform a ritual in the sacred grove [Iganjo]. Thereafter he will go and burn in his farm and the farm of the chief. When the villagers see the smoke going in the air everybody in the village will know it is a farm preparation season, so everybody follows suit. The same village leaders lead the harvesting season and even consuming new produce from the farms. Any unplanned use of fire was severely punished with a heavy fine on the perpetrator."*

## 3.2 Discussion

### 3.2.1 Similarity across villages

There were similar observations in the nine study sites. These similarities are as follows:

- The causes of fire are the use of fire by human in many different activities. Fires in every village start with an activity related to farm preparation, hunting, lumbering, tourism, livestock keeping, charcoal kernels, poaching and just burning for no reason.
- Fire records were not kept. The villagers rely on human memory of fire incidents, which is unreliable, an observation that was consistent throughout the nine villages.
- The magnitude of fire was qualitative. In every village the response was Fires are 'big' they burn 'large' areas and may 'burn for days.'
- Fires are localized and may spread from one village to the next. These Fires are frequent in dry season and worse with extreme droughts.
- It was not acceptable to burn sacred groves because they are places where prayers and sacrifices are made, in most cases sacred groves are water catchment or places where there is a water source.
- Childhood training on fire handling includes warning children not to play with fire because it has deleterious effects on property and lives.
- Fire incidents were communicated through a shout that indicated danger in the community. In

response to a shout collective fire fighting was common in each village.

- Fires were put out only when they pose danger to property and lives. Otherwise fires are left to burn until that fire reaches a point where there is nothing to burn or it extinguishes for some other reason.
- Local tools were used in fighting fires, these are tools that are used in other activities such as farm preparation [hand hoes, pangas, machetes, nyengo], domestic use [buckets] felling of brush and trees [nyengo, pangas, machetes]. Tree branches were used as fire beaters in every village.
- Non participation in fire fighting is punished by verbal warning from local leadership or fines [goats, chicken, cattle, flour, etc].
- Fires lead to loss of lives and property. The villagers were aware that fires are harmful when misused.
- Blame on the youth for ignoring traditions such as rituals for rain or any calamity that befalls the village. The older villagers argue that the youth question forbidden things. In the past when one is told something is forbidden, you do not do it, no questions.
- A chain-of-command<sup>13</sup> exists in every village. In villages such as Mbonile local chiefs<sup>14</sup> and other opinion leaders are still highly respected in the community.
- Awareness that firebreaks help control the spread of Fires from one place to the next.
- Use of prescribed fires to prevent major fire incidents.

### 3.2.2 Differences across villages

- Fire prevention through traditional medicine men<sup>15</sup> is confined to Mzeri in Tanga, Luhimba in Ruvuma and Kifura in Kigoma no in other villages.
- Tourism-induced<sup>16</sup> fires were more significant in Ipole and Kifura in Tabora and Kigoma, respectively.
- Age groups attitude on fire issues; the elderly, middle-aged (40s-50s), and youth varied prominently in Ipole and Kifura more than other villages. The middle and elder people think managing Fires is important while the youth do not show an overt concern on the fire issue.
- Kisasi Kituoni and Kifura border Selou and Moyowosi Game Reserve. There is a blame-game between officials of the game reserves with the villagers around the reserves on who causes Fires in the area. Each group accuses the other for starting fires.
- Variations in tribe [and culture] influence the way villagers view fire. For example, In Luhimba and Mirui if you have not harvested your crops in the farm until August such that your crops burn nobody will be concerned because it is viewed as due to individual negligence. The dry season is a fire season; it is seen as part of the community's regular cycle of events to have fires in the dry season.

It was observed that Fires start with an activity and that fire spreads from one village to other villages. The concentration of fires in the nine study sites seem to occur in areas that livestock keepers have interests.

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<sup>13</sup> The government set up of village, ward, district, region, national leadership chain that enables information flow up and down.

<sup>14</sup> Local chiefs were officially abolished after Tanganyika gained its independence in 1961 but they are still strong in some communities in Tanzania

<sup>15</sup> People who practice this are regarded as witches and non-religious so they do not want to be known by the public

<sup>16</sup> Managers practice prescribed burns that is interpreted as deliberate burning of the forests because that fire occasionally burns village land

The moment grazing interests blend with forested areas, which are managed for other interests fire concentration increases (FAO, 1953<sup>17</sup>) in these areas. The spread of fire depends on the type of vegetation.

Local or indigenous knowledge to prevent, suppress and control the use of fire exist in the nine villages that were studied. There is a variation across villages in the level of emphasis on what has been in practice and has worked. Some village practices that are indicative of preventing fire, fighting it, and controlled use of fire are by default, the practice has been inherited from their parents. The extent of the practice, however, varies because of the cultural differences associated with differences in tribes. As most villagers argued, they blame globalization, and tribal mixing in their villages for not nurturing the practices and the associated punishment for not practicing the latter. For example, it is common now that whenever a fire danger echo or shout has been given for some people not to show up for a collective fire fighting session. The punishment is not that unmanageable particularly to businessmen, who will end up paying the fine and do not feel the pinch of not participating in fire suppression.

Collective fire fighting is indicative of the possibility of revamping the already existing community effort in fighting Fires that seem to be a threat to property and lives. At least in Africa [including Tanzania] community participation is possibly the most sustainable way of dealing with Fires (FAO, 2007<sup>18</sup>). The effort to manage Fires in the community [nine sites] could be taken to another level that would incorporate fire prevention. The latter, however, requires awareness rising (FAO, 2007) of the communities that will be involved in the fire prevention campaign.

One of the ways of preventing Fires in the studied villages would be to improve on the land use and related land cover such that none of the available land will lack any valuable crop or vegetation such as trees for timber or fruit trees. When the value of land increases, which in turn implies, improved livelihood options for an individual or the family, there will be effort to protect it from burning. If the practice is shared in the village, soon or later there will less and less available land to burn.

For the commitment of the local communities to participate in fire prevention, suppression and controlled use require a mechanism that will sustain the effort. One of these efforts would be increasing the benefits that accrue to these villagers when they involve themselves in managing Fires. These benefits may be direct or indirect. Direct benefits may be forest produce [edibles], improved water availability in the village, and bee keeping activities that will provide the villagers with addition income. Indirectly, improved forests may improve the hydrological cycle, the ecological functioning of the forests and the improvement in weather conditions in the area. In villages such as Kifura and Ipole, the more villagers benefit from tourism in the area the more enthusiastic they are likely to be to engage in the management of Fires in their areas of jurisdiction.

At some point villagers may require building their technical capacity, advise on regulatory framework on assistance with logistics (FAO, 2011<sup>19</sup>), which may require outsourcing for what is missing in the community. At this point the value of a strategy that would indicate the role of each party [actors] involved in fire management cannot be underestimated.

Variations in attitude across age are informed by a number of things: the youth may not have seen the changes in the environment that could be explained, in part, by the presence of Fires in their adjacent

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17 FAO, 1953. *Forest fire control*. Rome.

18 FAO, 2007. *Fire management-a global assessment 2006*. fao forestry paper no. 151. Rome.

19 FAO, 2011. *Community-based fire management: a review*. fao forestry paper no. 166. Rome.

forests. The youth, do not realize the immediate benefits of preventing, fighting, controlled use of fires because the practices are labor intensive, sometimes risky, but the rewards are not tangible [at least not to them]. However, most youth have gone to school, they are energetic, may be educated on fire, depending on their flexibility and understanding, they are likely to help a lot in the campaign to manage Fires in their respective villages.

Since local tools are used in preventing, suppressing and ensuring that fire is carefully used, it is easier to replicate. The tools may be made and or improved through training on how to produce them e.g. fire beaters using local material and expertise. Support for some of the needed equipment may be explicitly stated in the management plan where roles and responsibilities may be stated for each of the actors involved.

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## 4 Conclusion and Recommendation

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1. This study has established an understanding of the fire problem in nine villages, each from one district and one region, respectively. Agro-ecological, social, economic and climatic variations among regions and districts and the diversity of tribes influence cultural traits in Tanzania. Cultural traits of each tribe have significant impact on the concern of the villagers on the fire issue.
2. The study indicates the existence of fire knowledge and management in the villages. Community-based fire management should build on the existing knowledge and practices.
3. A broader coverage of villages will provide more information for the development of guidelines for community-based fire management in Tanzania.
4. A regional [Southern Africa/SADC] experience needs to be brought into the Tanzania picture so there is a feedback mechanism in efforts that are implanted in Tanzania and that which is implemented elsewhere in the region. This is crucial because of the presence of cross-border fire incidents, the likelihood of common reasons and uses for fires, similar landscapes and agricultural and livestock activities and the joint effort that needs to be in place to address the fire issue in Tanzania, the region and Africa.

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# 5 Lessons learned and ideas for guidance

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- The study has shown clearly that in the villages which were studied a lot of knowledge and practices related to the use of fire and the prevention and suppression of fires exist. Moreover, the cultural expressions using fire show that fire has been an important part of the economical and social survival of these villages over hundreds of years.
- Where there is influence from strong chiefs [or opinion leaders], initiatives to improve the management of fire should be carefully planned and chiefs and other village leaders must be involved in the whole process. The management of fires should involve all villagers so they own the initiative.
- There is need to tailor fire management practices to particular areas as there are cultural differences among villages that inform day-to-day practices in the communities.
- Fire management initiatives should bank on what the local knowledge communities already know so they do not feel it is a foreign imposition of knowledge onto them. With time room for improving on the practices [blending the local knowledge with modern knowledge] as the villagers realize the importance of doing so.
- An enabling chain-of command and a communication system that could be used to address the fire issue at local level exists. Another important element seems to be the existence of traditional legal framework whereby people have to apologize to the chief and his committee when they cause damage through fire. Traditional punishment for not apologizing or non-participation in the collective community fire management activities exist. Cases are known where the population feared this more than national laws and punishment regarding fire.
- Where farmland land has more value [with planted commercial or fruit trees] villagers are keen to protect that land.
- Where generational differences in attitude towards fire management exist, the youth should be encouraged and motivated to participate in the initiatives of managing fires because it is more sustainable to have the youth involved in the management than not.
- There is need to run fire management in combination with other income and alternative food source projects. In areas where fires are caused by hunting for small mammals, alternative sources of protein through keeping of chicken, ducks, rabbits, goats, etc are suggested. Small projects to support such initiatives may, not only provide alternative sources of protein, but also income, and if it is part of the fire management initiative it is a catalyst for maintaining the enthusiasm about managing fire in the villages. Small projects may be financed through Village Community Banks (VICOBA) or Savings and Credit Cooperatives (SACCOS)
- The need to bring together different tribes from different agro-ecological zones to share their knowledge and experiences [good practices] may help disseminate information on best fire management practices.
- Guidance on fire management may base on commonality and differences, particularly on significant similarities and differences across villages.
- Poverty underlies practices that induce fires in the villages. Using fire is the cheapest option available to the villagers.
- Lack of strong tenure attachment to land instigates the sense of irresponsibility in managing fires in such land areas.
- Livestock keepers require training on improving their breeds so they may keep fewer animals [with high values] that may require less forage area than the current practices that require them to move around with large herds, using fire to stimulate regeneration, etc.

- Females should be involved in the initiatives to manage fire because they are the trainers of the children and the future generation. There should be a deliberate move to encourage them to participate.
- Clear messages on practices that involve the use of fire e.g. prescribed burning in game reserves that border villages should be disseminated to villagers [using the right channel-local radios, village meetings, and ngoma] to avoid the current confusion that the state burns forests, if the state does burn, why the villagers should be concerned.
- There is lack of understanding of the laws and regulation regarding the use of fire, forest fires and some villagers are not aware of their village by-laws. This understanding is important so the villagers know their roles and responsibilities in fire management.
- Many examples of prescribed burning were found in the villages including:
  - in land preparation, management of grazing lands and for other economical and socio-cultural activities
  - to clean areas around villages and other areas of interest to prevent uncontrolled fires from entering in them or to avoid other dangers, like dangerous wild animals, to come too close to settlement.
  - the use of backfires, to stop wildfires or change its direction
- Other fire management techniques are applied such as the creation of firebreaks with or without the use of fire to protect houses and villages from wildfires and to prevent the escape of fires when used (land clearing, honey collection, etc).
- The existence of fire management practices and existence of knowledge, like the use of branches from specific slow burning species as fire swatters and skills of fire management which have developed over hundreds of years needs to be nurtured.
- The study was not exhaustive for all the tribes and/or villages in the country and more studies can be undertaken to get a better insight how the communities are dealing with fire. The study undertaken can also be followed up by a more in depth analysis in the same villages.
- Among the most important conclusions of this study should be that that fire management activities, from projects or other, in the regions or districts when working with the communities should start first with a trying to understand what people already know and are doing to avoid the negative impacts of wildfires. Building on this, improved techniques can be sought to help the communities improve their capacity to diminish negative impact of wildfires on their and other livelihood.
- The development of a guidance tool for integrated fire management, including prevention, preparedness, suppression and restoration, at the community level should be considered not as a blueprint to implement but full of inspiring alternatives of existing communities' elements to take into consideration and alternatives to strengthen their capacities. Such a tool might be developed for Tanzanian but also at the SADC level.
- It goes without doubt that this does not mean that local governments, projects and Non Government Organizations do not have to wait till such guidance tool exist before starting activities in Community Based Fire Management. But, when starting such an activity first they should try to find out what communities already are doing and knowing before telling them what to do.





