Refocusing on Community-Based Fire Management (A Review)

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Abstract. Forest fires do not only destroy the forests, it endangers public health, disrupt socio-economic activities, and contribute to greenhouse gas emission but do more harm than good to the ecosystem. A greater percent of forest fires occurring in the world, especially developing countries have been identified to have human causes. Land use was identified as number one cause while others like conflicts and human errors follow as reasons for which people burn the forest. Governments and cooperate bodies have invested much in solutions that largely control these fires rather than preventing them. This approach has yielded results that do not match the investments. It is in view of this worrying situation that this review was carried out to reassess the prospects of Community Based Fire Management (CBFiM) system as a critical component for achieving an effective integrated forest fire management. The work is structured into four sections, section one introduces forest fires and discusses general causes, and prevailing management tactics, section two discusses CBFiM and its potentials, section three follows up with case-studies from USA, Vietnam, and Ghana, the fourth section concludes with ways of enhancing the CBFiM system to make it more effective.

1. Introduction

Fires have been and would continue to be an integral part of our ecosystem thus making their absolute extinction close to impossible [1]. They can be a good servant but a bad master if not managed appropriately. Wildfires assume different kinds of names depending on the nature of the vegetation and topography of the place under fire, this gives rise to names such as brush fire, bushfire, desert fire, forest fire, grass fire, hill fire, peat fire, vegetation fire, veld fire, etc [2]. Regardless of the name or kind, one thing common to all forms of fire is the reliance on the three conditions of fuel, heat, and oxygen (fire triangle) for their initiation and sustenance [3].

Positive functions of forest fires do exist: such as land management tools, keeping the population of the ecosystem in check and ultimately maintaining the health of certain ecosystems [4]. But these positive sides have been marginalized due to the uncontrolled and unmanaged manner of the burning. Forest fires can also be used to relieve the natural vegetation from the aggressive rivalry of relatively newer species thereby favoring the more diverse, robust and less flammable species, also including species adapted to future draught fire conditions [5]. In other instances, pest control, suppressing of weed growth, encouraging the

growth of new species, and restoration of nutrients into the soil through decomposition were also identified as benefits that could be derived from forest fires [6]. Negative ecological effects due to alien species invasion have been forecasted to occur in ecosystems with insufficient wildfire [7]. The positive benefits of these wildfires have however been solely associated with fires resulting from natural causes but not manmade [8]. The Causes of forest fires are largely categorized into two: natural and manmade causes. Natural causes of forest fires usually include but not limited to dry climate, lightning and volcanic eruption, while manmade causes result from arsons, negligence, cultural practices in communities, etc. [9]. Accidental and unrestrained use of fire for agricultural land clearing has also been widely reported to be one of the leading causes of forest fires, especially in African and Southeast Asian countries [10]. Human carelessness has also been reported as a major cause of forest fires in China and the Mediterranean Basin [11] [12]. Regardless of the source or initial cause of forest fires, the impact is largely determined by the duration and intensity. Neary [13] defined the severity of fire as a product of intensity and duration of the fire. Although the destruction of forest and other physical properties may be the most noticeable adverse effect of wildfires, the release of hazardous chemicals from the burning of fuels leaves a more lasting and devastating impact on human life [14] [15]. In worst-case scenarios, forest fires could also trigger industrial accidents known as Natechs [16]. Natech simply refers to natural disasters that trigger industrial or technological disasters. A typical example of Natech is a forest fire that goes out of control to cause the burning of a manufacturing industry nearby.

Many countries in recent times have invested in several counter approaches to manage the menace of forest fires. These range from high-tech early monitoring systems, cloud seeding, aerial fire control gadgets to fire impact assessment tools. These investments usually burden the national budget and leave very little to be invested in preventive management options that involve the local people and leaves other spillover social benefits. The modus operandi has yielded very little success story in the management of forest fires.

Based on the above premise, this review work was carried out to throw light on the potential and need for investment in a community-based fire management approach. The rest of the work is divided into three parts: part two discusses the subject of community-based fire management and its role, part three gives sample country CBFiM stories, part four concludes with lessons learned from the various countries' approaches.

2. Community-Based Fire Management (CBFiM)

Communities are mostly the targets of blame by forest and fire management authorities in the event of forest fires but are barely invited to the discussion table to brainstorm solutions. The term community-based fire management (CBFiM) was coined by Sameer Karki at the Regional Community Forestry Training Centre (RECOFTC) in Bangkok in 2000. The lower case "i" is used in the acronym to distinguish it from community-based forest management (CBFM) [17]. Global Fire Monitoring Center (GFMC) In 2003 defined CBFiM as a fire management approach based on the strategy to include local communities in the proper application of land-use fires (managed beneficial fires for controlling weeds, reducing the impact of pests and diseases, generating income from non-timber forest products, creating forage and hunting, etc.), wildfire prevention, in preparedness and suppression of wildfires. This same definition was later adopted by FAO in 2006 [10]. In an attempt to make the subject more specific and tailored, other terms such as Community-Based Forest Fire management (CBFFM) were also introduced. Even with the introduction of these specified options some still prefer to just use terms like Integrated Forest Fire Management IFFM or better still Collaborative Forest Fire Management to describe the same subject [18].

To the average local person, the use of fire has become an inherent part of their life and is considered almost indispensable. Typical of African and Southeast Asian countries, fire is used in slash-and-burn as a tool for farmland preparation [19] ;[20]. This burning is purported to enhance the fertility of the soil through

the addition of phosphorus, potash, and nitrogen [21]; [22]. The burning of pasture lands also increases the development of new and palatable shoots for feeding cattle and other livestock.
In the CBFiM system, it is not all about the local communities taking full responsibility in helping to manage forest fires, but the need for the community's role and capacity to be recognized and supported by external institutions like government, NGOs and other cooperate bodies. Despite the inherent abilities of the local people, there is the need for an intentional, well planned and coordinated character modification programme from these external bodies to the communities. A kind of social reform approach that will support the local people and instill in them a character of responsibility and the innate zeal to continue and sustain the programme.

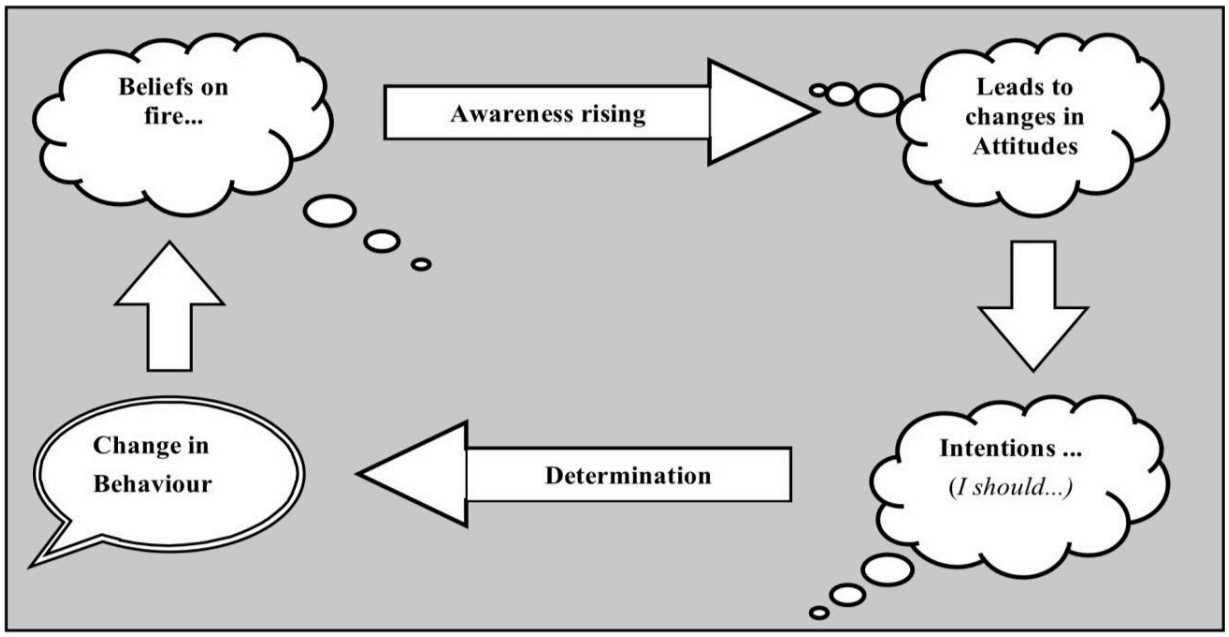

Figure 1. Theory of reasoned action) applied to raise fire awareness [23]

The cultural values, opinions, beliefs, attitudes, and norms of people can be considered as vital ecological values in community fire management. Making the local people to be involved in managing community fires and getting their full consent is a lengthy fundamental process, which can take several years to attain (figure 1)[24]. The unpredictable nature of human behavior makes planning such programs quite intensive and demanding in terms of time and other resources. The system also calls for a multifaceted approach and demands the contribution of divers stakeholders. This becomes imperative because any form of negligence along the process can cause total failure of the programme. Governments and institutions that seek to organize such programmes are obliged to package the programme in a very attractive manner to the local people. The manner in which the programme is presented to the people is important because members of the community usually look out for their individual benefits in a programme prior to making decisions of acceptance or rejection [25].

3. Sample Country CBFiM Stories

CBFiM is considered in most regions of the world as an integral component of efforts in managing forest fires. The level of effectiveness and success differs per region, country and even per community. The factors that influence the success rates include issues like supporting policies and legislations of the country, the

land tenure systems at work in these communities [19]. In addition to these general factors, the socioeconomic, political and cultural dynamics at play in the communities also plays a role

3.1 Ghana

In Ghana, the community rules and regulations for managing wildfire are centered on prohibition and suppression [26]. The prohibition agenda is carried out through the establishment of local rules or taboos that forbids the people from undertaking certain acts. These rules and taboos prevented community members from setting fires close to shrines and also from carrying out group activities that require the use of open fire when the environment is dry and prone to burning. Defaulters of the set rules were liable to heavy fines and other social penalties from their leaders and the inhabitants. More often than not, these rules do not have legal recognition but rather linked to religious or spiritual beliefs. Nonetheless, most of them have proven to be more effective in achieving results as compared to government rules that are set to protect the forest from fires and other destructive activities. In cases where there is the need to undertake some of these prohibited activities for obvious reasons, they are done with permission and supervision from fire volunteer groups. In addition, community programs for managing fires were strategically designed to also promote and instill in members a sense of individual responsibility and obligation towards the protection of natural resources from wildfires. The effectiveness of these local rules validates the resilience of local rules in terms of protecting natural resources [27]. As part of fire risk indicators, factors that were considered to raise red light included prolonged drought, strong *harmattan* winds, excessive shedding of tree leaves, etc. Tools traditionally employed in fighting wildfires include branches of neem and palm tree, sticks, sandbags, buckets mattock, and cutlasses. Water pumps are seldom used. In addition to the mechanical approach, techniques of silviculture that reduces fuel load in the forest are also extensively used by some communities.

In recent times, there has been the formation of the Rural Fire Division of Ghana National Fire Service (GNFS), the Forestry Commission in collaboration with the Ghana National Fire Service through this division often trains communities to acquire basic skills in fire suppression as well as pre-suppression and restoration activities. Another great stride in the improvement of community-based fire management is the introduction of a training manual for community fire organizations in 2004 by the forestry commission of Ghana. The key objective for producing the manual was to promote and provide technical and practical training for rural communities in the area of wildfire prevention and suppression [28].

3.2 USA (California State)

Expenses for community-based fire management in California is covered by state and federal government funds and released upon request from non-governmental parties and local association of the communities under the umbrella of a local collaborative "Fire Safe Council." Records of fire events can be accessed from relevant state and federal government agencies and local fire departments. One of the best and effective tools for deriving and examining general information about fires, fire prevention and responses from personal narratives and official records is to present the information on thematic maps which were initiated by NGOs rather than the state: a development that has greatly empowered communities that previously used to be marginalized thereby causing them to take responsibility for managing their local issues [29]. Technologies of mapping which previously used to be exclusively controlled and monopolized by powerful central governments and resource corporations are now available for use by the Community organizers, who develop alternative maps that truly reveal local communities' understandings of their landscapes and resources [30]. In the event of emergency fires in many rural areas, Volunteer Fire Departments (VFDs) who live in the locality become the first to respond to these emergencies. Community land managers mostly help to equip the VFDs and maintain very good communication with them. Sometimes when fires occur, local residents gain some short-term employment as firefighters or work as support staff providing food and

facilities for the firebase camps. Nevertheless, most would choose to waive the opportunity for such additional income and support fire managers willfully [31].

3.3 Vietnam

Vietnam had a total land area of 32.9 million ha in 1999, 10.9 ha of this is forest (9.4 million ha natural and 1.5 million ha plantation forests). At a point in time, a national economic development was carried out in which the government of Vietnam decided to improve the management and protection forests through the allocation of forestlands to organizations, households, and individuals to put to long-term sustainable uses. This policy came out as one of the most effective programmes, and has resulted in a remarkable identification of forest fire sources, development of forest fire prevention and control, and improvement in the welfare of community dwellers, especially those in the mountainside. The programme directly and remotely influenced the lives of some 25 million inhabitants dwelling in and around the forest. Currently, around 50,000 villages in 9,000 communities with forestlands can be allocated, apart from their traditional community forests. Management systems put to use in these forests generally integrate forest preservation and forest plantation development. In recent times, efforts put in place by the villagers to check logging, grazing, bush burning, and other destructive activities in forested areas have benefited the communities immensely [19].

4. Analyses of CBFiM stories

Despite the varying nature of the CBFiM stories from the various countries, there is an element that is common to all. Though the plans and strategies were implemented through diverse mechanisms, support from the central government towards activities of the communities extant in all the stories. Very clear structures were laid in place to create a smooth channel for the transfer of resources and external aid of any form to the community people. The establishment of a rural fire division in the Ghana national fire service created a bridge that enhanced the flow of not just financial assistance but also synchronized the high-tech management options at the state level with the local wisdom and skills of the community people. The active involvement of the local leaders and stakeholders helped to create an immediate check and control system on the character of the people. It also smoothens the process of instilling new positive lifestyles in the people. In the case of California (USA), the government's commitment and readiness to support and empower the local people was demonstrated through the massive financial support and delegation of tasks and operations to be handled by the community people. The capacity of the people has been developed to handle forest fire cases themselves, unless for extremes of cases, though these may be impractical in most developing countries due to low levels of literacy and other cultural and socioeconomic factors. Vietnam, on the other hand, was focused on reformulating its lands and forest ownership laws. A practice that is similar to community-controlled state forest (CCSFs) in which communities were responsible for the management of state-owned forest adjacent to their communities. Aside from the people receiving support from the government and the responsibility for managing the forest, the approach also developed sense belongingness in the people towards the management of forest resources. This practice reiterates the fact that the phrase" community based" does not limit the system to the sole operation and running of the local community dwellers, but rather an integrated system where the community is given its due role to play but their operations are supported massively by the government and other external agencies.

5. Conclusions

From the discussions carried out, it is clear that majority of forest fires are caused by human beings through reasons like; burning for agricultural land preparation, negligence, etc. The management approaches has so far been centered on suppression which often comes at a huge cost. Though suppression strategies do play a part it will be more effective if blended with the acceptance and participation of the local people. This

inclusive approach guarantee results because it employs the tactics of character reformations which is important in keeping the programme sustained and running with little resource investments.

The CBFiM also carries other spill-over benefits such as the provision of jobs for the unemployed youths and creations of systems for settling community disputes. These benefits in turn also lead to a reduction in forest fires resulting from arsons and disputes.

Finally, building collaboration with countries that have similar problems can also be a good way of learning from their approaches.

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