

# Fire Management on Rural Lands in Burkina Faso

A community-based approach





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## *A Community-based Approach*

**T**his booklet presents the new community-based approach to fire management in Burkina Faso. It is addressed to policy-makers and practitioners in different sectors of rural development.

Fire management in Burkina Faso has taken giant steps since the late 1990s:

- The legal framework for the utilisation of fire in rural lands was established already in 1998 and it will shortly be updated to take account of the implications of the decentralisation process.
- A community-based fire management approach was developed and tested in Burkina Faso from 1998 until 2006 through the project “Fire Management on Rural Lands of Burkina Faso”. It was initiated and institutionalised in more than 360 villages in four regions of the country (East, Boucle du Mouhoun, Hauts Bassins and South-West). The project was jointly funded by the governments of Burkina Faso and Finland.
- In 2006 a National Fire Management Strategy and related Action Plan was drawn up and it will shortly be adopted by the parliament.
- A plan exists to establish an Inter-Ministerial Fire Management Committee to monitor the implementation of the Action Plan. The main responsibility lies with the Ministry of Environment, in particular with the Directorate of Forestry.

Until now the new approach has been extended to only some of the provinces in four regions. It is of the utmost importance that community-based fire management should be adopted in the near future in all the provinces which have problems with uncontrolled fires.

*In short, **fire management on rural lands** is a set of techniques, activities and arrangements that are planned and implemented in a participatory and concerted manner by communities in their land, with the objective of using fire as a tool for sustainable management of natural resources. The aim is to realise a change in collective and individual behaviour concerning the utilisation of fire: it is a compulsory condition for sustainable natural resource management.*

*National Fire Management Strategy  
of Burkina Faso, 2006*

## Summary of the “Fire Management on Rural Lands of Burkina Faso” Project\*

In the 1990s, the political framework and paradigm changes in Burkina Faso evolved toward participatory and decentralised work modalities in forestry and fire management (Chapter 3). In 1998, the government of Burkina Faso presented a proposal to the Government of Finland for financing a component of the campaign to manage bush fires. The contents of the project are summarised below since this project was the driving force in developing the new approach.

### What was the Project about?

A study that had been conducted by the Regional Remote Sensing Centre of Ouagadougou (CRTO) during the dry season 1986-87 showed, amongst other things, that the Regions with the highest number of uncontrolled bushfires in Burkina Faso were the Cascades, the Hauts Bassins, Sud-Ouest, Boucle du Mouhoun, Centre-Ouest, Centre-Sud, Centre-Est and Est. A whole Region was, however, considered to be too large an entity for implementing activities. Therefore, the village or village cluster level became the basis for the Project in two provinces that belonged to two Regions with high incidence of bushfires.

The primary selection criteria for villages were the following:

- satisfactory level of organisation (men, women, children)

- frequent fires or high risk of fires threatening agriculture and pastoral resources
- evidence and awareness of degradation of natural resources
- accessibility
- potential natural boundaries, e.g. rivers, highways
- good sensitivity and commitment of traditional authorities

The provinces and departments were chosen with the collaboration of Regional Environmental Directors as well as provincial and departmental administrators.

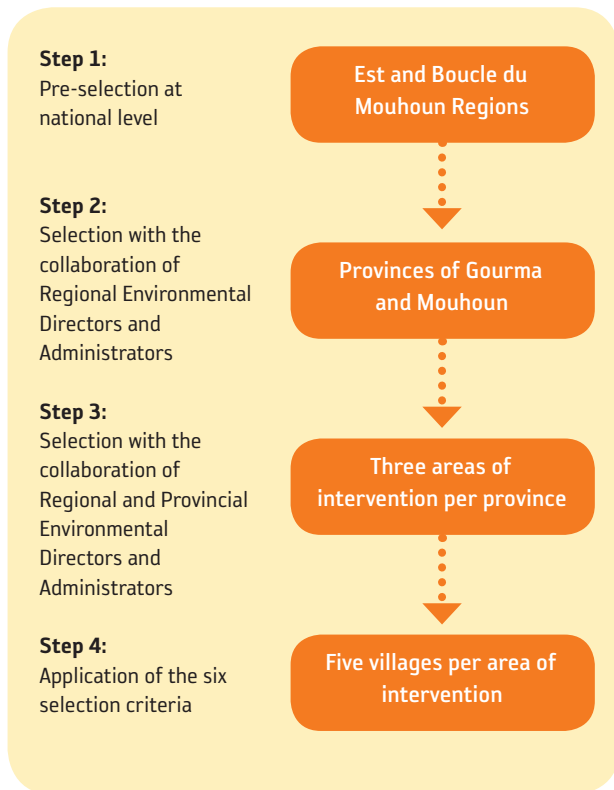
#### **Bushfire (wildfire, uncontrolled fire)**

*is any fire burning out of control !*

**Early fire (controlled fire)** is a less intense fire that burns at the beginning of the dry season when the grass cover has just started to dry. An early, controlled fire can be lit to reduce the biofuel load and consequently the risk and intensity of destructive late fires!

**Late fire** is an intense fire taking place at the peak of the dry season, when the grass cover is already completely dry. Late fires are not recommended due to their destructive effect on vegetation and soil.

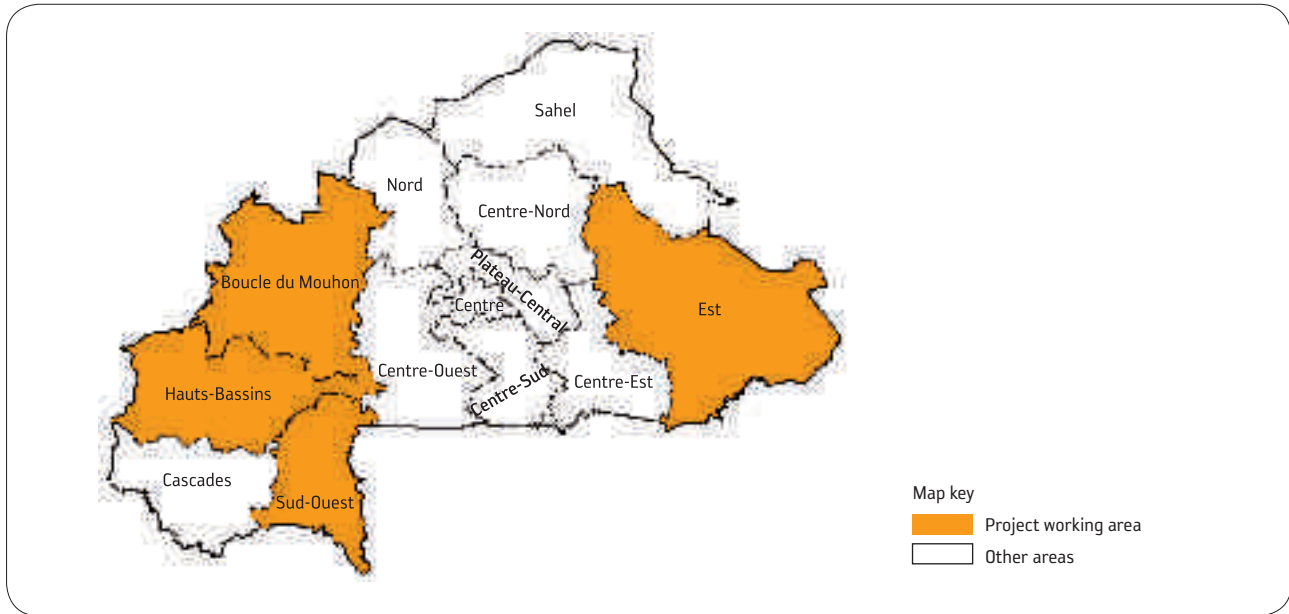
\* *Projet Gestion des Feux en Milieu Rural au Burkina Faso, referred to hereafter as “the Project”.*



**The pilot phase (1998-2001) of the Project** covered only one fire season. The activities carried out with 30 village communities within two regions (Est and Boucle du Mouhoun) quickly showed the potential for sustainable management of fire in rural areas. The villages demonstrated the ability to prevent uncontrolled fires, to use fire in a controlled manner, to protect their lands against fires, and to extinguish fires that occurred. With better control of fires, some villages started activities for better management and use of the natural resources they protected.

Villagers attested to immediately benefiting from the project through increased availability of grass (for cattle fodder, thatching, and sale), and improved fruit tree production in the bush areas. Migrant herders changed their seasonal grazing patterns in response to the increased fodder in the pilot zones. A number of villages outside the project joined spontaneously with project villages to learn the techniques for application in their own cases, or asked to be included in the project.

Building on the experience and achievements of the pilot phase, **the second phase (2001-2005)** replicated and further improved the approach and the technology in some 360 communities in four regions, with the inclusion of areas in the Hauts Bassins and Sud-Ouest Regions. Based on a participatory planning approach, implementation involved a simple strategy, locally available tools, and fire management techniques that could easily be taught to inhabitants of rural areas, both men and women, in short training seminars.



Map 1. Working areas of the Fire Management Project

The Project was implemented by six project-employed extension agents and 45 foresters working in the local Forest Service. The Mid-Term Evaluation of the Project in 2003 confirmed that the project was rapidly achieving its objectives, the numbers and areas of harmful late fires were being reduced, and community fire management was being institutionalised as a viable, permanent system.

During the last, Institutional Support Phase (2005-2006), a national fire management strategy and related action plan were drawn up, and the responsibilities for implementation were transferred completely to the national organisations. Civil society and its organisations, including newly established rural communities, were identified as important implementers of the strategy.

## Bush fires and burnt areas in Burkina Faso

The adverse impact of bush fires on the productive capacity of soils in Africa – particularly in the Sahel and savanna regions – and their influence on long-term desertification is well established. Nevertheless, large areas of forests and shrubs continue to be lost year after year to bush fires all over the continent, undermining the long-term capacity to sustain agricultural and forestry production.

Fire has been used for centuries as a management tool in most African agricultural and pastoral systems. Growing human populations and food production requirements reduce, however, the length of fallow periods, and inappropriate fire legislation increases the frequency of destructive late (dry season) fires. In this situation, the potential benefits of fire as a management tool can be outweighed by the negative impacts of late fires on soil fertility, leading to long-term declines in productivity.

Especially in West Africa, soils are very fragile and the use of fire to access new fertile soil (slash-and-burn agriculture) is not always sustainable. Moreover, fire has a huge impact on atmospheric carbon through long-term reduction of stored carbon and reduction of ecosystem carbon sequestration capabilities.

Usually the bush fires are divided into two categories: those of natural origin and those of human-caused origin. Natural fires are fairly rare, and almost all the fires are initiated by people. A common cause is fire escaping from the control of farmers, honey collectors, potassium producers and charcoal makers, or from bush camps where fire is not handled with sufficient care. It is also

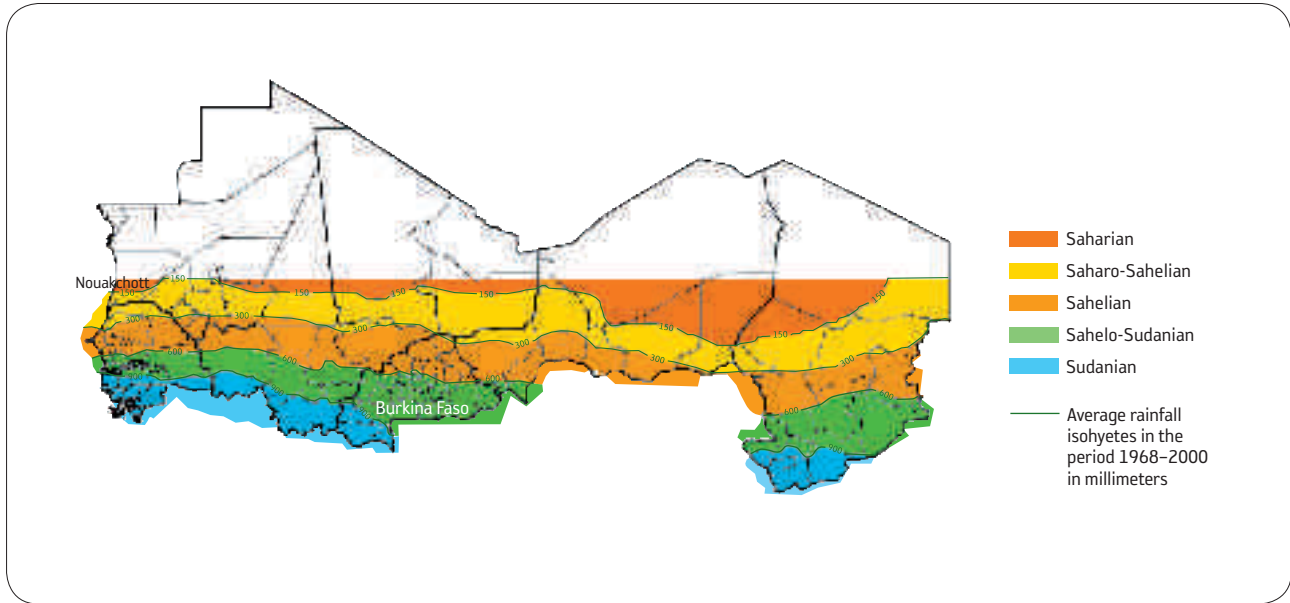


*Bushfires advance rapidly in the peak of the dry season.*

common that fire is used to try to protect the environment from reptiles or from thieves, to renovate pasture, in hunting, or for other reasons. Both women and men start uncontrolled fires, as well as children who handle fire carelessly.

A study made between 2001 and 2004<sup>1</sup> for the Programme National de Gestion des Terroirs (PNGT)

<sup>1</sup> Diébré Régis ; 2005. *Cartographie des feux de brousse à l'aide d'images AVHRR NOAA (LAC), VEGETATION SPOT, ETM+ de LANDSAT des campagnes: 2001-2002, 2002-2003, 2003-2004 pour le Burkina Faso. PNGT, Ouagadougou, Burkina Faso.*



Map 2. Vegetation and climate zones in the Sahel.

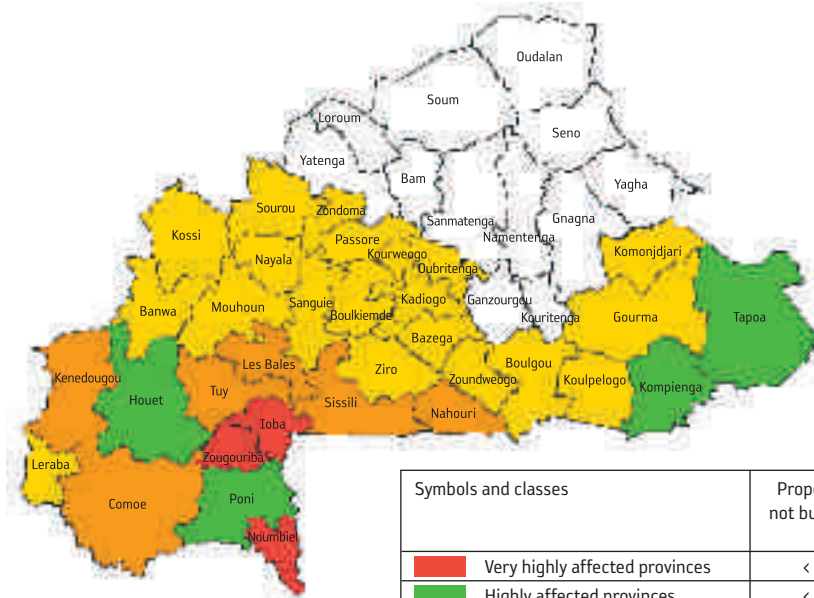
shows that about 21 % of the areas with vegetation prone to fires burn every year. Apart from some provinces in the Sahel and in the northern region, early burning or late fires are registered in the whole country. Nevertheless, during the 1980s and 1990s the burnt area covered almost half the country.

The map above shows the Sahel climate zones and precipitation levels in the Sahel area between 1968 and 2000. In 2000, the northernmost part of Burkina Faso

received only 300 mm of rainfall, while the area around the capital Ouagadougou had an annual rainfall of around 600 mm during the rainy season between June and October.

As can be seen from the following map, bush fires are commonly located in the western, southern and eastern parts of the country. In these areas the amount of grass biomass is high, but in central Burkina Faso bush fires are less frequent due to the discontinuity of grass cover.





| Symbols and classes   | Proportion of not burnt areas | Proportion of late burnt areas in dry season 2001-02, 2002-03, 2003-04 |
|---|-------------------------------|--|
| <span style="color: red;">■</span> Very highly affected provinces   | < 95 %                        | > 1 %  |
| <span style="color: green;">■</span> Highly affected provinces  | < 95 %                        | 0,51-1 %   |
| <span style="color: orange;">■</span> Moderately affected provinces   | < 95 %                        | 0,11-0,5 %   |
| <span style="color: yellow;">■</span> Slightly affected provinces   | < 95 %                        | 0-0,1 %  |
| <span style="color: white;">■</span> Not affected provinces   | > 95 %                        | 0 %  |
| <span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Limits of the province |                               |  |

The Map 3 shows that in certain provinces late fires are common every year, while some other provinces are almost completely saved from recurrent fires, especially from the late ones. The provinces that burn frequently in the peak of the dry season are the ones that have large spaces with plenty of biofuel: south-western and east (Sud-ouest and Est regions) parts of the country actually have most of the conservation and protected areas. On the contrary, the areas with very few late fires are the ones in the north and central Burkina Faso. In these provinces, the demographic pressure (centre) and the climate (north) have contributed to reduce vegetation. In the central Burkina Faso, agriculture is practised almost everywhere, while in the Sahelian north the population has gained awareness of the destructive effect of late fires in the vegetation.



*A forest after a late dry season bushfire.*

In the north, bush fires are rare as grass is continuously exploited to feed the animals.

Fire is also used in various ways in traditional ceremonies and rituals, and this has to be taken into account when developing a fire management approach, setting up committees or planning a fire management calendar in the village. Very often the cultural manifestations which call for fire to be used occur only once a year, marking the decisive moments in activities for different socio-professional groups and also in the mythical-religious practices which form the basis of traditions and customs.

Usually the cultural use of fire is controlled by traditional chiefs. The use of participatory planning methods has helped to ensure that these cultural uses are discussed openly and taken into account when making decisions. This also allows the positive participation of chiefs in formulating strategies for fire management, drawing on their knowledge and authority.

Many individuals and communities are aware of the negative consequences that bush fires have on their natural resources. But action to combat them has been difficult due to the stigma of the old law outlawing the use of fire, as well as to lack of organisation, lack of skills, and lack of proper tools and protective clothing.

## Legal, policy and institutional framework

The policies and legislation regulating the use of fire have followed the changes in the paradigms of natural resources management, particularly those of forest management.

*Pre-colonial use of fire* in Western Africa is relatively poorly understood, and only during the last twenty years has more specific research on West African savannas been conducted. There is evidence that local resource users have played a crucial role in moulding the landscape and creating savanna-type vegetation through different practises, including the use of fire as an important resource management tool<sup>2</sup>. The study made by Bird and Cali (1998) suggests that humans have actively developed fire-related practices in Sub-Saharan Africa during at least the past 10,000 years, and that the vegetation zones considered as “natural” vegetation are often the result of human interference. Other studies show that the use of fire has a long tradition in many societies of Burkina Faso.

*Colonial policies* can be differentiated as belonging either to the early or to the late colonial period. In the *early colonial period*, the destructive influence of bush fires was the predominant idea, and forest policies were generally based on three key principles<sup>3</sup>: state ownership and control of the (assumed) “vacant” forested lands; exclusion or

restriction of local communities’ access to forest reserves; and the use of sanctions. In Burkina Faso (known at that time as Upper Volta) a decree dated 4 July 1935 encouraged fire monitoring and the use of early burning in natural forests. The *late colonial period* (1940-1960) saw the consolidation of national forestry departments in West Africa, and the networks of forest reserves were expanded. Forest reserve boundaries were maintained by cutting firebreaks and using early burning. Some investigative research on the use of fire was carried out.

After *independence* (in the early 1960s) the new national governments were keen on centralising their powers and modernising agriculture, often undermining the small-scale resource users. The use of fire was criminalised in all West African countries, but at the same time the forestry administrations lacked resources to enforce the legislation. A major drought hit the Sahel region between 1968 and 1974. This resulted in an increase of labour force migration, but also in an increase in projects and programmes, especially in the environmental and natural resources sector. The number of NGOs also expanded considerably in the early 1970s, contributing to the entrenchment of the concept of participation, and village groups boomed as well, being originally formed to organise the reception of food aid given to famine-prone villages.

Order No. 81–0012/PRES/MET of 3 June 1981 resulted in the complete prohibition of bush fires in Burkina Faso. Even early burning in protected areas was stopped, although some trials to study the impact of fire on natural vegetation were started in state forests. The results of

<sup>2</sup> Fairhead, J. and Leach, M. 1998. *Reframing Deforestation. Global analysis and local realities: studies in West Africa.*

<sup>3</sup> Wardell D.A. et al. 2004. *Fire history, fire regimes and fire management in West Africa: An overview.* In: J.G. Goldammer and C. De Ronde (eds), *Wildlife Fire Management Handbook for Sub-Sahara Africa.*



*Trials have been conducted in sample plots to establish the impact of late and early fires.*

these trials showed that it would be wise to practise early burning as a silvicultural measure in natural forests, as well as in areas with high and dense grass cover, to avoid violent bush fires during the peak of dry season.

In 1985 a campaign against forest fires (*La Lutte contre les Feux de Brousse*) was launched to mobilise popular support for fire fighting as part of a tripartite environmental campaign (*Les trois Luttes*). The strictest law, criminalising all bush fires, was in force in the period

1981-1987. To support the law, fire-fighting committees were created at village, department, provincial and national levels. The harshness of the law created serious distrust between local populations and the authorities, jeopardising any cooperation in combating fire.

Only in 1997 was the forestry legislation modified, while the governmental decree issued in 1998 (No. 98-310/PRES/PM/MEE/MATS) further specified the law concerning bush fires. The new development was boosted by different inputs emanating, on one hand, from the promotion of village forestry and local participation approaches, and, on the other hand, from a number of scientific studies. In the 1980s Burkina Faso became a leading country with regard to participatory development, and a laboratory for participatory techniques such as *Méthode GRAAP*<sup>4</sup>. In 1986-87 the Regional Centre for Remote Sensing made a study of the times and burnt areas of bush fires occurring during the dry season (see also Chapter 1). The game ranch at Nazinga made notable contributions to understanding the importance of the time of year when fires occur. The studies showed that fires reached a maximum between December and February, and that later fires, though less numerous, were extremely destructive.

Later research conducted by the National Research Centre (CNRST), the National Centre for Forest Seeds (CNSF) and a number of researchers working with dif-

<sup>4</sup> *GRAAP is the French abbreviation for "Research and Action Group for Peasants", and Méthode GRAAP was developed in the 1980s as a participatory method to stimulate the consciousness of rural people.*

ferent projects clearly confirmed the importance of avoiding late fires. The practice of setting early fires, before the grass dries out, was proposed as the best method to avoid late fires. The World Bank was particularly instrumental in promoting a new approach to bush fires. The Bank financed studies on the sociology, economy, policies, and ecology of fire. The studies concluded that:

- Fire has an important social character,
- Bush fires destabilise local economies,
- Fire policies have evolved in relation to the context and the perception of the authorities,
- The effects of fire affect different subsystems of the ecosystem, giving fire a complex character.

## Terminology

### Customary fires

Customary fires are started and controlled in a determined area with the objective of respecting the needs of tradition, in collaboration with forestry service and the local authorities.

### Management fires

Management fires are controlled fires used for management purposes. They include fires for land clearance, early burning fires and technical management fires.

### Technical management fires

Technical management fires are fires used to renovate pastures or to conserve and protect pastoral areas, national parks, wildlife reserves, state forests and protected forests.

### Land clearing fires

Land clearing fires are set to clear land for agricultural purposes.

### Bush fires

Bush fires are uncontrolled fires of any origin in rural lands.

### Controlled fires

Fires started for specific management purposes or for

customary needs in accordance with measures that allow controlling its spreading.

### Uncontrolled fires

Fires that are not controlled by anybody.

### Early burning

Early burning fires (feux précoces) are controlled fires started at the beginning of the dry season for the purpose of reducing the biofuel load and consequently the risk and intensity of destructive late fires.

### Late fires

A fire is called late if it is started when the vegetation is completely dry. This period varies according to the bioclimatic zone.

### Control line

A control line is a firebreak created to prevent the spreading of a controlled fire.

### Firebreak

A firebreak is an obstacle that prevents the spreading of a bush fire. It can be natural, such as a river, or artificial, such as roads, weeded strips, green strips etc.

## Decree No. 98-310/PRES/PM/MEE/MATS

*This decree “on the utilisation of fire in rural lands in Burkina Faso” makes a clear-cut break with the past by authorising or prohibiting the use of fire according to the circumstances. It identifies the different types of fires in rural lands and groups them in three categories:*

- bush fires
- management fires
- customary fires

*It also defines the responsibilities of “fire users”, recognising clearly that fire is a tool and certain conditions have to be respected when handling it.*

*Bush fires are uncontrolled fires and they are prohibited in the whole country.*

***Management fires** are of three types: **field burning** (for clearing crop residues or clearing land) can be practised in agricultural areas under the responsibility of the user, while **early burning fires** can be authorised by the Ministry of Environment and practised under the responsibility of village land-use management committees and traditional authori-*

*ties. Early burning fires are lit at the beginning of the dry season to prevent bush fires. **Technical management fires** are used for regenerating pastures or to protect national parks or forest and wildlife reserves. In-depth knowledge of the type of vegetation and its capacity to regenerate in different sites and periods of the year is necessary.*

***Customary fires** (lit and controlled in determined areas to respect traditions) are practised under the responsibility of traditional authorities after informing the forestry service or village land-use management committee.*

*The decree further defines the general rules for using fire (weather conditions, behaviour of fire users), the participation of the local population in fire management through their committees, and the penalties for offenders who break the law.*

In 1996 a national bush fire seminar was organised with support from the World Bank, followed in 1997 by a National Forum on bush fires, which was actively attended by representatives of villages and traditional chiefs. During these events the phenomena of bush fires was analysed from different points of view and the term “bush fire fighting” was changed to “fire management on rural lands”. Another outcome of the Forum was a proposal to the Government of Finland for financing a component of the campaign to manage bush fires. In addition, the forestry legislation was reviewed and revised to define the acceptable uses of fire and assign responsibility for its controlled use to the local communities.

### **The institutional framework: administration and decentralisation**

In Burkina Faso two kinds of administration continue to exist in parallel: the old leadership with traditional chiefs, and the modern administration working through the national government.

The General Code of Sub-National Government (Collectivités Territoriales) provides the legal and institutional framework for the decentralisation process that was recently started in Burkina Faso. In accordance with this framework, political responsibility for the management of local affairs (including natural resources management) will be shared with the Regions and Communes.

In March 2006, municipal elections were organised in all Rural Communes (a total of around 300), and these

#### ***The areas of competence of local authorities with regard to Natural Resources Management include:***

- *Preventing and combating bushfires*
- *Law enforcement with regard to bushfires*
- *Implementing protective and forest management measures within their competence*
- *Determining specific sanctions for forest offences*
- *Signing conventions with the regional forestry administration to ensure forest law enforcement.*

#### ***There are two ways of organising these responsibilities:***

- *Through a concession – a contract between the Commune and a contractor (private, group, association etc.) when the area is under the competence of the Commune, or between the Forestry Administration and the contractor if the area is under state management (classified as state property)*
- *As the direct responsibility of the Village Development Committee.*



are now responsible for ensuring the organisation, follow-up and control of local natural resources management through Regional and Communal Councils as well as through Village Development Councils (VDCs) representing each village within the Commune.

Fire management now falls directly under the responsibility of the local authorities in statutory, fiscal, technical and institutional respects. The transfer and consolidation of these responsibilities remains a great challenge for community-based fire management in Burkina Faso.

### **Government organisations**

At government level, the organisation of fire management in rural areas in Burkina Faso is the responsibility of Directorate of Forestry in the Ministry of Environment. A special Fire Management Unit was created in the Directorate for the handing over of Project activities in 2005. The Directorate is now active in fire management issues and monitors the work as standard procedure, following the implementation of the national Fire Management Action Plan and the preparation of regional action plans.



## Fire Management Approach in Burkina Faso



*Village organisation and participation are one of the key principles.*

- **Key issues in the Fire Management Approach in Burkina Faso**
- **Integration of fire management as a useful tool in natural resources management (NRM).** Fire management is an important component of NRM because natural resources have to be protected from devastating impacts of late fires. In practice it has been demonstrated that fire management is not only a *sine qua*

*non* for NRM but also an excellent entry point to assist people in developing more rational and sustainable use of resources in their land. Local communities have traditional knowledge and methods that have long been used when using fire for natural resources management. These serve as the foundation for improved fire management techniques, and they can be considerably improved through training that helps people to understand and manage fire and its impacts.

- **The understanding that fire management in Burkina Faso is essentially a matter of organisation and participation.** Fire management has to be community-based, and it is necessary to have a consensus between all the different social groups in order to implement it.
- **The cross-cutting nature of the impacts of fire management.** It is important to understand that fire and its use affects all sectors of rural livelihoods. The production and sustainability of all kinds of agriculture, forestry and pastoral activities are affected, and it is essential to increase fire management awareness among the services, projects and NGOs in all those areas. The active participation of different stakeholders makes it easier to further develop and promote the fire management approach.
- **Participatory and land-use management approaches.** These two approaches lie at the heart of national forestry and NRM policies in Burkina Faso. They have been used in the organisation of Fire Management Committees and in applying fire management techniques in the field. The land-use management approach (*“approche gestion de terroirs”*) is based on participatory situation analysis, planning according to understanding of the territory, and implementation, monitoring and evaluation by community committees representing different socio-economic or interest groups. Local and traditional knowledge

are given due importance, and joint negotiation to find a consensus that can be accepted by everybody is stressed in all situations. The objective is to make fire management a community concern and not just something practised only by a limited group of people. It is also important to ensure that fire management is technically appropriate and economically affordable for the communities.

- **“Village cluster” and “spreading” approaches.** The first villages in which the Project started up were chosen as clusters of five villages adjacent to each other. This was a strategic method of promoting the rapid spread of techniques and economy of scale in the planning and implementation of fire management. The approach of starting from small villages and spreading to big ones has also proved to be efficient: smaller villages are quicker to reach the necessary consensus for implementing joint actions as social diversity is often less accentuated. Each year the scope has been extended by choosing additional new villages around the old ones, and many villages have actually contacted the services to request training in fire management. Creation of inter-village Fire Management Committee Unions has been encouraged and sustained wherever possible.

## ● Organisation: Fire Management Committees and Unions

The success of community-based fire management depends largely on the good organisation of people who have legitimate responsibility for planning and implementing the activities. In Burkina Faso, the village-based Fire Management Committees (FMCs) have until now formed the core organisation, which is assisted by technical services in planning, implementing and evaluating the work. The fire utilisation decree, No. 98–310/PRES/PM/MEE/MATS, assigns the Village Land Management Committees (*Comité Villageois de Gestion de Terroir, CVGT*) primary responsibility at village level. With the process of decentralisation and the establishment of VDCs these responsibilities will automatically be vested in the VDCs and the Fire Management Committees can become specialised structures of the VDCs.

In Burkina Faso the village chiefs are traditionally central to the entire societal structure. There are two types of chiefs, the Land Chief and Village Chief, while the state is represented by the Village Delegate (*Délegué Villageois*). The Fire Management Committees have usually successfully integrated traditional and modern leaderships in their fire management work. Participation by traditional authorities in developing and promoting fire management is a necessity, as the National Forum on bushfires concluded in 1997.



*Traditional chiefs have an important role in mobilising villagers*



*All villagers participate in drawing a map for fire management planning.*

The organisation of FMCs was launched by the Project in 1999. Their principal tasks are:

- to raise awareness among the villagers and educate them about fire management (the consequences, prevention and extinction of fire) through meetings and training
- to negotiate and collaborate with the FMCs of adjacent villages
- to plan fire management activities and organise their implementation by the communities
- to monitor and evaluate the activities
- to collaborate with the technical services and other partners

The FMC represents the village and all the people who live in the village territory and use its natural resources. Therefore it has to be as representative as possible and include men and women from all categories:

- the various socio-professional groups (farmers, live-stock keepers, pastoralists, hunters, charcoal makers, fruit and nut collectors, beekeepers and honey gatherers, etc.)
- different wards of the village, and migrants and transhumant herders
- women, men and young people
- traditional and administrative authorities

In many cases, each ward of the village is represented separately because the land is often managed by the elders of the ward, and at the same time wards are rather homogeneous units and this helps to reach consensus.

Women are represented in all the committees, but unfortunately they often participate only in theory. In some villages there are separate committees for men and women and this is considered beneficial, but usually, there is only one committee and women play a minor role in it. Women have a crucial role in educating children and they are an important interest group in fire management. Nevertheless their participation is often challenged by their limited time, high illiteracy rate and traditional role in society. In 2006, a special effort was made to train women farmer-trainers and to increase the overall training and participation of women. However, this requires awareness raising and training of people at

all levels, including central government employees, local government authorities, field extension agents and villagers, both men and women.

The FMC has to make decisions that concern the whole village territory, so it has to be officially recognised by the community. If the village does not have experience of democratic decision-making, it is sometimes hard to work through the committee. In these cases, decisions will often be taken by the old leaders or by the same restricted group of persons as usual. Other problems in FMCs include:

- disputes over leadership in the committees;
- the great influence of village chiefs and administrative authorities over the fire management committees. They often dominate the presidents of the committees, and the latter may also be figureheads acting for the village chief;
- a committee may sometimes depend on a very restricted group of persons who face difficulties in mobilising the others;
- equipment for fire fighting is often insufficient (boots, rakes, machetes, etc).

### **Inter-village Unions**

Village clusters and the Fire Management Unions formed by them have been very useful, but in some areas cooperation between villages has been impossible for historical sociopolitical reasons (Kaborè 2000). Working across village borders can be time-consuming and expensive for committee members. It is nevertheless beneficial for the



*Meeting in Tiankuy village, Boucle du Mouhoun region.*

*“I truly welcome the setting up of fire management committees in the villages. I know that the effectiveness of the actions of a committee depends essentially on the mobilisation of its members and on close cooperation with forest services. Like in our village, good organising is difficult in all committees. Each and everyone should show courage and readiness to achieve the common goals” (President of the FMC, Tiankuy).*



*Village elders have traditional knowledge of natural resources and the use of fire.*

villages to work in groups, because they can plan on a larger scale and save time by working together. Fire management can be undertaken at the level of the overall terrain and not confined to the home village.

### **By-laws made by Fire Management Committees**

Various by-laws are drawn up by FMCs to enforce fire management practises in the village area. These include

regulations concerning the timing and use of fire and natural resources, as well as concerning the fines to be paid to the FMC in case of infractions. By-laws in effect in villages include, for example:

- total protection of wooded, bush or pastoral areas
- areas for grazing or other land use
- timing of fruit and wood harvesting
- prohibitions on cutting green wood or fruit-bearing trees or bushes
- obligations to leave trees standing in the field
- confinement of fire utilisation to certain areas, only early burning being allowed.
- provisions for bush patrols

In many villages, the FMC has decided to fine offenders who break by-laws: for example people who start uncontrolled fires and those who cut down trees without permission. The efficiency of this system depends very much on the cohesion of the social system: if villagers and outsiders do not recognise the legitimacy of the FMC they will not adhere to its rules and will do everything they can to avoid paying fines. The participation of the traditional land chiefs in establishing and enforcing local by-laws has proved effective in areas where their authority is recognised. The adhesion of FMCs to Village Development Committees and their registration as Forest Management Groups will give them the necessary legitimacy, especially when backed up by the local authorities.

## Legal recognition of the committees

The necessity for legal recognition of the FMCs became obvious during the consultations conducted in 2003<sup>5</sup>. A number of FMCs and Unions had been created with the help of the Project but their real means of functioning, and their linkage to the institutional and socioeconomic environment had not been secured.

The committees had not received sufficient assistance in management and bookkeeping issues, even though almost all of them were handling materials and funds collected from the members or received from the Project. At the same time it also became obvious that it would be impossible to follow-up the activities of hundreds of individual FMCs spread across the country if they were not organised in structures that brought the committees together as groups.

The Mid-Term Evaluation mission recommended that the FMCs and Unions should be institutionalised either as cooperatives or groups. National legislation in Burkina Faso (decrees applying the law 14/99/AN to cooperatives and groups) supported frameworks for the constitution, recognition, organisation and functioning of unions, federations and confederations formed by cooperatives and groups. This legislation was considered very useful, for example in organising chains of custody for different actors in the wood exploitation or hunting sectors.

By the time the Project ended, around 100 committees had been recognised as Forest Management



*Fire management training.*

Groups and 50 committees had been officially recognised as part of a Village Land Use Management Committee, which will cease to exist with the establishment of VDCs. The process of recognising the committees in 81 villages had been initiated by the authorities in two departments (Gourma and Matiacoli in the East Region), and one Inter-village Land Use Committee had been recognised.

The transformation of FMCs to Forest Management Groups (FMGs) extends their field of action. Traditionally the FMGs concentrate only on fuel-wood produc-

<sup>5</sup> *Mid-Term Evaluation Report, 2003*



*No bush fires in our village!*

tion in managed areas. When an FMC is converted to an FMG, the field of intervention could actually include the exploitation of all kind of forestry products (including wood, non-wood, wildlife and fodder). This would also solve the problem of having a multitude of organi-

sations each concentrating on its own product: wildlife, fishing, beekeeping, wood, charcoal, medicine etc. Joint management and planning of resource utilisation would help to mitigate conflicts and facilitate the tasks of the Forestry Service.



## Incentives

During the Mid-Term Review of the Project in late 2003, the FMCs were asked if they would continue implementing fire management even after the Project ended. The answer was an enthusiastic “yes”: in most cases the villagers considered that there could be no return to the old practices as the immediate and significant benefits gained through increased natural resources production were too important.

The benefits themselves act as a great incentive, and the Project also provided the committees with some material inputs. They usually received boots, rakes, machetes, buckets and other tools that were locally available and could be used in making fire lines or in active fire-fighting. Farmer-trainers were provided with simple equipment to help them conduct training: bicycles, easy-to-use pedagogical guides and some stationery. Study tours in and between regions were organised as an incentive for committee members and to enable them to share their experiences with other committees. In 2005, the villages that did not have any bush-fire outbreaks were provided with signboards saying: “No Bush Fires in our Village!”

## ● Roles of different actors in fire management

The roles that were initially set out for different actors in fire management have gradually changed along with the on-going process of decentralisation in Burkina Faso. The most important change is the transfer of responsi-

bilities to locally elected authorities (local governments) who will be able to organise the natural resources management together with Village Development Councils and their specialised structures such as Fire Management Committees or Forest Management Groups.

Table 1 summarises the responsibilities of the main actors, from state authorities to civil society. This table is included in the National Fire Management Strategy (2006), and the definitions of roles are based both on the experience gained during the development of the community-based fire management approach and on the current understanding of the decentralisation process.

## ● Fire management techniques

The techniques used in managing fires are described in the manual “*Guide méthodologique pour la Gestion des Feux en Milieu Rural au Burkina Faso*”<sup>6</sup>. This guide is based on other fire management manuals and research in Burkina Faso, and also on the experience and research and development work of the Project personnel over seven years, which has significantly contributed to adapting fire management techniques and technology to the conditions in Burkina Faso.

<sup>6</sup> Wright P., Compaoré E. 2006. *Guide méthodologique pour la gestion des feux en milieu rural au Burkina Faso. Fire Management on Rural Lands Project, Ministry of Foreign Affairs, Finland.*

**Table 1. Roles of different actors in fire management**

| Categories of actors     |  | Roles  |  |
|--------------------------|--|--|--|
| State                    | Ministry of Environment  |  | Elaborating and monitoring implementation of the national fire management strategy action plan         |
|                          |  |  | Coordinating the implementation of different activities related to the strategy                        |
|                          |  |  | Supporting, advising, monitoring and controlling the activities  |
|                          |  |  | Strengthening the capacity of actors   |
|                          |  |  | Building up and enhancing the value of achievements  |
|                          |  |  | Supporting scientific research and development   |
|                          |  |  | Supporting the search for funding  |
|                          | Technical Service Partners   | Research organisations   | Improving knowledge through scientific research and communicating research findings on fire management |
| Other technical partners |  | Technical assistance to actors, assistance in mobilising resources |  |
| Local administration     |  | Coordinating technical services                                    |  |
|                          |  | Recognising peasant organisations                                  |  |
| Local authorities        | Familiarity with the planning and implementation of different projects and programmes to integrate fire management in their approaches |  |  |
|                          | Searching for funds for implementing actions   |  |  |
|                          | Developing consultation and collaboration between different actors   |  |  |
|                          | Elaborating and adopting local natural resource management agreements and by-laws which take rural fire management into account        |  |  |
|                          | Monitoring and evaluating the implementation of field activities   |  |  |
|                          | Managing conflicts related to fire utilisation   |  |  |

| Categories of actors   | Roles  |
|--|--|
| Village Development Councils and their special structures                      | Participating in the planning, implementation, monitoring and evaluation of activities                   |
|  | Supervising early burning and managing burning activities  |
|  | Identifying, implementing, monitoring and evaluating microprojects                                       |
|  | Participating in mobilising resources to implement activities  |
| Traditional and religious organisations, opinion leaders NGOs and associations | Supporting awareness raising   |
|  | Supporting conflict management   |
|  | Promoting traditional knowledge and knowhow about fire management  |
|  | Supporting the elaboration and application of local conventions and rules on natural resource management |
|  | Supporting the elaboration and application of local conventions and rules on natural resource management |
|  | Providing local populations with technical, financial and material support for fire management           |
| Private sector   | Supplying goods and services   |
| Technical and financial partners   | Providing technical and financial assistance   |



*Early burning in November – the vegetation is dominated by perennial grasses.*

### **Early burning**

The principal objectives of early burning are to limit the harmful effect of late fires and to create fire lanes around areas to be protected. Early burning reduces the intensity and speed of spread of late fires, as there will be less biofuel and the grass cover will be discontinuous. For example, a late fire can seriously damage the production of fruit trees but early fires do not seem to have such a harmful effect on them. In addition, conservation of soil partially covered by grasses can be improved

through early burning, as it will reduce the runoff of surface water and consequent soil erosion. Total protection may be justified in areas where fire risk can be easily managed, for example in areas with annual grasses that constitute a fodder reserve for domestic and wild animals. In addition, the revival of badly degraded vegetation, soil restoration, and regeneration of species susceptible to fire, all justify total protection if this can minimise fire risks.

The *right season* for early burning is when there is still humidity in the grass cover. The *techniques* vary according to the objectives. When protecting against late fires, spot fires are used: spots of vegetation are fired at more or less regular distances throughout the area. Fire lanes may be created by controlled burning around the area to be protected, starting from the surrounding roads or paths or from cleared control lines.

### **Technical management fires**

In Burkina Faso, technical management fires are principally used for pasture regeneration in areas dominated by perennial grasses. The dates for burning are determined according to the dryness of the grass cover, but in any case before all the grasses are dry.

To apply this technique properly it is necessary to have good knowledge of the environment, especially about soil humidity, in order to determine the best times for burning. In higher places soil and grass dry quickly, whereas in lowlands the humidity stays high over a long-

## An example of early burning

*A village decides to carry out early burning along the road that connects that village to another. Starting from the village, the road goes first across a plateau and then descends toward a depression which also forms the boundary of the village. The people who are responsible for fire management notice that the grass on the plateau is almost completely dry. To burn that area it is necessary to act fast before the period of early burning is over. In the depression, on the other hand, the grass is only just starting to dry.*

*Fire setting will start around noon. The group will first go to the margins of the depression to start setting fire along the road. They will then take advantage of the wind and the low relative humidity of midday hours to make the grass catch fire even though its water content is still high. As the day advances, the group advances upwards from the depressed area. The group will take care that they arrive in the upland towards sunset, which is the right moment to burn drier grass. When night comes, the fire will die down as the wind slows and relative humidity increases. If some parts of the depression have not burnt as expected due to high humidity levels, the group can return a week later to re work those spots.*



*After early burning litter and straws are still found on the ground, and the regrowth of grasses is fast, protecting the soil from erosion.*

er period. Burning should thus start from the upland areas, and progress toward the lowlands later during the year. In this way it may be possible to secure quality fodder for cattle or wildlife over the territory for most of the dry season.

The system adopted in Burkina Faso is based on observing the colour of the grass, which changes from green to yellow during the maturing and drying of the herbaceous vegetation. In areas dominated by annual grasses, this transition lasts only 1–2 weeks, and the

**Table 2. Timing of early burning.**

| TIME OF DAY      | RELATIVE AIR HUMIDITY (RH)             | WIND  | RECOMMENDATIONS FOR SETTING FIRES   |
|------------------|--|---|---|
| 8 a.m. to 1 p.m. | RH is diminishing.                     | Wind speed is increasing.                                     | NOT RECOMMENDED. Fire set in the morning will spread fast and its intensity will increase. There is a risk that the fire will spread uncontrollably.  |
| 1 p.m. to 3 p.m. | RH reaches its daily minimum.          | Wind speed fluctuates according to season but it can be high. | FAVOURABLE ONLY WHEN SETTING FIRE TO GRASS COVER THAT IS STARTING TO DRY. Wind is necessary for the fire to continue: if there is no wind, the fire will go out. NOT RECOMMENDED FOR DRY GRASS COVER. |
| 3 p.m. to 7 p.m. | RH increases toward the daily maximum. | Wind speed diminishes.  | RECOMMENDED WHEN GRASS COVER IS MODERATELY DRY. In these conditions the fire usually extinguishes by itself at night. Burning against the wind will diminish the intensity of fire.                   |
| 7 p.m. to 8 a.m. | RH has reached the maximum level.      | Wind is generally calmer during the night.                    | RECOMMENDED FOR GRASS COVER AT THE END OF DRYING, but working at night may present a risk to the people participating.  |

optimal period for burning is when around two-thirds of the length of the stems has turned yellow. In areas dominated by perennial grasses, the transition may take one month or more, depending on the water reserves in the soil. The optimal period for burning starts when the upper parts of stems have turned dry as well as the lower leaves, even though the stems are still quite green. Experience shows that farmers often wait too long to start burning, so specialist assistance and follow-up is often necessary.

The best time of day for burning is determined by two factors: the relative air humidity and the wind intensity. Table 2 shows the recommended timing for different dryness levels of vegetation:

### **Firebreaks and control lines**

Firebreaks are used to stop the spreading of fires and to protect natural resources during the period of bush-fire risk. They can be either natural (rivers, hills, open



1. Opening a fire break. 2. Two 2-meter wide strips are cleaned at each side of the fire break. Then the dry grass in the middle is burnt to make a fire break with the minimum of time and effort. 3. A devastating late dry season fire. 4. No litter remains to protect the soil after a late fire.

areas), green areas with plants that are resistant to fire, or cleared areas from which all the vegetation and dry leaves have removed.

Control lines serve to limit the spreading of controlled fires once they have been started, mostly in the following three cases:

- making a cleared firebreak with the help of fire
- starting a management fire
- lighting a backfire while fighting an uncontrolled bushfire.

### Active fighting against bush fires

Fire fighting is carried out in two ways:

- direct attack, when the fire is less violent and it is fought at the edges, with beaters proceeding progressively from two sides. In Burkina Faso men usually do the beating and women carry water to extinguish the embers.
- indirect attack, when the fire is too hot to fight directly and a control line is constructed at some distance from the leading edge of the fire. A “back fire” is then set along the control line in such a way as to burn out the fuel between the control line and the oncoming bush fire.

### Fire detection and ground patrolling

Fire detection is usually carried out by people living and working in the area, or by periodic excursions through



*Young members of a Fire Management Committee.*

the area. “Our village has two neighbourhoods which take weekly turns in these duties. The executive members of the committee have given young people the responsibility of doing the job. When an activity is to be carried out, they inform the young people, who then get together to do the work.” (Sienbou Dante, FMC, Kari village)

### **Fire management planning**

The Fire Management Committee is responsible for making a community analysis of the territory through

participatory methods. Usually a map representing the village area and its natural resources is first drawn on the ground and later transferred to paper. This helps the community to:

- identify all the natural resources available in the village area
- examine all the constraints on natural resource utilisation caused by uncontrolled bushfires (pasture, agriculture, reforestation etc.)
- define the areas that are most disturbed by uncontrolled fires and the origin of fires (direction and causes)

### **Fire Management Plan**

*The Fire Management Plan drawn up by the community must cover at least the following details*

- *the areas to manage and/or protect*
- *the results that the community wants to achieve*
- *the techniques to use (firebreaks, early burning, technical management fires etc.)*
- *the material and human resources required*
- *a time schedule for the implementation plan*
- *the organisation of work*
- *other necessary tasks (training, awareness raising, negotiation, by-laws on natural resources, penalties etc.)*



- propose fire management techniques that are appropriate to each of the situations involved
- evaluate the campaign after the dry season

In this way the analysis helps the community to link fire management techniques and their utilisation to their own territory, and allows for modification if something is considered to be inappropriate or not sufficiently effective.

At the end of the planning it is important to emphasise to the participants that:

- it is necessary to present the proposed plan to the village for any changes and for adoption
- coordination of activities with the adjacent villages will reduce the workload and strengthen and complement the work
- tasks such as training, awareness raising and negotiation help to ensure the success of activities
- good programming and timing will help to avoid overload of work during peak periods

### ● **Extension and training in rural communities**

The extension and training in villages was initially conducted by project extension agents and later also by forestry agents and members of Fire Management Committees. The principal activities that were practised in most villages included:

- organisation of awareness-raising meetings for villagers about the dangers of fire (organised either by the Forestry agents or by the FMCs.);
- organisation of and/or participation in exchange study tours in or outside the region;
- participation in technical training organised by the Project;
- holding ordinary and extraordinary general assemblies of FMCs and meetings by the Committee board;
- planning of fire management activities;
- implementation of programmed activities;
- negotiation with partners, especially Project or National Land Management Programme partners, to obtain assistance in the carrying out of activities;
- management of sites (selection and maintenance of protected areas set aside for fodder production, tree planting, early burning, opening of firebreaks, etc.);
- patrolling the territory to protect it from bushfires and illegal wood cutting.

Special meetings were organised in villages to inform people about the new legislation concerning the use of fire and the different types of fire. Villagers participated in discussions on the utility and risks involved in using fire. The meetings were supported by a large number of broadcasts on the national radio and by four regional radio stations, as well as by radio messages transmitted in many local languages. A simplified version of the fire decree was produced, and with the help of the National



*Forestry agents facilitate a village meeting.*

Literacy Training Institute it was translated into seven major local languages: Mooré, Fulfuldé, Gulmancema, Bouamu, Dioula, Lobiri and Dagara.

Fire management extension and training was started in 30 pilot villages in 1999. Training developed through various stages, starting with the use of special project extension agents and ending, in 2006, with the training of farmer-trainers, whose task is to train new villagers.

In 2006, a specific Training Strategy was elaborated together, with teaching material that can be used by farmer-trainers in the villages. This material includes a small guide on how the topics could be taught to village groups, as well as a set of pictures that can be used in training to accompany the discussions and illustrate the concepts.

### **Project extension agents**

During the Project's pilot phase, six extension agents, all men, were hired to work in the pilot villages in the East and Boucle du Mouhoun regions. They organised awareness-raising meetings, closely monitored the setting up of fire committees, and provided training for committee members. In the second phase, the Project was extended to two other regions and the target was to reach 300 villages in a total of 8 provinces, covering a considerably larger area than during the pilot phase.

### **Rural subject matter specialists as extension agents**

One of the lessons learnt during the pilot phase was that fire management is a cross-cutting issue which concerns all rural livelihoods. The message of fire management should therefore be diffused by many different development partners, including the forestry, livestock and agricultural extension services. This time a number of women were also included among the extension agents of these services. The initial approach consisted of train-

ing extension agents from each department who were specialists in these three fields. (The department was the administrative unit consisting of several villages; starting last year the departments were transformed into Rural Communes). Unfortunately the idea of joint extension work in several villages was practised in very few areas as the Project provided motorcycles and allowances only to forestry agents.

The continuous transfer of forestry agents from one department to another was always a significant problem for the implementation of fire management programme, as new agents were not necessarily familiar with the subject. Finally, in 2005, all the forestry agents in the four regions were trained in the fire management approach and its techniques.

### **Farmer-trainers**

Training in villages was usually conducted by project extension agents and forestry agents, with the intention that committee members would then train other villagers and also people from adjacent villages. However, it became obvious that this transfer of knowledge was not automatic: committee members simply did not have enough training themselves, and sometimes they lacked the necessary authority or they did not know how the training should be organised. Special farmer-trainers were therefore selected, and they were provided with material for teaching as well as with bicycles. Altogether 127 people, including 32 women, were trained to



*Training of local women trainers in classroom.*

hold training sessions, and they also received training guides and some material for practical sessions (boots, tools, etc.). These trainers are now ready to work with the rural communes that will in future start organising fire management in their areas. Farmer-trainers have already started to train nearby villages, but they also need support and guidance from technical staff, FMCs and local authorities.

## Training strategy

The objective of the training strategy is to strengthen the capacity of different actors in environmental management so that fire management becomes a general and well-established concept in the country. There are different specific objectives related to the capacity building of different actors (community structures, government services and partners). The partners include communes, provinces and Regions, and the Ministries of Agriculture and of Animal Resources, as well as the Ministry of the Environment, NGOs, associations and ongoing projects.

The training strategy is based on a cascade model: first people at the central government level of the ministries are trained; they then train people at the regional administrative level, which is responsible for transmitting the knowledge to provinces and to departments. Finally, the field-level forestry agents should train the farmer-trainers. Unfortunately, losses in transmission are often inherent in the cascade model. Ideally the best possible training should be provided to farmer-trainers who are responsible for transmitting the practices to communities.

## Training guide for farmer-trainers

*The guide is originally written in French and its instructions on how to run training are grouped under ten different fire management topics:*

1. *The utility and dangers of fire*
2. *How many types of fire can we encounter in our community?*
3. *What feeds the fire?*
4. *How should we use early burning and technical management fires?*
5. *How can we make a fire break?*
6. *How can we stop a bushfire?*
7. *How do we get to know the village better to make better fire management planning?*
8. *Making a village map*
9. *Fire management*
10. *How do we get organised to manage fires on our land?*

*Each topic has a learning objective, pedagogical instructions and a “debriefing” summary to be presented at the end of the session. The guide also contains instructions for conducting practical exercises with training participants.*

## Fire management strategy and action plan

The National Fire Management Strategy (NFMS) was finalised in 2006 and later it was adopted by the Parliament. Consequently an Action Plan for the NFMS implementation was presented in September 2006 – the next step will be the preparation of regional action plans. The process of creating the strategy took almost one year and it involved a number of stages:

The strategy's concept of fire management is based on the following key elements:

- a new definition of the use of fire which decriminalises certain fire practices,
- the promotion of early burning,
- the transfer of responsibility for fire management to local authorities and administrative constituencies.

The strategy aims to facilitate the reduction of the negative impacts of fire and enhance the value of its utilisation in sustainable development. The major challenges recognised in the strategy are:

- the integration of fire management in conventional/traditional forest management
- the knowledge and understanding of fire management by all actors
- the development of an organisational and statutory environment that is favourable for the correct use of fire in rural lands.

The goal of the strategy is to contribute to improving food security, natural resources management and pov-

### Creating the National Fire Management Strategy for Burkina Faso

1. *The first draft was written by a consultant who met different stakeholders at national level*
2. *A task force to work on the strategy was formed in the Forest Service*
3. *A sectoral workshop was organised in October 2005, and three workshops were held in the regions with different stakeholders to discuss the priorities for the strategy and the proposal made by the consultant*
4. *The second draft was worked out in November 2005*
5. *Staff from the Directorate General of Nature Conservation commented on the new draft, and it was rewritten in December 2005*
6. *In January an internal workshop was organised in the Ministry of Environment to discuss the draft*
7. *The final draft was presented at a national workshop in February 2006. This resulted in some changes in the text, which was finalised in March 2006.*

erty reduction through improved utilisation of fire. The specific objectives are defined as follows:

- to contribute to better knowledge about fire issues in rural lands

- to promote utilisation of fire in natural resources management
- to contribute to strengthening the capacity of actors
- to improve communication regarding fire management on rural lands.

The strategy recognises six “axes of intervention” to achieve these objectives:

1. Building on the achievements of fire management on rural lands;
2. Developing research to improve fire management practices;
3. Promoting a statutory and organisational environment that is favourable to fire management on rural lands;
4. Strengthening the technical capacity of actors involved in fire management on rural lands;
5. Developing communications about fire management on rural lands
6. Monitoring and evaluation of impacts of fire.

The strategy puts forward a clear division of roles in the implementation of fire management (see Table 1). The role of the state is to concentrate on ensuring a favourable policy and legislative framework, whereas in its implementation the strategy emphasises the importance of local authorities, communities, technical and financial partners, the private sector, NGOs and associations, as well as traditional and religious leaders.

The monitoring of implementation is planned to be mainly carried out through an Action Plan which was prepared by a task force in the Directorate General of Natural Resources only a few months after the finalisation of the Strategy. In accordance with the Action Plan, each Region is now expected to draw up its own annual activity calendar in collaboration with the villages and local authorities. These plans will in turn serve as the basis for the annual plan by the Directorate of Forestry, and the activities that are implemented will be reported annually by the Regional and National Forestry Services through the Fire Management Unit.

Three types of evaluation will take place during the implementation of the strategy:

- Self-evaluations conducted by the local population with the assistance of technical services. They will be periodical, with the periods concerned being set by the actors themselves.
- Internal evaluations, which will be conducted annually. They will permit the action plan to be adapted gradually to changes that take place in policy or in the institutional and technical framework.
- An external mid-term evaluation will be conducted to assess the extent to which objectives have been achieved, and the measures to be taken to strengthen the positive effects and impacts of the strategy.

## Monitoring and evaluation

### ● The importance of monitoring and evaluation in the context of fire management

There are many actors in the field of fire management in Burkina Faso, and they are on many different levels of society and administration; so monitoring and evaluation (M&E) needs to be organised as a process with information circulating at different levels. To be effective as a whole, fire management requires participatory approaches and mechanisms, and M&E, too, has to follow the same principles: local people are active participants, not just sources of information.

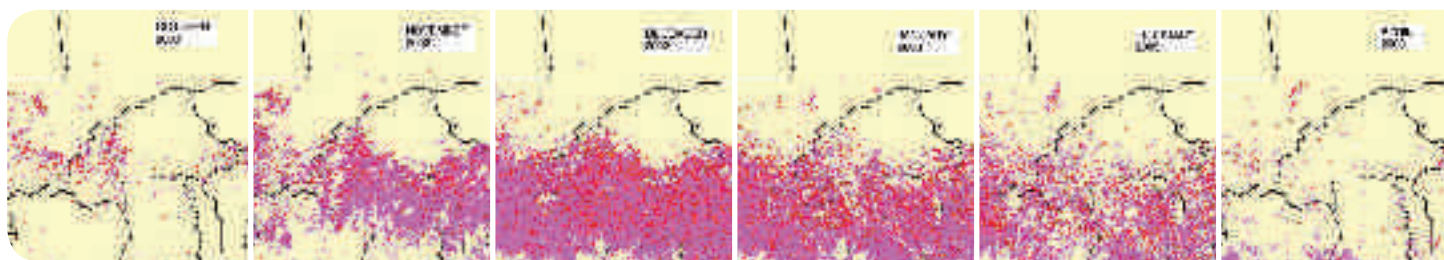
M&E of community-based fire management is a learning process. Monitoring is usually conducted as an ongoing activity, whereas evaluations are undertaken at certain times depending on the scope of the results and information required. Based on the results of evaluation, activities can be redirected and resources reallocated as appropriate in order to enhance performance, achieve

better results and facilitate positive impacts, even those that are not foreseen.

In the context of fire management, decision-making necessitates short- and long-term information about the behaviour both of fire and of stakeholders, and about the impacts of fire and fire management. With the information gained by monitoring, for example, the current status of controlled and uncontrolled fires can be analysed, and the measures to improve fire management assessed. Further, the M&E process makes it possible to adjust the national strategy and the related action plan.

### ● Basic monitoring and evaluation of fires in Burkina Faso

The aim of the M&E developed in Burkina Faso is self-evaluation by different stakeholders, comparing efforts against the results achieved and the nature and number of the fires. A simple check-list was drawn up to be



*Active fires in Burkina Faso from October through April, based on a sequence of satellite images.*

## Self-evaluations for capacity building and learning

*Activities to be assessed by FMCs include the following: sensitising, surveillance, informal training, firebreaks, early fires, extinction of fires, management of natural resources, restoration of the milieu and economic activities.*

*Firstly, the participants describe their activities with regard to the frequency and the content of each activity (including such themes as training, methods of making firebreaks, descriptions of areas protected, the nature of economic activities involved, etc.) All these groups of activities are then evaluated (with marks varying between -- and ++) with regard to the dynamism and mobilisation of the village and to the ratio of efforts made and results achieved. In addition, the difficulties faced, the solutions adopted and innovations involved are described, as well as the future perspectives for fire management based on experiences from the previous fire season.*

*During the project, each cluster of five villages organised a self-evaluation in which the endeavours of each village were evaluated. The best village then received a prize funded by the Project.*

used with the help of forestry agents. Evaluations were conducted after/before every fire season by the FMCs and the Inter-village Unions. Information was then sent to the regional Forestry Department for further reporting.

### Standard data collection

During the Project, field monitoring data was collected on monitoring sheets by the field agents in each district of operation. The visits to villages also served to give much-needed continuous support to the villages and the FMCs in their efforts.

The standard data collected and gender-disaggregated by the agents was as follows:

- Controlled fires (place, location, duration and nature)
- Bush fires (place, duration, extent, cause and author)
- Additional training (place, date, theme and number of participants)
- Informal training (place, date/duration, theme and number of trainers and participants)
- Fire breaks (place, date, number of participants, length and width)
- Awareness raising (place, date, theme and number of participants)
- Economic activities
- Fire management committees (date of creation, existing Unions)



- Reforestation (species and quantity)
- Basic information on the participating villages (name of the village, number of wards, ethnic groups, village organisations, basic livelihoods, level of mechanisation, nature of silviculture production, etc.)

The data was first recorded in a MS Excel database and later transferred to a specifically designed MS Access database at the national Fire Management Unit.

The quality and quantity of data was directly related to the number of villages monitored by the agent and the presence of regional coordinators. Already towards the end of the project it appeared that many of the new districts were not reporting the activities and cases of fires in their villages regularly or accurately. Data was often insufficient and was not recorded properly on the monitoring sheets, which resulted in inadequacies in the submission of monthly reports. During the PAI, it was impossible to make reliable analyses and reports of field activities. However, such data as was obtained was put into the newly created Access database and thus contributed to its updating.

The plan was to analyse the data periodically, even after the Project ended, and also to use it as a database for a Geographic Information System (GIS), combining the analysis with other spatial data available, for example satellite images. The Directorate of Forestry was to update the database and the Directorate for Ecological Monitoring to do the GIS work and analysis as they had the equipment and the capacity. By the end of the

Project, the minimum reporting data requirements were put into the standard periodic reporting forms of the Forestry Department, and the monitoring of fire management and the related activities was thereby to become a responsibility of each field agent.

### **Research on the ecological impacts of fires**

Research-related fire monitoring was conducted on a regular basis in 2002-2004. The objective was to determine the impact of fires on the dynamism and diversity of the vegetation, and particularly:

- to measure the impact of fire on the botanical structure of several experimental sites,
- to characterise species according to their vulnerability on fires,
- to identify indicators for levels of degradation, and
- to characterise the impact of fire as a function of the period and frequency of fire.

For this purpose, two experimental sites were accorded regular fire treatment. The sites were located in southern Burkina Faso, in the Pô National Park (Kaboré Tambi), and in western Burkina Faso, in Kékaba in the Boucle du Mouhoun Region. Four plots were established at each site, each measuring 25m by 25m, and they were inventoried for woody species. The purpose was to treat them sequentially with fire three times in a fire season: in December, February and April. One plot at each site was not subjected to fire at any time.



Late fire treatment in the sample plot in Kékaba, Boucle du Mouhoun Region.

Parameters for measurement included<sup>7</sup>:

- The temperature of the fire on 8 different heights: 10 cm under the ground, on the ground, and at 20, 100, 200, 300, 400 and 500 cm above ground.
- The presence or absence of individual species after the fire (the plants were identified before the fire and labels were attached on them)
- Biomass consumed
- Height, and diameter at 20 cm
- Phenology of the various species.

<sup>7</sup> See for example: Niķiema, Albert & Matti Oksanen (2003). *Ecologie des feux de brousse et gestion de la diversité floristique dans la région du Sud Burkina, Rapport périodique de recherche no. 1. Projet Gestion des Feux en Milieu Rural au Burkina Faso, Ouagadougou. Unpublished working paper.*

The results of the research conducted during the short period clearly show the differences between early and late fire treatments, and confirm the thesis that early fires damage the vegetation much less than the late ones: the fire treatment in February consumed almost the whole of the herbal biomass.

### ● Monitoring and evaluation of fires by remote sensing

Remote sensing provides information about, for example, ongoing fires, burnt areas, possible causes or determinants of fires, and fire risk. There is generally a trade-off between spatial detail and frequency of data availability. Coarse-resolution satellite data, such as NOAA (National Oceanographic and Atmospheric Administration) AVHRR (Advanced Very High Resolution Radiometer) images provides limited spatial detail with daily national or global coverage. On the other hand, high-resolution data, such as SPOT (*Système Probatoire de l'Observation du Terre*) and Landsat, provide fine details but images are available only at intervals of weeks. Even finer details are, however, offered by airborne remote sensing methods – aerial photos.

### Use of satellite images

Fire monitoring methods involving remote sensing have mostly been based on satellite images, and the inventories have been very large-scale. The products and meth-

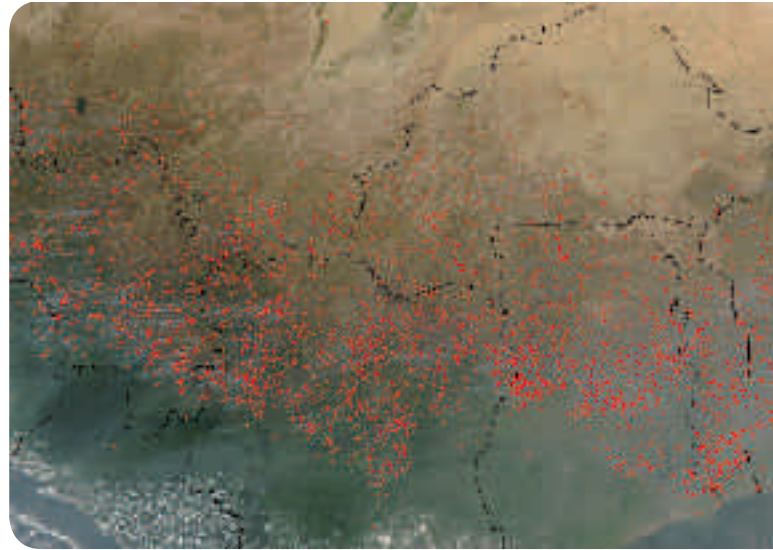
ods of remote sensing used for monitoring fires can be divided in two groups: spot focuses and traces of fires.

The detection of *spot focuses* of fires is principally achieved using the medium infrared and thermal spectra of NOAA AVHRR images with a spatial resolution of 1 km. It is also possible to use MODIS images, with a spatial resolution of 300 m, as is already done globally by the Department of Geography of the University of Maryland (see the box below).

For the detection of *traces of fires*, NOAA AVHRR images can also be used. However, they suffer the handicap of bad resolution leading to inadequate detection, and are thus only useful for making large-scale global estimations. For more detailed analysis, MERIS or MODIS images are better because of their higher resolution. But the use of these images is limited by the fact

### Timely fire maps on the Web

*The Fire Information for Resource Management System (FIRMS) integrates remote sensing and GIS technologies to deliver MODIS active fire locations to natural resource managers and other stakeholders around the World. FIRMS is funded by NASA and builds on the Web Fire Mapper, a web mapping interface that displays active fires detected by the MODIS Rapid Response System (see <http://maps.geog.umd.edu/firms/maps.asp>). Burkina Faso is included in the category "North Africa".*



*The MODIS-satellite image shows the active fires in West-Africa the 25<sup>th</sup> of December, 2002, at 1.40 p.m. Resolution 1 km<sup>2</sup>.*

that they are not free of charge. So for a local level (provincial or departmental) study, the most adequate images are Landsat ETM+ with a spatial resolution of 25 m<sup>8</sup>.

The National Programme for Land Management (PNGT2) is continually mapping the burnt areas in

<sup>8</sup> Diébré, Régis (2005). *Elaboration d'indicateurs et d'un système de suivi des feux de brousse par télédétection pour la SNGF. Project Gestion des Feux en Milieu Rural au Burkina Faso, Phase d'Appui Institutionnelle, Ouagadougou. Unpublished study paper.*



*Aerial photo of an area protected by roads (on the right and left) and by firebreaks (upper and lower part).*

Burkina Faso. In 2004, a cartographic study of bush fires in Burkina was conducted for the seasons 2001-2002, 2002-2003 and 2003-2004, using NOAA AVHRR (LAC), SPOT VEGETATION, and Landsat ETM+ images<sup>9</sup>. The results of mapping the fires by using these wide resolution images have not, however, been successful in covering the whole country due to the poor spatio-temporal coverage of the images.

<sup>9</sup> Diébré, Régis (2005). *Cartographie des feux de brousse au Burkina Faso pour les campagnes 2001-2002, 2002-2003 and 2003-2004 à l'aide d'images AVHRR de NOAA (LAC), Vegetation de SPOT et ETM+ de Landsat. PNGT2, Ouagadougou. Unpublished study paper.*

In 2007 a cartographic study of fires for the seasons 2004-2005 and 2005-2006 is going to be made using ENVISAT MERIS with approximately 300 m resolution (MERIS FULL Resolution Level 2 and ASTER images). The objectives of the study are: 1) To map and assess the burnt areas by campaign, month and type of fire (early or late); 2) To map and assess the burnt areas by type of fire (early or late); 3) To map and assess the repetitiveness of burnt areas by type of bush fires. Information about the study, financed by the National Programme for Land Management, is also provided by the European Space Agency, Earth Observation Principal Investigator Portal (<http://copi.esa.int/esa/esa>), as the study has been accepted by the Agency as a Category-1 (Scientific) project.

## **Aerial photos**

Aerial photos can also be useful in fire monitoring as they offer higher resolution than any satellite image. Using higher resolution can also support local planning and self-evaluation, giving a possibility to cross-check the monitoring data gathered by different methods at local and national levels.

If the photos were in digital format, to enable appropriate corrections and the creation of mosaics, they would be usable in many ways, and it would also be easy to integrate them with other monitoring data. However, filming and handling the photos is rather expensive and requires special capacity and additional time.

In order to be of benefit, M&E activities need to be coordinated, and the information obtained needs to be collected for decision-making. The National Fire Management Strategy and the related Action Plan play a key role in providing the necessary guidelines at the national level. The Strategy defines a minimum level of M&E, which is then put into effect through the jointly agreed action plan.

In general, the M&E specified in the National Strategy includes annual operational plans and reports of activities, technical reports and documents, monitoring missions and the evaluation of different field projects. The Strategy introduces three types of evaluation:

- Periodical self-evaluations by the communes with the support of the technical services;
- Annual internal evaluations with external assistance;
- Mid-term external evaluation of the execution of the action plan, to study the extent to which the objectives have been achieved and the measures needed to enforce the positive effects and impacts of the Strategy.

The National Strategy and Action Plan have introduced a system that will monitor the impact of the activities initiated by the Strategy as well as the dynamics of bush fires. Impacts will be monitored from a number of perspectives: biological, physical, socio-economical, institutional and political. Evaluation of these impacts will pro-

vide information about the effectiveness of the actions taken, and about any reorientation necessary to increase the quality of their impacts in the future at local, regional and national levels.

A baseline study is needed to provide a sound basis for impact monitoring. The impacts that are looked for include:

- Increased capacity of stakeholders
- Amelioration of socio-economic conditions of populations
- Preservation and restoration of natural resources (land, vegetation, fauna, water, etc.)
- Improved institutional and political environments for fire management.

The dynamics of fires concerns systematic observation of the dynamics of land degradation caused by bush fires. It is necessary to collect and analyse information on the evolution of biological, physical and socio-economical factors in both short- and medium-term perspectives. As this is closely connected with scientific methods and analysis, research needs to be included in monitoring.

## Results and impacts of fire management

The impacts of devastating bush fires are familiar to everybody but what can the impacts of community-based fire management be like?

When the approach developed by the Project was evaluated in 2003, the evaluators put this question to various village-level groups, to administrators and to technical services staff, and to staff in the ministries at central government level. It became obvious that in order to justify the material and human resources allocated to the continuous development and spreading of the approach at all levels, it would be necessary to follow up the impacts and to demonstrate that the work was worthwhile. Burkina Faso's National Poverty Reduction Strategy defines the priority sectors for the government budget as well as the indicators to be monitored. The natural resources sector, including forestry and fire management, has rarely been able to demonstrate its fundamental importance for rural livelihoods and consequently it has a low priority with regard to funding from the national budget.

Many of the impacts of the community-based fire management approach were unexpected. Changes occurred in various spheres of society and the environment, including their ecological, social, economical and institutional aspects. According to a study made by Oksanen in 2003<sup>10</sup>, some 34% of the villages that participated in fire management had no uncontrolled fires during the first

campaign (1999-2000), but already by 2002-2003 75% of villages monitored reported no uncontrolled bush fires. During the dry season of 2003-2004 no uncontrolled fires were reported in 65% of all the 360 villages. This significant reduction of fires shows a change in the behaviour of villagers leading to further social, economic and ecological changes. Also, 67% of the bush fires that occurred in the villages with fire committees during the dry season of 2003-2004 were extinguished.

The study also indicated that while the incidence of bush fires was reduced, fewer fire management activities were carried out in the villages: when the villagers change their behaviour concerning fires, fires are no longer set. Furthermore, in village clusters the threat of fires coming from neighbouring villages was reduced and fewer firebreaks were needed to protect the village.

The study on "The participation of the populations in fire management: The initiatives on natural resource management in the Eastern and Boucle du Mouhoun Regions of Burkina Faso" (CESAO, 2004) found a number of changes and impacts resulting from fire management and the ensuring of natural resource management in villages that had started the process. Table 3 presents the impacts that have been cited by different stakeholders in meetings and reports.

<sup>10</sup> Oksanen, Matti (2003). *Bush fires and fire management activities in the project villages of the East and Boucle du Mouhoun Regions, 1999-2003. Technical report. Projet Gestion des feux en Milieu Rural au Burkina Faso, Ouagadougou*

**TABLE 3. IMPACTS OF FIRE MANAGEMENT**

|   |   |
|---|---|
| <p><b>TYPE OF IMPACT</b><br/><b>ENVIRONMENTAL IMPACTS</b></p> | <ul style="list-style-type: none"> <li>- Increased vegetative cover;</li> <li>- Increased soil fertility through more humus;</li> <li>- Decreased soil erosion from both rain and wind;</li> <li>- Increased availability and/or restoration of some wood and non-wood species;</li> <li>- Reappearance of certain medicinal species;</li> <li>- Restoration of wildlife habitats and reappearance of wildlife in the protected areas (including elephants in one area).</li> </ul>   |
| <p><b>ECONOMIC IMPACTS</b></p>                                | <ul style="list-style-type: none"> <li>- Immediate and significant economic advantages including:</li> <li>- Increased amount of shea nuts and néré seeds collected by women, which has improved their income as well as their access to small credits;</li> <li>- Improved quality and availability of fodder for domestic stock, resulting in reduced distance to pasture, better animal health, and fewer lost or stolen animals;</li> <li>- Increased availability of thatching and weaving grass;</li> <li>- Improved quality and quantity of honey.</li> </ul> <p>Further impacts include:</p> <ul style="list-style-type: none"> <li>- Intensification of agriculture through increased supply of manure and increased use of soil erosion control methods resulting in increasing crop yields;</li> <li>- Improved fallow capacity, resulting in increased crop yields;</li> <li>- Initiation of synergic local natural resource management strategies for land resources, water, wildlife, fishing, forests (providing further economic impacts);</li> <li>- Access to sanction income by all the population (fines were previously paid to chiefs only), more transparency;</li> <li>- Generally more time available for income generation as forest products are available near to the village;</li> <li>- Improved relationships between villagers and forestry agents;</li> <li>- Some forestry agents who learnt new skills in fire management are providing training services to NGOs or projects, receiving training fees.</li> </ul> |
| <p><b>SOCIAL IMPACTS</b></p>                                  | <ul style="list-style-type: none"> <li>- Change of behaviour vis-à-vis the use of fire (reduced uncontrolled fires and illegal wood cutting);</li> <li>- Effect of “spreading”: new villages approach the experienced ones for assistance;</li> <li>- Consolidation of consensus and solidarity in and between villages, promoting conflict resolution in general, and especially between farmers and livestock keepers;</li> <li>- Improved pastures near to the villages, so children in charge of herding animals can stay closer, attend school and spend more time with the family;</li> <li>- Higher awareness of damage caused by bushfires;</li> <li>- Increased collaboration between different village Fire Management Committees;</li> <li>- Closer collaboration between the local committees and the administrative and technical services, particularly during the Project, thanks to the formation of inter-village committees and Unions;</li> <li>- Increased mobilisation of committees and village populations with regard to fire management issues;</li> <li>- Education of children concerning environmental issues.</li> </ul>   |

## Lessons learnt

The development of a successful approach to community-based fire management and the implementation of this approach by more than 360 Fire Management Committees in four regions can be considered as a striking achievement. The lessons learnt between 1999 and 2006 include the following:

### At policy and legislation level

The necessary policy and legislative support was put in place through decree 98-310 on the utilisation of fire. Thanks to this decree the collective suspicion created by the old regulations is gradually fading and making room for cooperation between individuals, communities and authorities.

### At institutional level:

- a) *Modification of collective behaviour with regard to the use of fire is really possible*, as shown by the high number of villages with no bushfires after a relatively short period of awareness raising and training.
- b) Insistence on the representation of all the socio-economic groups in the Fire Management Committees is usually accepted in the villages. It is very important for good planning and enforcing the by-laws concerning fire management.
- c) Traditional leaders should always be contacted first, and their support and participation in fire management is essential. Their response has been positive and they usually agree about the need to change individual and collective behaviour regarding the use of fire. Many of them know how to work to change people's behaviour.
- d) There is, however, still a lot of confusion between different roles in committees. Community leaders, in particular, are often eager to occupy more than one important post in different committees, and to hold the committee presidency whenever possible instead of delegating powers. There are often power conflicts, lack of transparency and confusion in leadership, which may necessitate outside assistance and coaching.
- e) Good conflict resolution and negotiation practices and skills are needed in villages when dealing with land use management questions and negotiating about territorial opportunities. These processes are not always transparent and conflicts may not be handled openly. Leaders should have at least a basic knowledge of negotiation practices and, naturally, the willingness to negotiate.
- f) The capacity of communities to manage the use of fire in their areas is closely linked to the degree of consensus among the population. Nevertheless, in the absence of legal status it is difficult for the community to enforce by-laws and impose penalties on unauthorised outside users. It is to be hoped that the process of decentralisation will improve the situation.
- g) The Fire Management Committees will have to obtain an officially recognised status either through their integration in the Village Development Committee as specialised structures or as Forest Management Groups.



- h) The rapidly realised tangible benefits from fire management are an important incentive for villagers – but they also need material and equipment for field work. Burning and fire-fighting can be dangerous: burns and snake bites are common. The small amount of material provided by the Project (rakes, boots, buckets, etc.) initially boosted the interest of communities and made fire management an attractive activity.
- i) Some of the biggest problems in assisting the local population by the Forestry Service have been :
- constant changes of staff
  - limited command of local languages by forestry agents
  - insufficient means of transportation
- Some of the solutions to these problems include:
- keeping the agents in one place long enough to benefit from the technical knowledge they have gained through training and to promote partnership in place of the distrust that often still prevails between agents and the populations. This would also facilitate the role of foresters as extension agents and monitors in fire management
  - recruiting local agents who would speak local languages (in the framework of decentralisation);
  - including forestry agents as beneficiaries of any kind of assistance to the agricultural sector for resolving the problems of transportation. The same also applies to the central government level – people do not move from their officers if no transport is available.
- j) Fire management can promote improved management and use of natural resources. Already during



*The increased amounts of shea butter are used by women to make soap for sale.*

the pilot phase of the Project, one village had joined with neighbouring villages in creating a managed wooded-pastoral zone in the area originally chosen for fire protection. Decisions regulating the use of natural resources were taken by village leaderships, and have by and large been respected. The advantages secured through improved natural resources management provide additional incentives to protect the area from bush fires.

- k) Monitoring of fires, and of the impacts of uncontrolled fires and of fire management, constitutes an essential learning tool for villages. The results of mon-



*Women farmer-trainers trained by the Project.*

itoring can be used for raising awareness in villages or among local authorities that do not yet adhere to community-based fire management.

- l) The costs of monitoring at national level should be shared by the different stakeholders as the price of using remote sensing technologies is prohibitive for ministries and institutions in Sub-Saharan countries.
- m) Monitoring of fires, and community organisations involved in fire management, should be included in standard forestry, agricultural and livestock service reporting.

#### **At the financial level:**

- a) The positive results of fire management are immediate and significant, and they become obvious very quickly. Already after the first year, the qualitative and quantitative increase of non-forest timber products and the improvement of pastures can bring tangible benefits to villages.
- b) The immediate quantitative and qualitative increase of particular natural resources also makes it possible to increase their commercialisation or their processing into other products. Technical assistance and credits or grants are necessary to benefit from this development, and cooperation with different development agencies, NGOs and associations is also necessary in order to gain from synergies.
- c) Fire management committees should be able to earn some revenue and thereby finance the purchase of equipment and material, as well as compensate the farmer-trainers, workers and patrolers or pay for the food during the days of collective work. They should be authorised by local authorities to charge penalties from offenders, and supported in applying for funds from partners jointly with other committees.

#### **At the technical level:**

- a) Fire management techniques developed or adapted by the project are based on techniques used under similar conditions in the state forests of Burkina

Faso. They can easily be applied under a variety of circumstances using a minimum of equipment. Training in use of the techniques requires only a few days. While some techniques could be more effective with additional equipment, such as backpack water pumps, their use has so far been avoided because of the high prices – or non-availability – of the equipment in local market.

- b) Initially extension and training was conducted by extension agents who were not in government service. This provided the flexibility and control over the extension agents that was necessary for ensuring the fast development of the approach. The subsequent fast spread of the approach was ensured by government forestry agents who were provided with both training and transport.
- c) It is easier to mobilise small villages first, because of the multitude and strength of their social contacts in comparison with the big villages, which are more heterogeneous. Organising villages in groups helps the communities to benefit from synergies and economies of scale in the fire management. Being in a group helps them to develop an inter-community dialogue and mitigates disagreements.
- d) The participation of women is just as important as that of men. However, the role of women is often limited to supplying water when extinguishing fire, or acting as silent representatives in committees and boards. They are often responsible for accidental fires but they would easily be able to educate the children about fire prevention and change their own habits.

Women who have been trained as farmer-trainers have shown a complete command of both the technology and the pedagogy needed to train other villagers. The obstacles to their active participation in the committees, in training and in educating other villagers have to be combated through raising the awareness of decision-makers, leaders, technicians and all socio-economic groups in villages.

- e) Information and training are important at all levels. All the forestry technicians in the Regions of Est, Boucle du Mouhoun, Hauts Bassins and Sud-Ouest have received basic training in fire management, and many of the livestock and agriculture officers also have some experience of it. Nevertheless a large number of extension agents in rural areas are not familiar with decree No. 98-310 or the key issues of the fire management approach. They do not know how to use the techniques, or how to organise or train villagers in fire management.
- f) Even if a fire management committee is set up and trained in a village, the related information and the skills are not automatically transmitted to other community members. It is important to train farmer-trainers and find ways to mobilise them in villages.
- g) Fire management helps to promote better natural resources management. It is, however, possible that protection of areas from bushfires will increase the pressure on the protected resources, especially from the adjacent villages that have not yet adopted fire management. Efforts to increase inter-village cooperation should therefore be given more attention.

## Conclusions

The development of community-based fire management is a continuous learning process which should be regularly evaluated. The adaptive management which follows the cycle of planning, implementation, monitoring and evaluation is based on learning by doing: managers set their objectives and share the final results with others in local, national and regional forums. The flow of information between practitioners and researchers should be constant, helping to fine-tune both the technology (guidelines for landscape management, ecosystem maintenance, the complete banning on burning in cases of fragile soils, etc.) and the organisational set-up.

Unfortunately there has been no systematic follow-up of the costs and impacts of fire management in Burkina Faso. All the calculations about the costs are theoretical and the follow-up of impacts is more qualitative than quantitative. Nevertheless, experience in Burkina Faso shows that both men and women from different socio-professional groups find it worthwhile to invest their time in fire management.

The approach and techniques should be adopted by all the institutions and organisations involved in promoting improved natural resources management, as this would provide an excellent way to reach the majority of rural population. Training in fire management should be integrated into school curricula at all levels, from primary education to professional agriculture, livestock and forestry colleges.

The process of decentralisation and the development of local democratic institutions with responsibil-

ity for natural resources management is an interesting new challenge to fire management in Burkina Faso. On one hand, the local authorities and local institutions will now be able to legally play a decisive role in NRM decision-making but, on the other hand, the tasks of training and awareness raising are huge. Increasing in-country and international migration, together with the privatisation of land ownership, present another challenge: land tenure problems. Conflicts in villages are growing and community-based natural resource and fire management institutions could provide an appropriate forum for stakeholder participation and negotiation.

As emphasised in the Fire Management Action Plan, decree No. 98-310/PRES/PM/MEE/MATS from 17 July 1998 should be revised according to the new provisions of the legislation on forestry and local authorities, and the Action Plan for decentralisation in the forestry sector. Consequently, the role of Village Fire Management Committees and their links to local authorities should also be redefined.

Much more has to be done to involve women properly in fire management, starting with awareness raising for decision-makers as well as literacy training for women. At the same time the raising of men's awareness in this respect is also important.

Bush fires do not acknowledge borders. The development of cross-border regional initiatives between different countries in the Sahel would be an important tool in the campaign against desertification, climate change and rural poverty.



*“People didn’t understand at first. But slowly they started to see the advantages and the benefits. Our fields, where there had been fires every year, no longer burned. Our animals, which had to go to the river 12 kilometres away, could now stay nearby and no longer disappeared. Even trees that didn’t produce before started to become productive.”*

## STUDIES, SURVEYS AND DOCUMENTS PREPARED BY THE “FIRE MANAGEMENT ON RURAL LANDS OF BURKINA FASO” PROJECT BETWEEN 1999 AND 2006

1. Villagers and bush fires. Consultancy report 2. Sociological study. Märta SALOKOSKI and Jean-Baptiste OUEDRAOGO. Helsinki and Ouagadougou, November 1999.
2. Etendue des feux de brousse dans la province du Mouhoun pendant la saison sèche 1999-2000; 32 p. Jukka MIETTINEN. Projet Gestion des Feux. Dédougou, Août 2000.
3. Impact des feux de brousse sur le pâturage ; 62 p. Markku LARJAVAARA. Projet Gestion des Feux. Dédougou, Août 2000.
4. Utilité des photos aériennes pour le suivi des feux de savane au niveau terroir au Burkina Faso; 52 p. Jukka MIETTINEN. Projet Gestion des Feux. Dédougou, Août 2000.
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6. Ecologie des Feux de Brousse et Gestion de la Diversité Floristique dans la Région du Sud Burkina, rapport périodique de recherche no. 1. NIKIEMA, Albert et OKSANEN, Matti. Projet Gestion des Feux en Milieu Rural. Ouagadougou, Mars 2003.
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9. Rapport général de l'enquête sur la participation des populations à la gestion des feux et sur les initiatives en gestion des ressources naturelles dans les Régions de l'Est et de la Boucle du Mouhoun. Centre d'Etudes Economiques et Sociales de l'Afrique de l'Ouest (CESAO) Bobo-Dioulasso, Janvier 2004. (Aussi disponible : 2 rapports régionaux.)
10. Transformation des produits forestiers non ligneux générateurs de revenus aux femmes dans les villages en cadre du Projet Gestion des feux en milieu rural au Burkina Faso. – Etude de base et planification d'un micro-projet ; 46 p. Anu PENTTINEN, Projet Gestion des Feux en Milieu Rural. Ouagadougou, 2004. Disponible aussi en Anglais.
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12. Les feux de brousse et les activités de gestion des feux dans les villages pilotes du Projet Gestion des Feux, de 1999 à 2004. Rapport technique. Matti Oksanen, Projet Gestion des Feux en Milieu Rural. Ouagadougou, 2004.
13. Cartographie des feux de brousse dans la Province du Mouhoun à l'aide d'images aéroportées haute résolution et satellites ETM+ de LANDSAT. Rapport final. DIÉBRÉ D. Jean-François Régis. Ouagadougou, Novembre 2004.
14. Etude sur la pérennisation des comités de gestion des feux en milieu rural. KONDÉ Mañing. Ouagadougou, Mai 2005.
15. Etude d'impact de la gestion des feux en milieu rural. Oumar TRAORE, Louis TRAORE, Oumar TRAORE, Lambert OUEDRAOGO. Ouagadougou, Mai 2005.
16. Esquisse de Stratégie Nationale de gestion des feux en milieu rural. (Document de travail). Daniel THIEBA. Ouagadougou, Mars et Novembre 2005.

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18. Stratégie nationale de gestion des feux au Burkina Faso, Direction des Forêts. Ouagadougou, Février 2006.
19. Cartographie des feux de brousse dans deux zones d'intervention du Projet Gestion des Feux de Brousse en Milieu Rural à l'aide d'une analyse multitemporelle d'images ETM+ de LANDSAT et appréciation des impacts physiques du projet (Rapport final). DIÉBRÉ D. Jean-François Régis. Ouagadougou, Mai 2006.
20. Plan de désengagement – Transfert de compétences, Direction des Forêts. Ouagadougou, Juillet 2006.
21. Stratégie de formation pour la Gestion des Feux, Direction des Forêts. Ouagadougou, Août 2006.
22. Plan d'action national pour la mise en œuvre de la Stratégie National de la Gestion des Feux au Burkina Faso, Direction des Forêts. Ouagadougou, Septembre 2006

## **PEDAGOGICAL PRODUCTS AND TOOLS**

- Video, "Les Maîtres du Feu", on fire management in Burkina Faso (2004), available on DVD
- Methodological Guide on Fire Management in Burkina Faso (March 2006)
- Pedagogical Guide for Farmer-Trainers (August 2006)
- Illustrated Flipchart for Farmer-Trainers (August 2006)
- Monitoring and Evaluation Guide for Farmer-Trainers (August 2006)
- PowerPoint Presentation for the Training of National Management Staff in Fire Management (December 2005)
- PowerPoint Presentation: "Training workshop for farmer-trainers on fire management" (July 2006)
- Video on the training of farmer-trainers (August 2006)

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