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Community Based Fire Management in Spain

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Comments and feedback are welcome.

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ABSTRACT

Today's urbanized societies tend to ask for wildfire exclusion through the strengthening of suppression resources to the extent that available budgets can buy. Unfortunately however, year after year, the experience shows that only a better understanding of the role of fire in the forest ecosystems can help to prevent catastrophic fires. In many places the rural land abandonment is creating the conditions for large fires, because of the huge fuel accumulations that are spreading into former agricultural lands.

To establish data on burning by local people their aims and motivations have been analyzed. The information gathered concludes that 60 percent of the total number of fires in the country can be prevented if controlled burning is carried out together with the farmers instead of just forbidding them from burning.

Therefore, awareness rising or sensitization programmes in the rural villages are crucial for the success in fire management when remembering that the local population are those who cause the fire damages and also remembering that training in controlled burning with the help of specialized teams (EPRIF¹) are organized in the areas where the number of fires is high.

Besides the EPRIF activities also other programs are carried out to promote cooperation with volunteers living in small villages by e.g. visiting them and providing economical incentives to them when they become integrated in permanent fire management organizations supervised by the Administration. Urban and rural people can cooperate together in these organizations to prevent fires.

1. INTRODUCTION

The spread of forest fires in the Mediterranean countries are clearly a sign of internal socio-economic differences between regions and between their degrees of development. The countries north of the Mediterranean Basin are registering the highest number of fires with the largest burned surface in the region. This trend is spreading from the Northwest to the East, now encompassing Croatia and Turkey into the "fire club" (Portugal, Spain, France, Italy, and Greece). Bosnia, Bulgaria, Romania are bound to have a similar future.

Socio-economic changes in the above countries are influencing the fire risk by increasing the combustibility in forest ecosystems. The reasons can be listed as follows:

- Depopulation of rural areas resulting in an accelerated process of land abandonment, leading to a rapid invasion of natural vegetation with a high degree of combustibility. Besides, ageing of the remaining rural people further increases the fire risk because of traditional burning practices by farmers and shepherds, to manage vegetation.

The Mediterranean Basin is a region with a growing population. From 1950 to 2000, the population grew from 225 million people to 450 million. Projections indicate that

¹. EPRIF: Equipos de Prevención Integral de Incendios Forestales

by 2050 it could reach 600 million (Plan Bleu 2003). However, the majority of this population is concentrated in the coastal areas and in some built-up urban inland areas. Specifically, the urban population for the entire Basin make up 60 percent of the total population in 1970 and by year 2000 it reached 70 %.

In the countries in the north of the Basin, the proportion is already 90 percent. This means that rural areas are emptying and that the mountainous woodlands, in particular, can already be considered deserted by active population. The current elevated migratory movements do nothing to alter this situation, given that immigrants settle mainly in urban areas and in highly-productive agricultural zones (that is, areas with the most employment opportunities). By way of example, the active rural population (number of jobs in Spain decreased from 1,600,000 in 1988 to 800,000 by 2002 (ASEMFO 2003). In the short term, the deserting of rural areas leads to neglected lands where natural regeneration of the vegetation takes over. During many years this land will present a high flammability when torched by fire. In addition, a low population also means lack of labour for carrying out forestry work in general and fire protection work in particular. Other related implications:

- People concentration in the urban areas are now spreading into the forest ecosystems, thus enlarging the wildland/urban interface. Permanent and secondary residences in forested areas are at fire risk with the thickening of the surrounding vegetation.
- Shifting of forest policy from management of forests for production of timber to one for Nature conservation, landscaping and recreation. Dramatic decrease in logging and extraction of firewood has in some regions a direct effect on the increase of forest fuel accumulations and combustibility.

The low fire hazard in the Southern and Eastern countries of the Basin marks a big contrast to the socio-economic changes listed in the countries north of the Basin..

During the last two decades the “fire club” countries have registered a marked improvement in fire suppression resources, limiting the damages but at such a high cost that economical possibilities to increase those resources are nearly exhausted. This means that forest fire organizations have to find more effective approaches to fire management by improving strategies and technologies for fire prevention and mitigation. Agreements will have to be made with local population for the use of fire in the right way. There is a need to publicly acknowledge the role of fire in preventive silviculture as ways to incorporate it in future forest policies better adapted to the present socio-economic situation in the Mediterranean Basin.

2. THE ROLE OF FIRE IN PREVENTIVE SILVICULTURE

➤ Fire Resistance of Forest Species

The forest environment is made of flammable organic material. No fire prevention measures can alter this fact. Nevertheless, a fire is more than just combustion. It consists of flames moving across flammable matter. Prevention therefore aims at hindering this movement, thereby blocking the spread of fire. (Vélez 1990)

Two principles should guide the design of preventive measures. The first is the concept of fire resistance of vegetation species. The second is that of fire resistance of the forest as a whole.

- Species resist fire in two ways: **Passively**, by means of thick bark which protects the cambium (for example, cork oaks) or through the presence of dormant buds that regenerate after the exposed parts are killed by the fire (canary pines, practically all broadleaved species, and many scrub species); or **actively**, through intense dissemination after the fire to replace the individuals killed (pines, eucalyptus, cistus, etc.). Most species growing in Mediterranean ecosystems resist fire in one or the other of those ways, or even both; as a result of long-term adaptation to a history of fires. The speed with which they regenerate actively or passively is not, however, the same for all of them. Repeated fires have therefore contributed to natural selection. The more frequent the fires, the less chance woody species have to regenerate, leading to a dominance of fast-growing, herbaceous plants. When, on the other hand, there are no fires for a long time, the land will be invaded by scrub and, later, tree species will appear. These different reactions after fire can be called more accurately “persistence” than “resistance”.

Species’ fire resistance can also be assessed in terms of their flammability, in other words the ease with which they burst into flames at a given temperature. This depends basically on the moisture content, which varies throughout the vegetative cycle for the living plants, and on the atmospheric humidity as regards dead combustible material, including leaves and branches.

- The degree of resistance to fire and the probability of its spreading is also a consequence of the structure of the vegetation cover. A few examples will illustrate this. A new plantation, in which the soil has been worked, is resistant to fire spreading, as long as the soil is kept clean and the young plants are small and kept well apart.

In evergreen oak scrubland with a lot of undergrowth, fires spread easily. In fully grown woodland in which the trees have thick trunks and dense, above-the-ground foliage which limits the regeneration of the undergrowth, it will be hard for fire to spread.

A fully grown, dense pine stand gives a lot of shade and lacks undergrowth; as a result it is hard for fires to spread in this stand. On the other hand, open woodland of pines and evergreen oaks enables a lot of sun to reach the soil, stimulating the growth of a range of helophytic species that form thick undergrowth in which it is easy for fires to begin and spread.

It is evident from these examples that resistance to spread of fire is a matter of the horizontal and vertical continuity of flammable matter. Interruptions in continuity increase the difficulty for fires to spread, limit the damage that they cause and make it easier to put them out. Wind is also a factor to be taken into account. Tall woodland is a more effective windbreak than scrubland, which is more effective than pasture. On ridges, where the wind changes, and along watercourses, which direct it, tree cover may be an important obstacle to fire, since it reduces wind speed.

➤ **Species selection and woodland structure**

From the above considerations, it is possible to formulate certain conclusions regarding species selection. There are certain species of arid zone genera (*Atriplex*, *Tamarix*, etc.) which have a high salt content, burn slowly and could be tested in several locations.

However, a definitive solution to fire cannot be found by replacing certain species with others, because all species burn under the tough conditions imposed by the Mediterranean summer. Then preventive silviculture cannot be based on intrinsic resistance, but on creating discontinuities, avoiding very extensive, monospecific surface areas and creating patchworks of different flammability levels to “disturb” the fire. In particular, wherever there is sufficient humidity, especially watercourses, the opportunity should be seized to plant species that make use of it.

The aim should be to create mosaics of species, by integrating other activities that give rise to discontinuity, such as roads, electricity lines, farm land, and recreational areas. Likewise, in exploiting the wood, an effort should be made to maintain its density, so as to limit undergrowth.

It is also worth keeping hillsides, which face into the prevailing winds, well covered with high vegetation that works as a windbreak, while opening fuel breaks on the leeward side, avoiding ridges.

Forested areas should be split up by fuel breaks of up to 200 metres wide. This discontinuity should be enhanced by means of pruning, ground clearing, mixing species, and roads and in certain cases, by strips of bare soil. Such fuel-break areas are always necessary at the edge of woodlands, to separate forest areas from agricultural or urban land.

➤ **Methods of reducing fuel accumulations**

Creating both horizontal and vertical discontinuities requires a variety of techniques for the elimination of flammable matter. These include mechanical and manual clearance, manual pruning, prescribed burning, controlled grazing and the use of phytocides.

In choosing the most appropriate techniques for each case, social, ecological and economic conditions should be borne in mind. For example, in areas of high unemployment, manual clearance is to be preferred. If there is a demand for land on which to raise cattle,

controlled grazing is likely to be a good choice, since the application provides for an economic return as well as for the clearing of fuel-break areas.

Prescribed burning is a very economical technique which nevertheless requires specific training. When combined with controlled grazing, it can be highly recommended (Martínez 2001, Molina 2000, Rodríguez Silva 2001, and Vega 2001). These techniques are, because of their nature, those to be applied by the population in local communities (farmers and shepherds).

The use of phytocides should always be highly restricted, in view of the cost and of the difficulty of controlling its effects outside the treatment zone.

Mechanical ground clearance requires the use of machinery that is suitable for the various types of combustible material and terrain. Such machinery might include dozers and chippers to produce fuel for Bioenergy. However, at present time it is questionable whether such exploitation is economical in Spain, given its cost in comparison with other energy sources. It could really only be made economically attractive through subsidies, which would be justified by the necessity of clearing and pruning in order to establish discontinuities in flammable material.

3. THE RURAL PEOPLE AT THE ORIGIN OF FOREST FIRES

Fire as a tool for vegetation management has for millennia been the basis of agriculture and livestock-raising. At the present time the use of fire is still an essential component of the rural technologies in many places of the world. The Mediterranean Basin is not an exception. But in the described socio-economic conditions described above, fire can also be a component of several conflicts, causing wildfires.

Some of them are described in the following:

➤ Persistence against “slash and burn” for agricultural purposes

The conflict arises out of the use of fire to eliminate forest vegetation and its subsequent replacement by agricultural crops.

However, the current tendency is for the conflict to die out because of lack in land reclamation. Only in places where irrigation is possible, which agricultural application usually is highly profitable in Mediterranean countries, can this kind of land demand still be seen. Obviously, irrigated lands are highly limited in space because their dependency of water availability. In addition, European Union (EU) policy for preventing surpluses (CAP) is deterring further settlements on forest lands that are usually low productivity type lands, due to their quality or slope. In fact this conflict is tending to disappear.

➤ Land abandonment

The conflict arises as a result of rural activities ceasing on marginal agricultural lands, either spontaneously or encouraged by the aforesaid policy against surpluses. Leaving the land unattended gives rise to an invasion by wildland species in a process that would

lead to the future regeneration of the forest. The species invasion very quickly generates the most dangerous types of light fuel accumulation; in which fires breaking out for whatever reason, take on high speeds and intensities and are extremely difficult to fight.

The tendency in this conflict is to regulate the change in land use from farm to forest, with funds to make it viable and prevent fuel accumulations. However, the process of giving up the land is outpacing the different countries' current policies. In addition, this process makes owners who might request subsidies disappear. However, even with subsidies it is difficult these days to find people interested to risk money to protect something that does not directly produce anything for them. The conclusion is that this conflict is tending to worsen in the entire Mediterranean Basin.

➤ **Burning grasses and bushes to renew pastureland**

In all countries legislation forbids the use of fire in forest areas and in a belt (200 m. in France, 300 m. in Portugal and 400 m. in Spain) surrounding the forest. Outside this area, authorization to use fire must be applied for from Forest Services; however, the issuing of a burning permit will depend on the fire danger index. Generally, there are rules referring to the fire season during which authorization cannot be given. (Vélez 2000a)

Nevertheless, this preventive legislation is indirectly defied by regulations protecting people living in the mountains. The current situation is characterized by the continuous reduction in the number of shepherds caused by rural depopulation. However, one possible fire management policy would be to encourage grazing in depopulated areas. Nevertheless, there are two problems for this policy to work correctly:

- First, the average age of the population remaining in the forest land is very high. The human ageing process reduces physical strength and increases resistance to change in personal behaviour. This is why they carry on burning "to regenerate pastureland" as they did in their youth, but without taking precautions in the changed fuel conditions. Due to the large fuel accumulations mentioned, their burning technique proves uncontrollable. In fact, every year old country people die when trying to burn pastureland. In 2003 nine persons older than 67 years were killed in Spain and 83 old farmers were killed by forest fires in Portugal (Viegas 2004).
- Second, the EU incentive policy consists in subsidies per heads of sheep and goat; but without any relation to the area of land on which these animals will graze. In addition, this policy allows the owners of the animals to seasonally take them to new pastures.

The people who are utilizing these subsidies are those who know how to apply for them and they are more often than not from the urban environment. The apparent lack of relationship between the landowner and the land users lead to the hiring of shepherds who many times, set fire in an uncontrolled way, thus causing fires.

This problem could be minimised by getting greater internal coordination of EU regulations as well as promoting the use of controlled burning.

➤ **Burning agricultural remains**

The spreading of fires into forest areas arises from the use of fire to remove of agricultural harvest remains (stubble burning) and prepare the land for further sowing. This is a traditional operation on cereal growing lands. It is also performed to remove underbrush and weeds or any other vegetation interfering with farming.

Legislation runs, in all Mediterranean countries, parallel to that which is governing pasture burning. The conflict arises likewise through failure to comply with preventive measures laid down by the law and which are specified in burning permissions. To avoid burning expenses it proves cheaper not to take precautions. In addition, if burning runs wild and there is no permission obtained for it, it will be necessary for the Administration to prove who did the burning in order to hand out a penalty (burden of proof) to the culprit.

The current tendency is that this type of burning will increase. In fact, farmland is becoming a mere support for the crop, because organic matter of the farmland is destroyed every year by burning and has to be fertilised to compensate for these losses. That is to say, it is a completely non-ecological method of agriculture.

The negative ecological effects of these burnings have produced in 2005 its prohibition by the European Commission to the agricultural lands beneficiaries of subsidies from the Common Agricultural Policy (CAP). To enforce the prohibition the subsidy would be cancelled if the land owner broadcasts stubble burning.

Declaration of specially protected areas

Conflicts arise from the imposed limitations in landuse which these declarations bring to local populations. When a region is declared a national park, Natural Park, or some other protection area, certain restrictions is established aimed at conservation or restoration of natural resources. This has an immediate influence on the livelihood of the area's inhabitants and may clash with their traditional land uses and customs. Confrontation can occur, of which the forest fire is a symptom.

The aim in environmental policies is to recognise these potential conflicts and take compensatory measures which should be extended to the entire population in the protected regions' area of influence.

The conclusion is that this type of conflicts will tend to spread, even though it may be controlled by good management of these protected regions.

4. SOME DATA ON FOREST FIRES OF RURAL ORIGIN

The Forest Fires Data Base (EGIF)² of Spain is registering the fire cause in every fire report. There are two classes where the rural “origin” of forest fires can be found:

- Carelessness: It includes two subclasses “Agricultural burning” and “Grass burning”
- Arson: Motivations to burn are categorized to explain arsonism. Rural burning without permission is included in this class. So, again “Agricultural burning” and “Grass burning” appear under the category of arson.
Another subclass is “Burning because of animal damages”, that is, to scare away wild animals from the crops.

The average figures for the period 1991-2003 are the following

	<u>percent of total number of fires</u>	<u>percent of total burned surface</u>
Carelessness (legal burnings)		
- Agricultural burning	4	5
- Grass burning	3	2
Deliberate (illegal burnings)		
- Agricultural burning	33	16
- Grass burning	17	30
- Animal damages	<u>3</u>	<u>3</u>
	60	56

This means that nearly two thirds of the total number of fires has a verified rural origin i.e. are related to traditional use of fire. Those fires burn more than half the total burned surface every year in Spain.

Many fires are also caused by people living in the rural areas, although with motivations more related to the human nature (like revenge) than to the agricultural technologies (Graph 1)

The magnitude of these figures makes a priority of establishing a systematic prevention policy, aimed at the rural population.

² EGIF: Estadística General de Incendios Forestales

5. PREVENTION POLICIES

To design these policies it is necessary to consider that:

- rural people use fire for a number of utilitarian purposes
- fire prohibition has never succeeded
- fire effects can be controlled with the appropriate techniques

Because of the reason above; three specific lines of action have been set on a permanent basis:

- actions for persuasion (environmental education)
- actions for conciliation of interests (to make local interests in forests, crops and livestock compatible)
- actions for coordination in fire patrolling, detection and suppression

5.1 Persuasion: Environmental education

To effectively deal with the negative aspects of traditional fire use, the first type of activities have a persuasive nature to teach the rural people that they themselves and their neighborhood are directly damaged by uncontrolled fires. To transfer this message to the rural population has one basic difficulty i.e. their distrust for the Forest Administration (F.A.); primarily because the F.A. asks for permissions for every activity in the wildland, even in the private land, and with alternative sizes of levies and fines.

The sensibilization campaign of the rural population, which started in Spain in the 1980's found in the beginning of the 1990's an unusual way to educate the public. The new approach included community theatre plays as means to approach the population in fire prone communities. These plays, performed by professional theatre groups not identified as Administration agents, were able to present, in a dramatic way, how rural attitudes were causing fires and the tragic consequences of these fires to the country people, sometimes even resulting in loss of their lives (Vélez 1987).

During the last ten years seven playwrights were written by famous Spanish authors and these were played along the rural areas during the fire seasons, both in summer and in winter, (grass fires mainly occur in the winter months).

Tens of thousands of rural people have freely watched these plays in the main squares of their villages in summertime or inside schools, sport facilities, even churches in wintertime. This has allowed them to think and ponder on fire danger created by grass and bush burnings in their own fields and surrounding.

Systematic monitoring of opinions has shown that receptivity among the rural people is consistent. There are some differences between the "winter" answers and the "summer" ones, probably because of the distribution in zones. The winter campaign generally covers the North-western and Northern regions whereas the summer campaign mainly covers the Mediterranean ones. In winter time peasants have more spare time than in the summer and consequently they attend the campaign more frequently in winter than in summer.

The general feeling is that most people in Spain do not worry about forest fires, but the people attending the campaign say they do. The degree of self-satisfaction is lower in summer.

Maybe in this season (from June onwards), when there are large fires, the people are more sincere. It is interesting to realize that the participants praise the campaign because it is conducted just in their rural environment, that is, where both fire causers and the people damaged by fires have to live together.

In conclusion: the answers to the large scale opinion checking show the general approval of the fire message (**rural people are causing forest fires by their burnings and they are also damaged by the fires**) and of the way of how to transfer the message (through theatre plays in the rural villages).

5.2 Conciliation of interests

The traditional use of fire as a tool in rural (agricultural) technologies has been classified as a dangerous activity by all Forest Administrations in Europe. Sometimes it has been radically forbidden, but without success. This is why many legal systems have opted to continue allowing fire use by regulation, fixing zones and periods of prohibition, and by requiring burning licenses, in addition adoption of a sets of preventive measures against fire escapes have to be respected. However, there are always people who do not care about licenses and precautions and still burn and continue causing forest fires.

The conflict of interests is easy to identify: the rural people burn to manage the vegetation, but the Administration tries to limit open burning to prevent fires from spreading into the forest.

This conflict sometimes appears in indirect ways. For instance, in North-western Spain it has been observed, that the growing number of aircrafts used in fire detection and firefighting has shifted the starting time of most burnings to after sunset, when the airplanes cannot fly because of lack of light. Persons trying to burn without permission discovered that it was easier to start the fire (and remain undetected) when it was dark because the aircrafts were flying only in daylight.

Now that stubble burning has been forbidden in Spain, the farmers have two ways to eliminate the straw:

- by burning illegally in an uncontrolled way
- by ripping up the spikes as near as possible to the soil with the harvester, by lowering the tool. This is causing also very dangerous fires because of sparks produced on beating stones.

The conclusion is that simple prohibition of stubble burning produces more problems of forest fires. Then conciliation of interests looks like the right way to prevent arsonism.

➤ The EPRIF Program

Conciliation of interests between farmers and Administration is being promoted by a program of controlled burnings in winter. This program started in 1999 in the North-western and Northern regions of Spain, in three high risk districts.

In the winter fire season 2004-2005 the program is being performed in nine districts in the following provinces (see Map 1)

	<u>Province</u>	<u>Nº of fires*</u>	<u>Burned surface (ha)*</u>
1.	Pontevedra	3.017	3.930
2.	Orense	3.324	13.763
3.	Asturias	1.168	10.479
4.	Cantabria	336	3.758
5.	Navarra	263	1.133
6.	Zamora	502	8.664
7.	León	652	16.872
8.	Burgos	180	2.002
9.	Cáceres	736	6.751

* Ten years average 1991-2000

A team of four specialists is working in every district. They are fellows who in summer work in the fire heli-crews and who are trained in controlled burning and in public awareness rising of in rural areas.

EPRIF works in close coordination with the local foresters, although the organization and budget comes from the Ministry of Environment. They are known as “Integral Prevention Teams” (EPRIF is the Spanish acronym). Terms of reference for this activity are shown in Annex 1.

➤ The EPRIF’s tasks

These EPRIF teams work from November till April of the following year. Their tasks are the following:

- a) Diagnosis of the fire danger;
 - analysis of the information on fire causes stored in the Data base;
 - identification of the local needs for burning (number of livestock heads);
 - identification of the local uses of fire (methods of burning, times, etc.); and
 - identification of relationships between the Forest Administration and the local people (conflict assessment).
- b) Public relations
 - Presentation of the controlled burning program to the local authorities (mayors) and to the local foresters;
 - Meetings with the local associations of farmers, visits to livestock markets, etc.; and
 - Demonstration of the program.

- c) Joint preparation of plans for bush and grass burnings with the association of farmers and the local foresters.
- d) Execution and evaluation of burnings with the help of the firefighting resources of the Administration to prevent escapes.
- e) Mobile patrolling with small slip-on ground tankers
- f) Firefighting when necessary.
- g) Investigation of fire causes in the district.

➤ **Profile of the EPRIF's specialists**

In order to perform efficiently the above tasks, the specialists are selected according to the following criteria:

- Staff (age: between 25 and 35) with a university degree in Forestry (Ingenieros forestales);
- 5 years of experience in the Special Forest Fire Brigades (BRIF³), similar to the American “hot-shots”) like Fire Boss;
- Practical training in controlled burning, received during their jobs in the Brigades;
- Good aptitude of communicating with other people, identified after their records in the Brigades and verified in a selection interview; and
- Good physical fitness according to the standard test for the suppression personnel (step test).

The Field Coordinators of the EPRIF Program have the same profile plus a diploma in an Advanced Course on Prevention, organized by the Ministry of Environment.

These preconditions aim at the Program efficiency with an added important side-effect: These personnel get a guaranteed six-month job in the Program, plus another four months in the summer brigades (BRIF). That means a minimum of ten months of employment each year, which is creating a good incentive to remain in the forest fire activities and not to look for more comfortable jobs.

➤ **Working procedures**

Step 1 Based on an agreement between the Ministry of Environment (DGB) and every Region, a decision on the districts where the EPRIF will be sent is taken according to the information on fire causes in the National Data Base (EGIF). Once the decision is made then the DGB hires a company (working unit) providing the necessary staff with the described profile for every EPRIF.

The fee paid by the DGB to each company covers salaries and per diem of staff plus other costs (vehicles, materials, etc).

³ BRIF: Brigada de Refuerzo en Incendios Forestales

⁴ BRIF: Brigadas de Refuerzo en Incendios Forestales

Step 2 The EPRIF arrives in the district assigned and establishes its headquarters in the office provided by the local Forest Service. Sometimes they are installed in the town hall or in the fire service (if there is one). A first meeting is held there with representatives of the local forest service and the mayor to explain or to remind the local administration about the objectives of EPRIF and to discuss the difficulties in prevention and in finding the fire causes. During this initial meeting and during the following meetings the EPRIF is gathering basic information to identify existing conflicts between the rural people and the Administration. Sometimes conflicts arise from the differences in interests between the main village in the district and other villages.

The process to identify conflicts has to be completed later, after first having listened to the farmers.

Diplomacy is a must at this phase of the work, because the EPRIF has to work in good terms with all sides.

The explanation of EPRIF objectives to the local foresters is a critical moment, because sometimes the local beliefs and attitudes often make “fire prevention” and “fire exclusion” synonymous. After this it is necessary to get their agreement to the use of controlled burning (according to the Forest Law) as the best practices to prevent illegal burnings and run-off wildfires.

Another crucial point in presenting the objectives is to make the local foresters understand that the main objective of EPRIF is fire **prevention**.

Many times the local authorities and foresters see the EPRIF staff as a well qualified group of fire suppression experts (as they rightly are) and they would prefer to have them available mainly for suppression instead of doing controlled burning in the field.

Step 3 Information obtained during these preliminary meetings with the officers (in the forest service and in the municipal governments) is to be verified by analyzing the Data base and by interviewing other people like e.g. local farmer’s associations (if there is one), the country workers union, the main cattle breeders (if they use grazing extensively). The agronomical and livestock services are also good information sources; they often are responsible for distributing subsidies from the Common Agricultural Policy (EU/CAP) and they can thus provide information on which types of subsidies farmers are receiving (e.g. livestock farms).

A critical information concerning livestock is the relationship or connection between land ownership and shepherds. When there no connection exists, illegal burning is more likely to be occurring to regenerate the grass without taking any preventive measure for avoiding fire escapes.

Other good information sources can be the local suppliers of tools, machines, fertilizers, etc. Some visits to these information sources have to be programmed.

Step 4 After having identified, more or less, the situation in the district, it is necessary to get in direct contact with the risk groups. They are to be met at the local or

regional livestock markets, at the pubs or wherever people go in the evenings, at the church on Sundays, etc.

Local people need to be told that the EPRIF staffs are living in their community, and that their duty is not to fine the farmers, but to help the people in the district to use fire in a wise way.

At this stage in the process a larger open meeting in the town hall can be organized, to announce that the EPRIF is available to prepare burning plans with the land owners and help to train people to burn in the right way.

This kind of meetings can be coordinated with the environment education activities (paragraph 5.1), joining their message (**rural people are causing forest fires by their burnings and they are also damaged by the fires**) and the offer to prepare burning plans, including support by forest brigades and ground tankers if necessary. People attending these meetings have to know the address and the cell phone number of the EPRIF, to be able to locate them when a burning is to be broadcasted.

Step 5 A first demonstration of the program has to be prepared in coordination with the local forester.

It would be interesting to select two different places, one owned by the municipality and the other by a farmer. It is important to agree with the collaborating parties that they disseminate their burning experience with farmers living in the surroundings. The pilot farmers or stakeholders will later help the program by spreading information to their neighbours.

These burnings always consist of grass or shrub burnings (fuel models 1, 2, 3, 4, 5, 6) (ICONA 1997) and are never done under a tree canopy.

In this “demo” all the phases of a controlled burning are to be followed such as:

- a) Requesting a burning permission from the Forest Service, fixing the alternative dates and the low risk conditions to start burning;
- b) Spreading information on the burning date to the neighbours, to the local Forest Guard and to the Civil Guard (the rural police);
- c) Fixing the needs of personnel and equipment to get a safe control of the burning. If necessary, requesting for help from the Forest Service and the Fire Service, if there is one available in the area, or from the neighbours;
- d) Cleaning a fuel-break around the area to be burn or, at least, creating a fuel-less barrier between that area and the woodland to be protected. In this case, if necessary, requesting for help from, maybe, a Forest Service’s dozer working in the surroundings;
- e) Obtaining a weather forecast to calculate fire behaviour parameters. This subject can be developed in a short seminar with the farmers. Most times they know well what can happen if they burn under certain conditions, but other

times they do not have a clear concept of fire behaviour. That may sometimes cause them to make wrong decisions because of lack of knowledge;

- f) Safety issues: At this point it is interesting to talk about casualties in this kind of burnings;
- g) Taking the decision to burn and the plan of burning (by stripes, by spots, by piles, etc; time of the day; etc)
- h) Evaluating the results
 - Costs
 - Vegetation consumption
 - Further grass regeneration or shrub re-sprouting
 - Possible damages

Step 6 All this preparation is time consuming but, at the same time, it contributes to create a positive atmosphere in the district about this activity and it will also make more fluent relations between the rural people and the local officers.

So, this step means that information on this activity is to be continuously spread, to maintain the flow of requests for preparing burning plans.

For instance, pictures of the “demo” burning can be sent to the provincial media. Radio is probably the most interesting, because many rural people are listening to the radio when they are in the fields, but also newspapers have to receive this fire mitigation information. That can help to prevent opposition from the urban people, whose minds are often fixed at the “fire exclusion” approach.

Step 7 Once the activity is introduced, the EPRIF has to continue to systematically offer its services in the same way described in Step 4.

➤ **Appraisal of the EPRIF work**

The control of the EPRIF work is made through detailed reports prepared after every activity. There is a standard form (see Annex 2) to be filled by the team. These reports provide information for monitoring of the activities as well as to see if the objectives were met.

During the campaign “November 2003 – April 2004” the following activities were carried out in six districts:

<u>Activities</u>	<u>Number</u>	<u>Time</u>	<u>Surface (ha)</u>
- Meetings with farmers and the Administration	387	705:15	--
- Sensibilization talks	90	229:50	--
- Fuel management without fire	11	51:30	14
- Controlled burning	236	893:35	2.493
- Fire suppression	300	449:42	2.307
- Causes investigation	1	2:15	--
- Logistic activities	--	5714:48	--

- a) Meetings: 38 percent of the meetings were held with the farmers. The others were held with the Forest Administration or with the municipal authorities. As a matter of fact, to promote controlled burning it is necessary first to agree with the Administration to get permissions, prepare plans, etc.;
- b) Sensibilization: 88 percent of these talks were addressed to the local people. These talks were mainly to train them in the techniques of how to control the fire;
- c) Fuel management (mitigation) without fire: This was necessary sometimes to protect houses or other facilities, showing an alternative approach to the use of fire;
- d) Controlled burning: Only 7 percent of the burned surface was not publicly owned. In fact 67 percent of burnings had the objective of managing grazing lands. Those lands are in most cases municipal or communal and rented to the farmers to feed their cattle. In 86 percent of the burnings the results were **satisfactory** for the land owners (public or private);
- e) Fire suppression: Although this is not the main objective, the EPRIF team had to help in a number of fires, because when it is possible to disseminate burning experience, it is also possible to burn illegally.

Only in one province the fire suppression took most of the time of the EPRIF. The final evaluation in that area showed the need to create a better understanding about the EPRIF's objectives with the local foresters.

- f) Investigation of fire causes: Only one request received means that the local services were not much interested in this activity, although the EPRIF members are experts in it. In some provinces there are investigation brigades, but not in all of them. So a better coordination is necessary to make use of this expertise in the future.

These figures show the level of activity of the EPRIF's, but, after five years of this program, there were very encouraging results: In all districts where the EPRIF are working a drastic change in attitudes about the use of fire both among the farmers and local foresters can be observed. They now realize that they can control burnings just by working together, and by doing this they can prevent fires from spread into the forest.

In the summer 2004, just after the last EPRIF campaign, a remarkable reduction in the number of fires has been registered in all the six districts above.

5.3 Coordination between the Administration resources and the country people

The "ancient" traditional organization in Spain against forest fires was based on the capability of the nearest people to react. However, the increasing intensity of fires, the land abandonment and the ageing of the remaining residents in the rural areas had made that option obsolete and forced the Administration to become the main actor in managing wildland fires.

Sophistication of the resources and techniques employed by the Administration, under the pressure by the urban population for faster results, placed the rural people in the position of observers. Although the Forest Law states that helping to suppress fire is an obligation of everybody, official services often keep the local people away from the fire line, mainly for safety reasons and also for the difficulty in integrating them in the suppression operations.

Safety is a must. So this official attitude is to be applied as a general rule.

However there are a number of tasks where the local people can help efficiently. In fact environmental education produces the need to create opportunities for organizing the local people eager to help.

Spain has two main approaches for that purpose:

- the Registered Groups of Volunteers
- the Societies for Forest Protection (ADF⁵ is the Spanish acronym)

➤ **The Registered Groups of Volunteers (RGV)**

Both the National Forest Law and the Regional Forest Laws are encouraging the promotion of the volunteers groups by providing economical support and by creating a

legal framework for their activities. The Region of Valencia (Comunidad Valenciana) is an interesting example (Suárez 2000). Its legislation provides the legal framework for volunteers, with a specific budget provisions under certain conditions:

- Participation in the volunteers groups has to be open to all kinds of people without discrimination because of origin, sex or age.
- The role of the volunteers is preventive, i.e. to inform the visitors to forest areas on the rules and precautions to prevent fires from starting and on other types of dangers in the forest.
- Fire suppression is excluded from the field of their activities. They have to work just for fire prevention. This means that they do not pass any physical fitness tests or have fire fighting experience; and they do not need to carry suppression equipment.
- “Volunteer” does not mean ”spontaneous” in this case. That is, they need a special training to know how to perform in an effective way in their preventive tasks. Therefore the Administration devotes financial resources for organizing short courses in the villages where the groups are based.
- Forest protection tasks have to be compatible with the daily life of the volunteer. Therefore the work is not obligatory and there is no signed labour contract between the volunteer and the Administration.

- All volunteers have to register within the Administration, which will provide them with an official certificate recognizing them as “registered volunteers”. This certificate means that the Administration backs their activities in forest protection.
- The groups have to design their own programs of activity, which may be supervised by the Administration.
- The Regional Administration has a budget for purchasing equipment (vehicles, radios, work costumes, training courses, etc)

The standard Volunteer training program has to include:

- Dangers for the forest environment, fire causes, fire weather, vegetation;
- Fire behaviour in the Mediterranean environment;
- Design of a prevention plan: Sensibilization, preventive silviculture;
- Organization: Basic rules of functioning;
- Methods for dissuasive actions: Public relations, how to communicate a message to other people, how to understand other people’s attitudes, how to change negative reactions;
- Use of radios and maps; and
- Safety basics and first aid: How to prevent an accident, how to avoid wrong actions in an accident, how to ask for help.

Presently there are more than 4000 people registered in this program, living all around the Valencia Region, both in the rural and the urban areas. Forest/urban interface in this Region is very large and fires often spread into this areas. Thereby the role of the volunteers groups to inform the people about the danger and to give recommendations for prevention has been critical in avoiding excessive damages.

The results of this Volunteer action together with preventive silviculture, fire mitigation and other measures, had made the Valencia Region leader in fire prevention in Spain, with a steady reduction in both the number of fires and in the burned area during the last ten years.

➤ **The Societies for Forest Protection (ADF)**

The ADFs are a different kind of volunteer group from the RGV’s, because their members are not only individuals, but also local bodies and NGOs such as associations of forest owners, associations of farmers, environmentalist groups, etc. The local authority (mayor) is an essential member, because these societies have a municipal base and they work under the municipal coordination.

They are responsible for the following activities;

- Programs for patrolling in their territory;
- Programs for “first attack” before the arrival of the professional fire fighters. The ADF leaves the fire line in that moment. They also cooperate in mop-up operations;
- Programs for reforestation (rehabilitation of burned areas) after fire;
- Sensibilization campaigns addressed to the forest owners and to the farmers in their territory;

- Sensibilization campaigns addressed to the local dwellers in general; and
- Maintenance of infrastructures: fuel breaks, roads, water reservoirs.

Every ADF has a Council and a General Assembly usually chaired by the mayor.

The first ADFs were created in 1988 in Catalonia (Garriga 2000). The Regional Administration devotes a budget to subsidize the purchasing of equipment for the above listed activities. For instance, slip-on tanks are purchased with that budget and mounted on the farmer's pick-ups for first attack or mop-up.

The Region of Andalusia has established provisions to support similar societies in its Forest Fires Law of 1999. Although the experience is still recent, it has up to now proven an interesting tool in promoting the preparation of fire prevention plans by forest owners or members of the ADF; because in such cases they can get economical incentives.

6. CONCLUSION

In a urbanized society like Europe the concept of wildfires is difficult to understand, because the historical memory of rural burnings has long since been lost and substituted by the concept of total “fire exclusion”.

The traditional use of fire is no more understood, and the rural people who still burn become relics of ancient times.

At the same time land abandonment produces more and more fuel accumulations and escaping wildfires from agricultural burning or weekend camping/hunting becomes a major agent of disturbance in the remaining forest ecosystems.

Therefore, it is necessary to understand the role of fire in the environment as well as to integrate it in present silvicultural practices. It is also necessary for the general public as well as for the Administration to understand which the aims of the rural people are when they burn. This revelation would open ways to achieve the **right type of burning instead of increased wildfires**. This is the essence of the **EPRIF program**.

Besides, the local people, more and more urbanized but at the same time, more and more aware of the negative wildfire effects are asking for ways to cooperate. But, primarily because of the dangers to human lives in fire suppression activities, the Administration have agreed to facilitate the offered cooperation through the various volunteers' organizations; aimed at preventive activities and, only in well defined conditions, to help in fire suppression. These organizations are always linked to a municipal authority, in order to get good cooperation from all kinds of people and stakeholders.

Maybe these programs can be better explained by two slogans of our sensibilization campaigns:

- LET US LIVE WITH FIRE AND ENDURE IT
- EVERYBODY AGAINST WILD FIRE

Bibliography

ASEMFO 2003: *III Estudio de inversión y empleo en el Sector Forestal*, Asociación Nacional de Empresas Forestales, Madrid 68 pp

Garriga, J., 2000: *Voluntarios forestales en Cataluña*, en “*La defensa contra incendios forestales, Fundamentos y experiencias*”, Coordinator: R. Vélez, pp.13.46-13.49, Ed. McGraw-Hill, Madrid

ICONA, 1997: *Clave fotográfica de modelos de combustibles*, Madrid (There is a version on CD, Ministry of Environment, Madrid 2004)

Martínez, E. et al. 2001: *Manual de quemas controladas*, 175 pp, Ed. Mundi-Prensa, Madrid.

Molina, D. 2000: *Fuego prescrito y Planes de quema*, en “*La defensa contra incendios forestales. Fundamentos y experiencias*”, Coordinator: R. Vélez, pp. 14.36 – 14.61, Ed. McGraw-Hill, Madrid.

Plan Bleu 2003: *Les espaces boisés méditerranéens*, J. Montgolfier, Plan Bleu, Paris, 192 pp

Rodríguez-Silva, F. et al. 2001: *Modelos forestales de quemas prescritas*, Junta de Andalucía, unpublished.

Suarez, J., 2000: *El voluntariado en la Comunidad Valenciana*, en “*La defensa contra incendios forestales, Fundamentos y experiencias*”, Coordinator: R. Vélez, pp.13.40-13.46, Ed. McGraw-Hill, Madrid

Vega, J.A., et al. 2001: *Manual de queimas prescritas para matogueiras de Galicia*, 171 pp, Ed. Xunta de Galicia, Pontevedra.

Vélez, R., 1987: *Basic recommendations for prevention campaigns directed towards man-made forest fires*, Documents of the Seminar UN/FAO/OIT on Methods and equipment for forest fire prevention, Ed. ICONA, Madrid.

Vélez, R., 1990: *Preventing forest fires through silviculture*, UNASYLVA 162, Vol. 41, FAO, Rome.

Vélez, R., 1992: *Forest Fire Prevention: Policies and Legislation*, Documents of the Seminar UN/FAO on Fire Prevention and Land Management, Athens.

Vélez, R., 2000a: *Las quemas incontroladas como causa de incendios forestales*. Cuadernos de la Sociedad Española de Ciencias Forestales, nº 9, pp. 13-26, Ed. SECF, Madrid.

Vélez, R., 2000b: *Actuación sobre las causas de origen humano. Persuasión, conciliación y sanción. Legislación preventiva*, en “*La defensa contra incendios forestales. Fundamentos y experiencias.*”, Coordinator: R. Vélez, pp. 13.1-13.6 y 13.18–13.28, Ed. McGraw-Hill, Madrid.

Vélez, R., 2002: *Forest fire prevention with a target: The rural people*, in Proceedings of the IV International Conference on Forest Fire Research, Luso, Portugal

Viegas, D.X., 2004: High mortality, Rev. WILDFIRE, September/October 2004, pp. 22-26, IAWF, New York.

Videotapes

(original version in Spanish, copies in English with French Subtitles)

ICONA 1985: *Fire prevention in agricultural burnings*, 13 min., VHS-PAL, MAPA, Madrid.

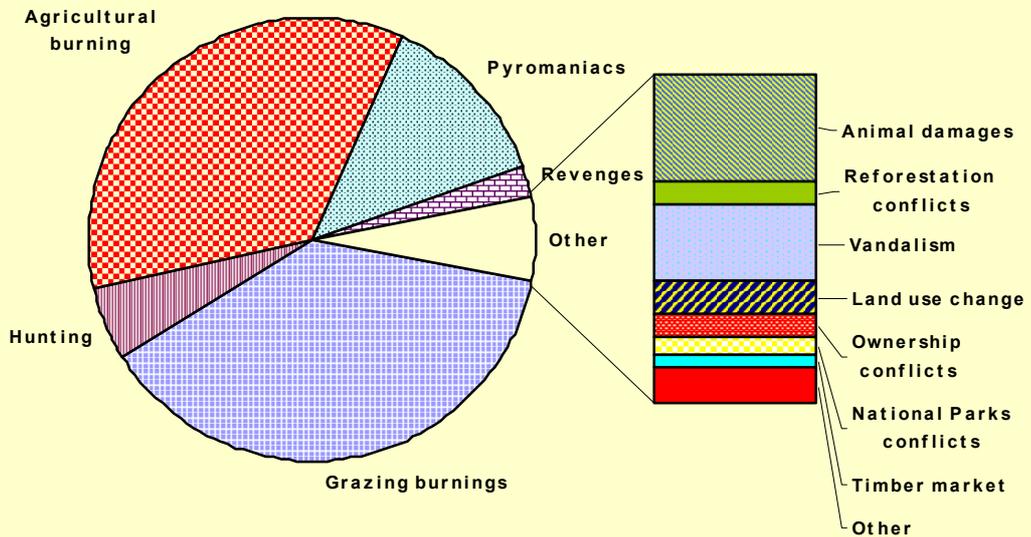
ICONA 1986: *Fire prevention in rural burnings in Northern Spain*, 15 min., VHS-PAL, MAPA, Madrid.

ICONA 1995: *Preventive silviculture*, 15 min, VHS-PAL, MAPA, Madrid

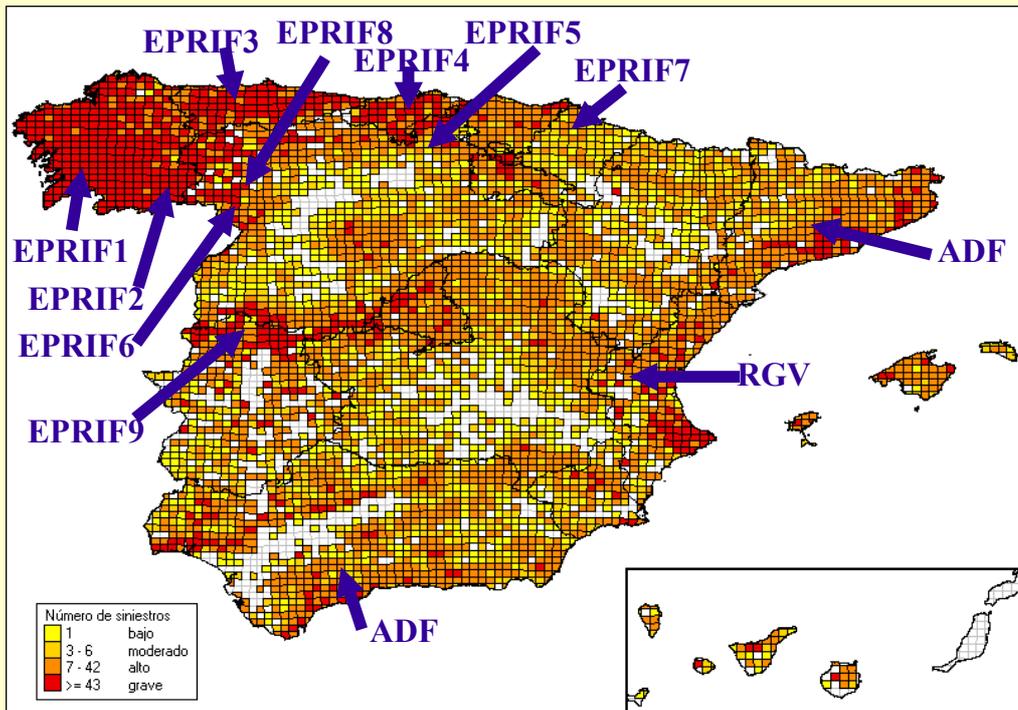
DGCN 1998: *Prescribed burning for fire prevention*, 15 min., VHS-PAL, Ministry of Environment, Madrid.

DGB 2005: EPRIF : *Prevention of fire escapes from rural burnings*, VHS-PAL, Ministry of Environment, Madrid

Graph 1: Motivations of deliberate fires



Map 1: Deliberate fires 1991 – 2000 Areas where EPRIF and ADF are established



ANNEX 1. EPRIF Terms of Reference

1. SPECIFIC MISSIONS

These missions are to be developed in the district previously chosen with the Regional Authority and in coordination with its Services, which will provide an office in the district.

- Education on Forest fire prevention techniques for the rural population: farmers, livestock breeders, shepherds, forest owners and hunters.
- Advising the public in preventive silviculture works: fuel breaks, slash elimination, roads cleaning, wells and reservoirs, etc.
- Planning and implementing controlled burning with farmers
- Patrolling the district during the high risk days
- Investigating fire causes
- Environmental education for children in the schools

2. COMPLEMENTARY MISSION

- Assistance to the district services in first attack to the fires starting in its area of operations. The EPRIF team will work under guidance (command) of the district fire boss. .

3. EPRIF EQUIPMENT

- Standard Individual Protection Equipment, according to the “Catalog of Equipment and Tools”, CLIF⁵ Recommendation, MMA⁶ 2000 (nomex overall, hard hat, fire boots, gloves, etc.).
- Standard tools for burning (drip torch) and suppression (pulaski, shovel, macleod, etc.) according to the mentioned CLIF Recommendations.
- Investigation box containing the following:
 - Camera
 - Thermometer, psychrometer and anemometer
 - Compass, metric tape and lantern
 - Sampling tools

⁵ CLIF: Comité de Lucha contra Incendios Forestales (National Wildfire Coordinating Committee)

⁶ MMA: Ministerio de Medio Ambiente (Ministry of Environment)

- Elements to mark the origin of the fire
- Two cell phones
- A 4 x 4 vehicle able to carry 7 people plus equipment
- During three months (February 15-April 15) another 4 x 4 vehicle with a slip-on tank of 600 l. capacity to help in burning and in suppression
- Educational documents (videos, pamphlets, hand-outs, etc.)

4. LABOR TERMS

- Week hours

37.5 hours a week, on usual working days.

When some tasks cannot be performed during weekdays, this over time will be compensated with vacation time. Some examples of these tasks are: Burnings when the right weather conditions fall on Sunday; meetings with the farmers in livestock markets, when they fall also on Sunday; fire suppression on weekends, etc.

- Daily hours

7.5 hours a day usually from Monday till Friday.

When it is necessary to extend this shift (for instance, because of fire suppression) the maximum limit will be twelve hours from the arrival at the job place.

After this limit the personnel will have a minimum rest of eight hours.

5. CONTROL OF ACTIVITY

The EPRIF team will prepare a report of every activity, by filling the standard form (Annex 2). These forms will be sent every 15 days to the “Area de Defensa contra Incendios Forestales”. (The National Forest Fire Service, Ministry of Environment), Gran Vía de San Francisco, 4, 28005 Madrid, Spain.

6. INTERPRETATION OF THESE TERMS

All questions on these terms are to be addressed to the “Area de Defensa contra Incendios Forestales”.

N.B.- These are the terms of the 2004-2005 contract, established in October 2004

3.- CONTROLLED BURNING

4.- MECHANICAL CLEARING

Land ownership: Public: Public no Cat.: Private: Military: Other:

Objectif Surface (ha): Planned Effective

Vegetation:

Grass Model | Trees Model

Shrub Model | Slash Model

Resources:

Foresters Assistants Workers VPPA

Rangers Firefighters Machines Tankers

Farmers G.Civil, P, etc Others

Times: Total (hh:mm) Execution (hh:mm)

Owner: Farmers Municipal Region Others

Satisfaction degree: Low Medium High Very high

Fuel reduction degree: %

5.- EVALUATION OF PREVIOUS BURNINGS:

Type

Time: (hh:mm)

Year of the burning Surface:

6.- INVESTIGATION OF CAUSES:

Date

Causes: First estimation

Time in the field: (hh:mm)

Causer: Identified: Yes No

Report No.

Final result

Report to the Judge: Yes No

Police intervention Yes No

7.- MEETINGS:

Time: (hh:mm)

With: Administration Mayor Farmers

Hunters Others

8.- SENSIBILIZATION

Time: (hh:mm)

To: Administration Farmers

Children Others

9.- OTHER ACTIVITIES:(Times) (hh:mm)

- In the office - Visit to livestock markets

- Patrolling - Others

10.- OBSERVATIONS

The EPRIF Boss

Signed: _____