

Management of Forest Fires Through the Involvement of Local Communities in Turkey

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EXECUTIVE SUMMARY

In Turkey, forest degradation is the result of overutilization, forest fires, unsustainable forest management, the socio-economic problems of local forest dwellers, ownership and land tenure problems, converting forest land to agriculture and settlement and unsound legislation. Turkey is in the Mediterranean region and is mostly under semi-arid climatic conditions, with 7 million ha of forests being very sensitive to fire. In Turkey, nearly all forest fires are the result of human activities. In order to develop sound measures regarding forest fires, it is necessary to know what lies behind these human activities and how communities take an active role in forest fire management.

This study discusses the social aspects of forest fires, particularly community involvement in forest fire prevention and public policies affecting that involvement. The study assesses community involvement in forest fire prevention, control and management in the Çal and Bergama Forest District Directorates, where there is active participation of the local people, and results are compared with neighbouring forest district directorates that have similar climatic and ecological conditions. Results from the case study show that rural people participating in community-based fire management (CBFiM) have lower than average levels of intentional fires compared with national statistics. The rate of intentional forest fires in Çal is 12.1 percent and in Bergama 10.8 percent, while the national average for the last ten years is 14 percent (not including unreported fires). In addition, when villagers carry out early fire control interventions (without waiting for fire fighting teams to arrive on the site), fire sizes are smaller than the national average. Average fire sizes are 2.4 ha in Çal and 3.9 ha in Bergama, while the national average for the last ten years is 6.5 ha. This demonstrates the effectiveness of CBFiM. Both Çal and Bergama are thus very good examples of how the active participation of local people can increase the success of forest fire prevention and control measures.

Gestion des Incendies de Forêt Grâce à la Participation des Communautés Locales en Turquie

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RÉSUMÉ

En Turquie, la dégradation des forêts est due à la surutilisation, aux incendies, à la gestion non durable, aux problèmes socio-économiques des habitants des forêts, aux problèmes de propriété et de régime foncier, à la mise en culture des terres boisées, à la colonisation et à la législation peu judicieuse. La Turquie, pays méditerranéen, a dans l'ensemble un climat semi-aride de sorte que 7 millions d'hectares de forêts sont fortement exposés à l'incendie. Dans ce pays, les feux de forêt sont presque toujours provoqués par les activités humaines. Afin de mettre au point des mesures bien fondées dans ce domaine, il est nécessaire de savoir quelles sont les causes profondes de ces activités et comment les communautés participent activement à la gestion des feux de forêt.

L'étude expose les aspects sociaux des incendies de forêt, en particulier la participation des communautés à la prévention et les politiques officielles qui influent sur cette participation. La participation des communautés à la prévention, à la lutte et à la gestion des incendies de forêt dans les directions des districts de Çal et de Bergama où les populations locales interviennent activement, est étudiée et les résultats obtenus sont comparés à ceux des districts forestiers voisins qui ont un climat et un environnement analogues. Il ressort de l'étude que les populations rurales participant à la gestion à base communautaire des incendies enregistrent un taux d'incendies volontaires inférieur à la moyenne nationale. Le taux d'incendies de ce type atteint 12,1 pour cent à Çal et 10,8 pour cent à Bergama, contre une moyenne nationale de 14 pour cent pour les dix dernières années (compte non tenu des feux non déclarés). En outre, lorsque les villageois interviennent rapidement pour lutter contre les incendies (sans attendre l'arrivée des équipes de pompiers), les incendies restent d'une ampleur inférieure à la moyenne nationale. En effet, l'ampleur moyenne se chiffre à 2,4 hectares à Çal et 3,9 hectares à Bergama, contre une moyenne nationale de 6,5 hectares pour les dix dernières années. Ces chiffres montrent bien l'efficacité de la gestion à base communautaire des incendies de forêts. L'exemple de ces deux zones fait clairement ressortir comment la participation active des populations locales renforce l'efficacité des mesures de prévention et de lutte contre les incendies de forêt.

Manejo de Incendios Forestales a Través de la Participación de las Comunidades Locales en Turquía

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RESUMEN DE ORIENTACION

En Turquía, la degradación de los bosques obedece a la utilización excesiva de las quemadas forestales, así como al manejo insostenible de los bosques, a los problemas socioeconómicos de los habitantes del bosque, a los problemas relacionados con la propiedad y tenencia de la tierra, a la conversión del bosque en tierras agrícolas y en áreas de asentamiento, así como a la legislación inadecuada. Turquía se sitúa en la región mediterránea y sus condiciones climáticas son semiáridas, contando además, con 7 millones de ha de bosques, muy vulnerables a los incendios. En Turquía, casi todos los incendios forestales son consecuencia de las actividades humanas. A fin de desarrollar las medidas apropiadas en materia de incendios forestales, es necesario conocer las causas que subyacen en estas actividades humanas, y entender cómo las comunidades participan de manera activa en el manejo de los incendios forestales.

El estudio aborda los aspectos sociales que conllevan los incendios forestales, especialmente la participación de la comunidad en la prevención de los incendios forestales, así como las políticas gubernamentales que influyen en esta participación. El estudio evalúa la participación que la comunidad tiene en la prevención, control y manejo de los incendios forestales en las juntas directivas de Çal y Bergama del distrito forestal, en donde existe una participación activa de la población local, y cuyos resultados están siendo comparados con los de las juntas vecinas del distrito forestal, cuyas condiciones climáticas y ecológicas son similares. Los resultados que arrojó el estudio de caso muestran que la población rural que participó en el manejo comunitario de incendios forestales cuenta con niveles de incidencia de incendios intencionales por debajo del promedio de las estadísticas nacionales. El ritmo de incendios forestales intencionales en Çal es del 12.1 por ciento, alcanzando el 10.8 por ciento en Bergama, mientras que el promedio nacional, en los últimos diez años, asciende al 14 por ciento (excluyendo los incendios no señalados). Además, cuando la población lleva a cabo actividades de control temprano de incendios (sin esperar a que los equipos contra incendios lleguen al lugar) la extensión de los incendios suelen ser menores respecto al promedio de las extensiones que se queman en el resto del país. La extensión promedio de los incendios es de 2.4 ha en Çal y de 3.9 ha en Bergama, mientras que el promedio nacional, durante los últimos diez años, llegó a 6.5 ha. Estas cifras demuestran que el manejo comunitario de los incendios forestales es eficaz. Tanto Çal, como Bergama constituyen ejemplos muy buenos de cómo la participación activa de la población local puede incrementar el éxito de las medidas de prevención y control de incendios forestales

INTRODUCTION

Forests are one of the world's most important renewable natural resources. For centuries, populations have degraded these resources in their attempts to satisfy their wood and fuelwood demands and to open additional agricultural lands and settlement areas. One of the most important reasons for forest deterioration has been the increase in forest fires. Forest fires are the main environmental disaster suffered by countries in arid and semi-arid climatic regions. Turkey has such a Mediterranean climate, and some 7 million ha of its forests are sensitive to fires. In Turkey, nearly all forest fires are the result of human activities. In order to develop sound measures regarding forest fires, it is necessary to know what lies behind these human activities and how communities play an active role in forest fire management. This study discusses the social aspects of forest fires, community involvement in forest fire prevention, control and management, and public policies that affect fires in Turkey.

Objective of the case study

The objective of this study is to examine the impact of community involvement in forest fire management. The study includes a review of how active participation helps to prevent and control wildfires, acknowledging that this varies from place to place depending on socio-economic and political conditions and on whether management is government- or community-driven.

BACKGROUND INFORMATION ON TURKISH FORESTS AND FORESTRY

Turkey has a unique geographical and cultural position at the crossroads between Europe and Asia. It covers an area of 777 971 km², including 78 000 ha of lake and water surfaces. Rich diversity of ecological conditions prevail in different regions of the country. Depending on the topographical and climatic conditions, vegetation types may show distinct variety even within short distances. The average altitude is about 1 132m above sea level, and only 10 percent of the country lies below 250 m above sea level

Mixed farming is the predominant farming system, with 72 percent of farms producing both livestock and crops. Animals feed on range and pasture grasses in summer and on crop residues, conserved forages and purchased concentrates in winter. The winter diet is often deficient, and animals are frequently put out to graze on communally owned rangelands very early in the spring, before vegetation has become well established. Large areas of degraded forests are used by villagers as grazing lands, causing further degradation as well as conflicts between villagers and forestry organizations. The young shoots and leaves of some forest trees (mostly oak species) are cut and dried by villagers to be used as winter feed.

The population of Turkey was an estimated 64.3 million people in 1997, and there is an annual growth rate of 1.6 percent. The population of forest village communities has decreased significantly, especially during recent decades, as a result of a high rate of migration from such areas to find jobs and better living conditions in urban centres.

Forest area and forest resources

The forest area of 20.7 million ha accounts for 26.7 percent of the country's total area (National Forestry Inventory, 1972 to 1996). However, productive forests cover only about 48.2 percent (10 million ha) of the total forest area, the remaining 51.8 percent (10.7 million ha) being

degraded or severely degraded unproductive forest cover. Conifer forests dominate the high forests, occupying 32 percent of the total forest area and 80 percent of the high forest. High broadleaf forests occupy only 8 percent of the total forest area and 20 percent of the high forest. Concerning forest fires, it is worth mentioning that Calabrian pine and black pine, both fire-sensitive species, account for 20.2 and 15.97 percent, respectively, of the total forest area.

The production of various non-wood forest products (NWFPs) (fodder, resin, nuts, mushrooms, bulbous plants, herbs, game, etc.) provides significant contributions to the local and national economies. Export revenues from NWFPs (about US\$70 million annually) are greater than wood export revenues. The potential contribution of NWFPs is much higher, and could be realized through more efficient management and utilization of such resources.

Forest resources provide vital socio-economic contributions, especially for local communities – i.e. the 7 million people living in approximately 19 000 forest villages. Almost all the energy needs of such communities are provided by fuelwood, which is supplied to them at highly subsidized prices from the state forests. (The state forests provide almost 80 percent of the total fuelwood production of about 10 million m³.) The roundwood needed by forest villagers is also provided at subsidized prices from the state forests, which produce about 380 000 m³ annually. The total value of the subsidies that the General Directorate of Forestry provides to forest dwellers as fuelwood and roundwood was estimated to be about US\$100 million in 1997.

Employment in forestry activities (i.e. protection, harvesting, transportation, nursery production, plantation, etc.) is another important contribution of the forest sector. A total of 47 million worker days were provided by these activities during 1996. The great majority of people employed in these activities come from forest villages where incomes are very low and alternative employment opportunities are scarce.

Credits and grants provided through the Forest Village Development Fund for the development and support of various small-scale income-generating and village development activities (i.e. beekeeping, animal husbandry, energy-saving stoves and cooking devices) represent another important socio-economic contribution from the Ministry of Forestry.

Socio-economic conditions of forest village communities

According to forest legislation, villages located within or adjacent to forest areas are considered to be forest villages. Their estimated population of 7 million accounts for half of the rural population and 11.5 percent of the national population. The ecological, social and economic conditions of forest village communities show significant diversity.

Forest villages are poorer than other Turkish villages. The most important poverty indicators are far below national averages. Landownership, the most important indicator, is significantly lower than the national average of 64 decares per household. Regional averages for forest villages are 20 decares in the Black Sea region, 24 decares in the Mediterranean region and 28 decares in the Aegean region. Livestock ownership is also very low. The main income sources of forest villages are farming, livestock raising and horticulture. Families earn one-third of their income from farming and another third from raising livestock. Only 8 percent of villagers earn their living from work in forest-related activities.

According to the Forestry Sector Review, high rates of out-migration, particularly of the younger generation, are changing the demographics of forest villages. As a result, elderly people (more

than 60 years of age) now make up 14 percent of the total forest village population. Migration from rural to urban areas is particularly visible in forest areas. As most migrants are men, there is a disproportionately high female population in forest villages. Migration of the younger generation, particularly men, has created a serious disproportion in terms of demography and gender balance. The trend significantly limits forest villages' workforce capabilities. Furthermore, when men work outside the village women take over timber harvesting and other traditional male activities. This is especially significant because women perceive that they obtain more benefits from the forest than men perceive and, as a result, they attach greater value to it.

Animal husbandry is a major economic activity in forest villages. Pastures within or near forests cover a total area of only about 1.5 million ha, which is far from being sufficient to meet the needs of existing animal populations. Controlled grazing, range improvement and fodder production efforts and practices are scarce owing to economic and traditional reasons. Heavy grazing in the forest creates serious damage, especially by destroying regenerations, and the cutting of young oak shoots and leaves for winter feed is a widespread traditional practice.

Employment in forestry activities (felling, extraction, transportation, nursery production, plantation, forest maintenance) is one of the main sources of income for forest village communities. However, other than in the limited regions where intensive harvesting and other large forestry programmes are implemented, employment in forestry activities is generally seasonal and only for short periods (according to one evaluation, only 8 percent of forest workers are permanently employed, while the remaining 92 percent are employed temporarily in seasonal work).

The potential for gaining good additional income from other income-generating activities, such as carpet weaving, handicrafts, apiculture, mushroom and NWFP harvesting, has been utilized to only a limited extent owing to a lack of sufficient awareness, training, financial support and marketing experience. Ecotourism and recreation activities in forest areas provide no significant contribution, although they have good potential in several regions. At present, the per capita income in forest villages is estimated to be about US\$200, which is well below the national average.

MAJOR CAUSES OF FOREST FIRES

Most deforestation and forest degradation originate from the interventions of the large forest village population who are heavily dependent on excessive use of forest areas and resources for their livelihood. According to statistics, about 5 000 forest encroachment cases take place annually. On average, 15 000 ha of forest area is cleared every year by forest-dependent villagers through intentional forest fires and illicit cutting.

Meeting family fuelwood needs is the main reason for illicit cutting. The fuelwood that the forestry organization provides at subsidized prices accounts for only a small portion of actual consumption. The remainder is provided from illicit cutting in neighbouring forests, which exceeds 10 million m³ annually. Illicit grazing in degraded and productive areas is another serious problem in most forest regions. Grazing goats cause severe damage because they eat the shoots of young trees in regeneration sites. Controlled grazing has a very important role in preventing forest fires, especially in coastal areas where the climate and vegetation are very likely to lead to forest fires.



Charcoal production in the forest

Turkey's climatic conditions are highly favourable to forest fires, especially in the Mediterranean, Aegean and Marmara regions. The large number of settlement areas within or near forest areas further increases the fire risk, and a great majority of fires are caused by accidental or intentional human interventions.

Some 6.9 million ha of Turkey's 20.7 million ha forest area are very sensitive to forest fires. The areas of highest risks are the Aegean region (41 percent of all fires), the Mediterranean region (24 percent) and the Marmara region (22 percent). About 43 percent of the forest areas in 16 of Turkey's 27 Forest Regional Directorates and 126 of its 243 District Forest Directorates are deemed at risk from forest fires. Data indicate that four Regional Directorates account for about 56 percent of the total area burnt. The largest forest area burnt is in Mugla (21.3 percent), followed by Izmir (13.3 percent), Antalya (11.3 percent) and Çanakkale (10.0 percent). Some 41 percent of all forest fires occur in these four Regional Directorates.

Most of the forest fires in Turkey occur between June and October: according to observations about 83 percent of forest fires occur in this period. Fire causes maximum damage in terms of area burnt during the month of July (30.8 percent), followed by August (27.1 percent), September (13.4 percent) and October (9.3 percent). Most forest fires start between 10:00 and 20:00 hours, when human activities levels are very high and humidity levels are very low.

The majority of forest fires in Turkey are the result of human activities. Human-caused fires account for 97 percent of all fires. The causes of forest fires in Turkey are: 36 percent caused by human negligence or carelessness (camps, shepherds' campfires, cigarettes), 13 percent caused by intentional human interventions (clearing for agricultural land and settlement areas), 3 percent caused by lightning and other natural causes, and the remaining 48 percent caused by unidentified human activities. The causes of nearly half of forest fires are unknown, making it very difficult for decision-makers to develop effective fire prevention strategies. Fires are registered as unknown fires for the following reasons:

Case studies

- Forestry staff sometimes register a fire as an unknown fire in order to avoid having to investigate it and follow legal procedures. (When the cause of a fire is registered as carelessness or intentional, questions such as who the offenders were, how it happened, how it spread, who witnessed it have to be answered.)
- Forestry staff might conceal the cause of a fire for some personal reason.
- Sometimes, villagers do not inform the authorities, even if they know the causes of the fire.

However, it is very likely that fires caused by negligence and carelessness and by intentional activities account for shares of the unknown fires that are similar to their shares in known causes. It can therefore be concluded that 70 percent of all forest fires are the result of negligence and carelessness and 27 percent are the result of intentional activities.

It is worth mentioning that the share of unknown fires has decreased considerably over the last five years. This is the result of very detailed investigation of the causes of fire. In the period 1997 to 1999, the main causes of forest fires, by average numbers, were: agricultural residue burning (172 fires), shepherds' fires (164), cigarettes (134 fires), arson (91 fires), opening forest lands for agriculture and settlement (134 fire) and energy lines (56 fires). Unknown fires accounted for 23 percent of fires (1 175 out of 5 345), which is well below the average for the previous 63 years of statistics.

In recent years, the number of fires has increased as a result of increased population, industrial development and mass tourism activities. However, the total area burnt and the average area burnt per fire have decreased with the implementation of effective measures including developed communication, increased public awareness and strategic suppression efforts.

Fire suppression and control are carried out by the Forest Protection and Fire Fighting Department of the General Directorate of Forestry at the central and field levels through 27 Forest Regional Directorates. There are no fire control or fire fighting plans at the regional directorate level. Fire control and fire fighting plans are prepared and implemented at the forest district directorate level.

TRADITIONAL USE OF FOREST FIRE AND RELATIONSHIP WITH OTHER PRACTICES

Fire use is not very common in Turkey. Prescribed burning is not a part of forest fire management. In forest management, fires are used locally for land clearance (for afforestation) and for promoting natural regeneration in cedar and Calabrian pine stands.

The use of fire in agriculture frequently results in forest fires that destroy forests. Over the three years from 1997 to 1999, an average of 9 percent of forest fire occurrences and 10 percent of the total burnt area were caused by agricultural burning.

There are three types of traditional fire use in agriculture:

- burning of agricultural residues (stubble burning);
- burning of rubbish from orchards and vineyards (branches, roots, etc.), especially after autumn maintenance;
- burning of shrubs, brush and thorns for the improvement of rangelands or to gain new grazing lands.

Stubble burning

Stubble burning is a very common tradition in Turkey and is widely practised throughout the country. After harvesting cereals, farmers burn the crop residues (stubble) during May and June, when the weather is hot and dry. This was not a common practice until the 1950s, when agricultural machines were first introduced. Prior to that, farmers left some lands fallow and reaped cereals by hand (with sickles or scythes), cutting the crops at the soil level. Reaping–threshing machines, which have been used for the harvesting of cereals since the 1950s, cut the crops 15 to 20 cm above soil level (because soil surfaces are usually uneven) and leave stubble on the ground. Although stubble burning is forbidden by law, it is very common. Although scientists disagree, farmers believe that stubble burning is useful, especially for soil fertilization. They give the following reasons for stubble burning:

- It reduces fuel (diesel) expenses; ploughing agricultural lands with stubble increases the fuel expenses of the machinery used.
- It reduces weeds and pests; according to farmers, it is the easiest and quickest way to get rid of unwanted vegetation in dry regions.
- There is no market for straw, so farmers do not collect the stubble for straw.

As already mentioned, legal restriction has not solved the problem. Statistics indicate that forest fire damage resulting from agricultural burning has increased, rather than decreased, since legal restrictions were introduced in 1995. The problem and possible solutions should be discussed with farmers, who should also participate in decision-making, along with local authorities, muhtars and members of village elders' councils. The following are some of the potential ways of integrating stubble burning with land management practices:

- Stubble could be burnt after the fire season, preferably in late autumn. When rotational agriculture is practised (at least two crops are cultivated in rotation every year), farmers could be convinced to change their crop types. At present, stubble burning is mainly practised in rainfed agricultural areas by farmers who generally cultivate wheat and barley in one rotation.
- Firebreaks should be established between agricultural lands and forest borders by ploughing the agricultural land to keep the fires in the agricultural areas.
- Markets and potential uses for straw should be sought, and straw utilization should be encouraged.
- The effects of stubble burning on soil productivity, microorganisms and climate should be researched, and farmers' awareness of fire's effects should be increased through effective extension activities.
- Traditional agroforestry/agro-silvipastoral systems should be examined and extended, where appropriate, to agricultural and forest border areas. In some regions, the use of such traditional systems has resulted in reduced fire spread and damage. Firebreak shelters should be established on both private agricultural land and forest land.

Burning of rubbish from orchards and vineyards

The aim of this kind of burning is to clear and prepare gardens for the following year. In autumn, after harvesting, farmers carry out pruning, selection and clearing activities in their orchards, olive groves, vineyards and citrus gardens. They collect rubbish (branches, roots, leaves and stems), gather it on the edges of their gardens and burn it. Such fires frequently get out of control and spread to the forests. As forest fires resulting from rubbish burning occur in late autumn,

when timber is dry and fire prevention and control measures are at their lowest level, they can easily spread and cause severe damage. This kind of burning is forbidden by the Forest Law (No 6831 Article 76/d), but legal prohibition is not always effective and farmers should be trained on controlled burning techniques and fire behaviour.

Burning for grazing purposes

The aim of this kind of burning is to clear the unwanted vegetation (shrubs, brush and thorns) that grows in range areas and reduces the quality of the range. This burning is also used to create new grazing land, but such use of fire is not very common. As a result of decreasing rural populations and fewer animals, the need for grazing lands has been reduced. In order to prevent burning to create grazing lands, farmers should be trained on controlled grazing, range improvement and fodder production, and these activities should be supported with appropriate incentive and credit policies. The effects of fire – especially in the long term – and range management options should be discussed with farmers. Afforestation areas in which the trees have reached a certain height can be opened to controlled grazing in order to reduce both the fire risk and the grazing pressure. However, it should not be forgotten that range as well as fire management are inseparable parts of forest management in Turkey.

AWARENESS LEVEL OF THE RURAL POPULATION

In order to assess the awareness level of rural people, field-level studies were carried out in two different Forest District Directorates located in the Mediterranean and Aegean regions. Questions and discussions focused on villagers' awareness about forest fires, their perspective on forestry staff and forestry management, their attitudes to forest fires and their attitude changes when they take part in forest management.

The study showed that, when villagers are included as partners in forest management and when they are able to derive benefits from forestry activities, the number of deliberate fires decreases considerably. Furthermore, as a result of villagers' rapid intervention whenever a fire breaks out, the total burnt area and the burnt area per fire also decrease. Even so, and in spite of the fact that they are aware of forest fires and have knowledge of forests and forest management, rural people still cause fires, either intentionally or unintentionally. The discrepancy between awareness and behaviour is the result of economic and social factors and, in order to explain it, it is necessary to assess human behaviour in terms of the causes of fire.

Intentional fires

It is clear that most intentional forest fires are set by the rural population (forest dwellers) for various social and economic reasons. However, this does not mean that forest dwellers are unaware of forest fires and their effects. Several factors induce rural people to set forest fires:

- As the forests are owned and managed by the state, all decisions on forestry matters are taken by the government and implemented by government staff. Most government staff do not have communication and interpersonal skills, and sometimes their behaviour creates conflict with forest villagers. Forest villagers do not have enough legal or political power to change decisions. One local forestry staff member stated that most deliberate forest fires are set by villagers reacting against unjust decisions of the Forestry Department or unfair behaviour of forestry staff.

- Forestry activities are labour-intensive and provide temporary or permanent employment for thousands of forest villagers. The Forestry Department can reduce or stop harvesting, afforestation and other forestry activities in the region, thereby affecting the economic situation of the region. Some villagers set forest fires as a way of creating new employment opportunities. Post-fire activities include clearing dead trees, transportation activities, land preparation for plantations, and the maintenance of plantations for four to five years. Forest villagers are employed in these activities in accordance with the Forest Law. Fires that are set to create employment opportunities are mainly caused by selfish people and are individual cases rather than the norm.
- Most agricultural land was cleared from forests. Severe erosion is evident in these lands with soil gradually losing its fertility and production capacity. Irrigation is not possible on most agricultural lands, and artificial fertilization is not economic. Villagers have few alternatives for increasing agricultural production. The expansion of agricultural lands is one such alternative, which is widely practised. In order to obtain new agricultural lands, forests are cleared through fire and other means.

Intentional fires are the result of deep-rooted socio-economic problems that have prevailed in the country for decades. It is not possible to prevent these kinds of fire with education and extension programmes alone. Long-term strategies including substantial changes such as joint management of forest resources, land classification and economic development programmes should be prepared and implemented for this purpose.

Negligence and carelessness

Some forest fires are caused by the negligence or carelessness of rural people. Agricultural burning and shepherds' fires are the most common causes. Such fires can be explained in terms of socio-economic analysis of rural life and activities:

- As a result of migration, the social structure in rural areas has changed considerably. Migration of the younger generation, particularly men, has created a serious disproportion in terms of demography and gender balance. The trend significantly limits forest villages' workforce capacities. Women and children are undertaking most of the daily work, including animal breeding and agricultural activities, and they are also employed in forestry activities such as afforestation, land preparation and maintenance of plantations. A very high proportion of women are illiterate and their social and cultural levels are relatively low compared with those of men. Most shepherds are children (of between 8 and 14 years of age), women and, in some cases, men who are suffering from mental illness or who are disabled. While grazing animals, these people light fire for heating or to prepare food. This high fire risk and ignition frequency results in an increase in forest fires.
- After migration to the cities, rural people maintain ties to the rural areas. During the summer (the harvesting season), when the schools are closed, most migrants return to their villages to carry out farming activities, particularly harvesting. The second generation of migrants do not have the necessary rural background and knowledge. When this generation performs agricultural activities or animal grazing, they cause forest fires because their knowledge of fires is not sufficient.
- Forest villagers regard agricultural burning as an economic and quick way of getting rid of unwanted vegetation. They do not believe that agricultural burning is harmful to agricultural lands – on the contrary, they believe that it is useful, especially for soil fertilization.

Agricultural burning in areas adjoining forest was forbidden by law in 1995. However, legal prohibition has increased the effects of forest fires by converting agricultural burning into uncontrolled burning. The ban is thus not practical and results in villagers burning without control. For example, villagers secretly light fires in neighbouring agricultural areas and leave them to burn unattended for fear of being caught. Such fires often reach the forests and turn into uncontrolled forest fires.

In order to prevent fires resulting from negligence, a detailed target group analysis should be carried out. According to the results, appropriate extension methods should be used in an awareness programme. Target groups should include rural women, children, shepherds, rural hunters, disadvantaged groups and adults. For cultural reasons, it is very important to employ female extension agents to reach rural women in Turkey.

COMMUNITY INVOLVEMENT IN FOREST FIRE PREVENTION, CONTROL AND MANAGEMENT

Before discussing community involvement in forest fire prevention, control and management, it is necessary to have a good understanding of forest management in Turkey.

Nearly all forests are owned and managed by the state. Forest lands and resources are managed according to the forest management plans prepared by the planning department of the General Directorate of Forestry. These plans are the most basic and strictly binding documents for all sorts of forestry activities. Their main concerns and orientation are the planning of timber and fuelwood production, the development of growing stock and the implementation of regeneration and silvicultural activities. Consultation with local people (forest dwellers) and studies of socio-economic conditions and needs are typically very weak. This means that local people do not take part in decision-making and planning process, and they have very little influence on decision-makers or planners. In addition, local people do not take part in the management and utilization process. Local people's utilization of forest resources, for example, grazing animals inside forests or collecting NWFPs – which they perceive as a traditional right – is subject to the permission of the forestry administration. In participatory management systems such decisions are made with the participation of all the parties involved, and villagers are thus able to see themselves as partners in the management of forest resources. This is also the case in the management of protected areas. Protected areas are established without consulting the people living in the area, and some of their rights are restricted by the forestry administration and protection statutes. Moreover, the revenues from protected areas (such as national parks, nature parks, recreational areas) usually go to private contractors, the forest administration and the treasury. In some cases, villagers have to pay to enter local protected areas. During discussions, one villager showed his reaction by saying: “some times, I am thinking to light fire to the forest so that the area will lose its value and protection statutes will be lifted”.

Another important point is that there is no two-way communication between the Forestry Department and local people owing to the central-based institutional structure of the department and the inadequate interpersonal and communication skills of forestry staff. On the one hand, the Forestry Department has its own objectives and priorities regarding forest management, which it has set without giving much consideration to the needs and priorities of forest villagers. On the other hand, the forest villagers have their own objectives and priorities, which are not generally consistent with those of the Forestry Department. Long-lasting conflicts and lack of communication have aggravated this situation.

Villagers are employed in forestry activities and are supplied with some timber and fuelwood at subsidized prices. These are very important contributions of the forest sector to the income of local communities, but the management system has caused conflicts between forestry administration and local people (forest dwellers) and has resulted in forest degradation. The objective of government policies is to reduce the pressure on forests, and not to achieve public participation in forest management. There are some exceptions to this management system. The management of coppices, chestnut and stone pine forests are among the best examples of community forestry in Turkey. Turkey has much potential for the development of participatory forest management systems.

Community involvement in forest fire prevention, control and management is also affected by the forest management approaches adopted. In this area, the government is trying to achieve public involvement in forest management through legislation.

PARTICIPATION OF THE RURAL POPULATION

Rural people living in villages or towns are legally responsible for participating in forest fire prevention and control. The Forestry Law gives rural people the following responsibilities:

- Individuals who notice a fire or signs of a fire within or around the forest are obliged to inform the Forestry Department or other government authorities.
- Men aged between 18 and 50 years of age and living in the villages around the forest are obliged to join fire suppression activities with their own fire control equipment.

The areas over which villages are responsible for preventing and controlling fire are allocated in district-level fire control plans. According to these plans, some 766 000 people living in villages and towns are responsible for forest fire suppression.

Rural people generally react against such legal obligation. The following are some of the reasons for this reaction:

- The Forestry Department pays fire workers who, villagers argue, should have full responsibility for fire fighting. These fire workers receive very high salaries (even higher than those of technical staff, because workers are members of unions), which creates jealousy among other people in the local community and reduces their participation in fire control activities.
- Rural people do not see themselves as partners in forest management and they do not believe that they derive any benefit from the revenues generated by forestry activities.
- The relation between rural people and forestry staff is based mainly on the personality of local forestry staff. The dictatorial behaviour of top-down forestry causes reactions and reduces participation. The local people make excuses to escape from their legal responsibilities regarding participation in fire suppression.
- Most fires occur during the harvesting season, when people do not like to leave their work to go to perform fire suppression, especially if it does not threaten their own settlement and agricultural areas.

Legal obligations are not producing the expected results. The Forestry Department is trying to carry out fire prevention and control activities through employing fire workers, who account for 79 percent of total fire prevention and control expenses. Under current economic conditions, it would not be realistic to expect the government to allocate the financial resources necessary for this purpose in the medium and/or long term.

The rural people actively participate in forest fire prevention and control when they, in some way or other, take part in forest management and derive benefits from the forests (i.e. have a vested interest in protecting the resource). As the forests are owned and managed by the state, rural people's participation in forest management is limited to local cases, with the exception of coppice management in which forest villagers take part actively. Coppice areas were not included in the case study, as they consist mainly of broadleaf trees (80 percent oak species) and have a low level of fire risk. Coppice areas could, however, provide a model that is transferable to other forested regions of Turkey.

During the study, community involvement in forest fire prevention, control and management was assessed in the Çal and Bergama Forest District Directorates, where local people participate actively in forest management. The results were compared with neighbouring Forest District Directorates under similar climatic and ecological conditions.

Çal case

The total area of Çal district is 387 000 ha, of which 106 000 ha is forested and consists primarily of black pine and Calabrian pine. The government has established a lease agreement on behalf of forest growers for a period of 49 years. Privately managed forests have a second degree risk of forest fire. Local people are well organized for managing the forestry plantation and have their own local leaders. They have very good relations with the local forestry administration. The people are alerted to forest fires through a municipality siren and intervene immediately, with their hand tools, before the Forestry Department requests assistance.

During discussions, local leaders stated that the Forestry Department should trust the local people and, rather than dictating, should play a guiding role in the development of community-based or private forestry activities. They also stated that the community's awareness level about the long-term benefits of forests is generally low. They complained that the Forestry Department's training and extension activities on forest and fire management are insufficient and they are trying to solve this problem through their own efforts.

During the last ten years, the average number of fires per year is 8.0 with an average size of 2.4 ha each. Regarding the causes of fire, 5.9 percent of the total number of fires were caused by shepherds, 4.2 percent by agricultural burning, 12.1 percent were intentional, and 54.3 percent were caused by carelessness; the causes of 23.4 percent of fires were unknown. A comparison of Çal District's fire figures with those of neighbouring district directorates is given in Table 1.

Table 1: Çal district's average fire figures for the last ten years, compared with those of neighbouring district directorates

District Directorate	Average number of fires per year	Average area burnt per year (ha)	Number of fires per 100 000 ha	Area burnt per 100 000 ha
Çal	8	19	7	18
Uşak	36	128	20	70
Denizli	27	203	21	157
Afyon	13	44	7	25
Tavas	9	25	10	26
Acipayam	11	18	11	18

It can be concluded from Table 1 that the average number of fires and the average area burnt are lower in Çal district than in the neighbouring district directorates (which have similar climatic and ecological conditions). Smaller areas burnt per fire indicate that local people perform early intervention well. Fire figures for Çal district are well below national averages.

Bergama case

There are 107 000 ha of forested area in the Bergama district, of which 16 000 ha consist of stone pine stands. Stone pine farming in the region is a very good example of agro-silvipastoral systems. Of 16 villages, 13 are involved in pine seed production in the Kozak subdistrict. Because the distances between trees are wide enough to allow plant growth, grazing is practised under the trees. As a result of cone collection, pruning and grazing, there is very little fuel accumulation in stone pine stands, and the height to live crown has increased significantly.



Afforestation campaign organised by villagers

Local people have very good relations with the local forestry administration. Villagers participate voluntarily in afforestation activities. Bergama Forest District Directorate produces 200 000 pine seedlings every year for distribution to poor or disadvantaged villagers. Villagers are well organized among themselves. The revenues from commonly owned pine stands are used to meet the village's expenses. As in the Çal case, villagers tend to be the first to intervene in fires, with their hand tools. As they know the region very well, villagers also guide firefighters to fires in remote locations.

Bergama district has a first degree risk of fire. According to the last ten years' statistics, there have been an average of 16 fires per year with an average size of 3.9 ha each. Of the total number of fires, 3.4 percent were caused by lightning, 4.7 percent by cigarettes, 10.8 were intentional, 12.2 percent were caused by shepherds, and 52.7 percent by carelessness; the causes of 16.2 percent of fires are unknown. Bergama district's fire figures are compared with those of neighbouring district directorates in Table 2.

Table 2: Bergama district's average fire figures for the last ten years, compared with those of neighbouring district directorates

District directorate	Average numbers of fires per year	Average area burnt per year (ha)	Number of fires per 100 000 ha	Area burnt per 100 000 ha
Bergama	16	62	15	56
Izmir	83	612	35	256
Manisa	36	155	20	88
Akhisar	31	193	21	132
Edremit	22	239	26	284
Balikesir	23	170	12	90

It can be concluded from Table 2 that the fire figures of Bergama district are better than those of neighbouring district directorates. Although the region has first degree fire risk, the average number of fires, the average burnt area and the average fire size are well below national statistics. Local people state that the number of fires has decreased considerably for the last three to four years. Another important point is that the number of intentional fires has decreased as the people have developed a sense of ownership in the forests (and their vested interest has increased).

Considering these two cases, the following recommendations can be made concerning rural people's participation in forest fire prevention and control:

- It is very important to mention that rural people are very proud. They like to be seen as partners in forest management and they require the Forestry Department's respect for their rights to the forests and forest resources. When they take part in forestry management and derive benefits from forests and forestry activities, they can undertake some of the Forestry Department's responsibilities regarding forest fire prevention, control and management. For example, people can be trained and organized as rural fire crews, which would be of great help in fire prevention and control. In this way, worker expenses (79 percent of current fire control costs) could be reduced considerably. As they know local geographical and climatic conditions better than outsiders, local people can also be very useful for guiding fire fighting teams.
- Although the Çal and Bergama cases have local characteristics, they can be used as a model for the improvement or development of community-based forest management practices, including a CBFiM component. Community-based forestry practices play a very important role in improving the relations between the forestry administration and local people and pave the way to participation. In this context, the Çal and Bergama cases are very good examples of how the active participation of local people can increase the success of forest fire prevention and control measures.
- Another important result of rural people's participation in CBFiM is the resulting low level of intentional fires compared with national statistics. The rate of intentional forest fires in Çal is

12.1 percent and in Bergama 10.8 percent, while the national average for the last ten years is 14 percent (not counting fires of unknown cause). Participation creates a type of self-initiated control among the community and prevents individual or selfish human activities.

- As the first intervention against fire is carried out by villagers without waiting for fire fighting teams to arrive, the total area burnt and the fire size are low compared with national statistics. Average fire sizes are 2.4 ha in Çal and 3.9 ha in Bergama, while the national average for the last ten years is 6.5 ha. This also shows the effectiveness of CBFiM.

CONCLUSION

Of the 1 000 forest fires that occur annually in Turkey, approximately 97 percent are caused by humans. Therefore, the emphasis in risk reduction should be placed on preventing human-induced forest fires. Although the fires are increasing in number, the total area burnt and the area burnt per fire are decreasing. From these figures, it can be concluded that fire detection and suppression are relatively effective. However, the costs of these activities are very high; in other words, these activities are not cost-effective and it is not clear whether the government will finance them in a continuous way in the future.



Public campaign on forest fire prevention organised by TEMA (national NGO)

The fact that the number of fires has increased indicates that fire prevention alone is not effective. Prevention measures are not corresponding to the economic and social conditions that prevail in the community. It can be added that post-fire assessments are not carried out properly. For these reasons, forest fire strategies for the future should concentrate on fire prevention in order to

reduce the number of fires, fire hazards and fire control costs. Post-fire assessment should be carried out in a neutral and transparent forum with the participation of stakeholders, and new fire prevention and control strategies should be based on the assessments.

The first step in this process is to investigate the causes of fires and the driving factors of human activities. Once the causes are identified and classified, specific remedies should be planned accordingly. Research on the causes of human-induced fires and driving factors is very weak and statistics do not give a clear idea of the causes of fires. However, it can roughly be calculated that 70 percent of fires are the result of negligence and carelessness and 27 percent are caused by specific intentional activities. Of the fires caused by negligence and carelessness, approximately 10 percent are classified as accidental fires.

The fire suppression programme is effective in terms of total area burnt and average size of fire. This is primarily because of the large number of personnel and quantity of equipment that are deployed in the fire season. However, fire suppression costs are very high and it would be very difficult for the government to provide additional funds for this purpose. In order to develop a community-based fire suppression strategy and to reduce suppression costs, the following approaches and actions should be integrated into the fire management programme:

- Rural people living in villages and towns are legally responsible for participating in fire detection and fire suppression. However, they often react against this legal obligation for several reasons. Participation of the rural community in fire control is based largely on forest management approaches, so activities in the short term should be based on improving forest–village relations and income-generating activities. In the medium and long terms, participatory integrated mechanisms for joint forest management, including fire issues, should be developed and implemented. Regarding fire detection and suppression, the local people can play a very important role because they live in or near forest areas. Rural people can be trained and organized as rural fire crews and can be a great help in fire control. Through this involvement of local people, worker expenses (accounting for 79 percent of total fire prevention and control expenses) could be reduced considerably. Teams could be trained and equipped by the Forestry Department and payment could be made to the village fund for the common expenses of the village community. The strategy could be implemented in pilot areas such as Çal and Bergama, where there is active participation of the local people.
- As they know the local geographical and climatic conditions, local people can also be very useful in guiding fire fighting teams.

ACKNOWLEDGEMENTS

In conducting this case study, the consultants were assisted by several government staff members, at both the central and field levels, and local people including forest villagers, muhtars (village heads), the council of elders, private forest owners and representatives of NGOs and the local administration. Thanks are extended to all.

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