# DETERMINING PEOPLE'S PARTICIPATION IN FOREST FIRE CONTROL : A STUDY OF HIMACHAL PRADESH

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**Abstract :** Among the different causes of forest fires, accidental causes result into more than 90 per cent fires followed by natural causes. Socio-economic factors, viz., land holding and social participation play an important role in the management of forest fires. This finding was further conformed by the regression analysis. However, education was found inversely related. The lack of interaction with forest department was reported as an important factor for the non participation of the respondent in the forest fire control.

## INTRODUCTION

The forests of India are endowed with rich flora and fauna. The plant wealth of the country represents about 12 per cent of the global forest wealth. The forests have, however, to meet the demand of the population of about one billion people and around 450 million cattle from one per cent of the world forest resources (Bahugana, 1999). The forests of the country are therefore, under tremendous pressure on the one hand the poor are heavily dependent on the forests for their subsistence needs, where as the liberalization, industrialization and fast spreading economic activities at the national and regional level are putting pressures through increased demand for forest products. Under this situation loss of forest on account of forest fires is a matter of serious concern.

According to Forest Survey of India, about 6 per cent of the forests are prone to severe fire damage causing huge losses every year. Human beings often are responsible for forest fires that may be a deliberate attempt or an accidental fire. Therefore, forest fire management, requires a balanced approach of a suitable mix of formal Forest Department input and local people's participation; with an appropriate use of technical and other locally adaptable social strategies for prevention and control of forest fires. More than 19 per cent of total forest area in Himachal Pradesh is highly prone to forest fires causing not only a huge financial loss to the State but also an equally huge loss to floral and faunal diversity. Thus, an attempt has been made in this study to examine the people's perception about the causes of forest fire and factors affecting their participation in the forest fire control.

## MATERIALS AND METHODS

The Bilaspur Forest Circle was purposively selected because of higher incidence of forest fires. The multistage random sampling technique was used to select the study area as well as respondents. The respondents were divided into two Categories, viz, Category –I (up to 1 km) and Category-II (more than 1km) distance from the local forest area. A total sample of 30 per cent of the total inhabitants of the selected study area i.e., 88 respondents was selected as per detail given in Table-1.

**Table-1:** Sampling Details of the Study Area

(Number of respondents)

| Village category | Forest Range | | Overall |
|---|---|---|---|
| | I | II | |
| < 1km | 23 (53.49) | 18 (40.00) | 41 (46.59) |
| > 1km | 20 (46.51) | 27 (60.00) | 47 (53.41) |
| Total | 43 (100.00) | 45 (100.00) | 88 (100.00) |

Figures in the parenthesis is the percentage of the total

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## DATA COLLECTION

Primary data were collected for the year 2004 through personal interview method from the selected respondents. The data pertaining to various socio-economic variables/factors were collected from the respondents with the help of specially structured survey schedules.

## ANALYTICAL FRAMEWORK

In order to examine the people's perception about the causes of forest fire and their participation, ranking method was used. To study the factors affecting people's participation in the forest fire management multiple regression analysis was also carried out with the following form:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + a_8X_8 + u_i$$

Where,

$Y$ = Total participation (number of participations)
$X_1$ = Education (score)
$X_2$ = Family size (number)
$X_3$ = Land holdings (Hectare)
$X_4$ = Total livestock holding (number)
$X_5$ = Annual gross family income (Rs.)
$X_6$ = Social participation (score)
$X_7$ = Cooking energy (number of LPG cylinders per month)
$X_8$ = Distance from forest (score)
$u_i$ = Random distribution term assumed to be i.i.d. N $(0, \sigma e^2)$
$a_o$ = Constant term
$a_1 ... a_8$ = Regression coefficients

## RESULTS AND DISCUSSION

### Causes of Forest Fires – People's Perception

A cause-wise analysis of forest fires was carried out and the results have been presented in Table-2. More than 81 per cent of the respondents in Range-1 and all the respondents of Range-II felt that lighted cigarette/bidi thrown in the forest is the major cause of forest fire in their area. This was followed by accidental fires by honey collectors, fuel wood collectors, hunters and grazers. Fuel wood collector/ grazer and hunters in Range-I and Range-II

**Table-2:** People's Responses of the Main Causes of Forest Fires in the Study Area

(Multiple responses)

| Cause | Forest Range -I | | Forest Range- II | | Overall | |
|---|---|---|---|---|---|---|
| | No.* | % | No.* | % | No.* | % |
| **I. Accidental** | | | | | | |
| Cigarette, bidi, etc. | 35 | 81.39 | 45 | 100.00 | 80 | 90.91 |
| Fuel wood collectors | 1 | 2.33 | 14 | 31.11 | 15 | 17.05 |
| Honey collectors | 4 | 9.30 | 7 | 15.56 | 11 | 12.50 |
| Hunters | 3 | 6.98 | 9 | 20.00 | 12 | 13.64 |
| Grazers | 1 | 2.33 | 12 | 26.67 | 13 | 14.77 |
| **II. Natural** | | | | | | |
| Lightening | - | - | - | - | - | - |
| Extreme heat in summers | - | - | 41 | 91.11 | 41 | 46.59 |
| **III. Purposive** Hunting, land grabbing, burning of pasture and to cover illegal misdeeds | - | - | - | - | - | - |

*Number of respondents

respectively (Ghosh, 2002). So far as natural causes are concerned only 41 respondents (more than 91 per cent) of Range-II believed that extreme summer heat is also a cause of forest fires in the area. Surprisingly none of the respondents believe that forest fires are purposively started.

**People's Participation in Forest Fire Control**

*Socio-economic Characteristics of Households*

Forest fires which are a recurring phenomenon in Himachal Pradesh resulting into huge direct and indirect losses ultimately reflected in a low forest resource use opportunity for local people. Moreover, people in the State, particularly in the rural areas have traditionally been drawing various forest products, most prominently timber and grass. Over the years, availability of these resources has gone down as a result of various socio-economic pressures and forest fires further aggravate this situation. The gravity of this concern would depend upon the extent of people's dependence on the forest resources for meeting various needs (Netalkar, 1999).

Thus dependence and people's participation in forest management particularly fire management, in turn, is linked to various socio-economic characteristics, the results of which have been presented in Table-3. Family size in the study area

**Table-3:** Distribution of Respondents on the Basis of Important Socio- Economic Characteristics

(Percentage)

| Particulars | Forest Range I | | | Forest Range II | | | Overall | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cat. I | Cat. II | Total | Cat. I | Cat. II | Total | Cat. I | Cat. II | Total |
| **Size of family** | | | | | | | | | |
| Up to 5 | 47.83 | 60.00 | 53.49 | 50.00 | 14.81 | 28.89 | 48.78 | 34.04 | 40.91 |
| Above 5 | 52.17 | 40.00 | 46.51 | 50.00 | 85.19 | 71.11 | 51.22 | 65.96 | 59.09 |
| **Education** | | | | | | | | | |
| Illiterates | - | 10.00 | 4.65 | - | - | - | - | 4.26 | 2.27 |
| Primary | 8.70 | 20.00 | 13.95 | 11.1 | 14.81 | 13.33 | 9.75 | 17.02 | 13.64 |
| Middle | 47.82 | 15.00 | 32.56 | 16.67 | 40.74 | 31.11 | 34.15 | 29.79 | 31.82 |
| High | 26.09 | 45.00 | 34.88 | 66.67 | 37.04 | 48.89 | 43.90 | 40.43 | 42.05 |
| Graduate and above | 17.39 | 10.00 | 13.95 | 5.56 | 7.41 | 6.67 | 12.20 | 8.50 | 10.22 |
| **Land (hectares)** | | | | | | | | | |
| ≤ 1.0 | 65.21 | 60.55 | 62.78 | 66.67 | 62.96 | 64.44 | 65.85 | 61.70 | 63.64 |
| 1.0-2.0 | 17.39 | 10.00 | 13.95 | 22.22 | 29.63 | 26.67 | 19.51 | 21.28 | 20.45 |
| 2.0-3.0 | 13.04 | 20.00 | 16.27 | 11.11 | 7.41 | 8.89 | 12.20 | 12.76 | 12.50 |
| > 3.0 | 4.36 | 10.00 | 7.00 | - | - | - | 2.44 | 4.26 | 3.41 |
| **Memberships of organization** | | | | | | | | | |
| Nil | 59.55 | 60.00 | 65.12 | 27.87 | 27.03 | 33.34 | 51.21 | 46.81 | 48.87 |
| Mahila Mandal | 4.35 | 5.0 | 4.65 | 16.67 | 17.41 | 11.11 | 9.76 | 6.38 | 7.95 |
| Sawam Sahiyata Smhoo | 4.35 | 15.00 | 9.30 | 22.22 | 25.93 | 24.44 | 12.20 | 21.28 | 17.05 |
| Joint Forest Management | 8.70 | 5.00 | 6.98 | - | - | - | 4.88 | 2.13 | 3.41 |
| Office bearer | 4.35 | 15.00 | 9.30 | 33.30 | 29.63 | 31.11 | 17.07 | 23.40 | 20.45 |
| Public leader | 8.7 | - | 4.65 | - | - | - | 4.88 | - | 2.27 |

showed significant differences between the two forest ranges. In this regards, more than 71 per cent of total respondents had a family size of more than 5 person in Range II as compared to 46.51 per cent of corresponding total respondents in Range-I.

The analysis revealed that there was not a significant difference with respect to education among the respondents of the selected forest ranges. The analysis of land holdings of the respondents revealed the predominance of small and marginal farmer (63.64%). The extent of people's social participation as reflected in their membership of various socio-cultural organizations revealed on an average more than 50 per cent respondents were member of different socio-cultural organizations. Hence it is concluded from the foregoing analysis that family size of majority of the selected respondents was more than 5 persons and there were no significant differences w.r.t. education in the selected forest ranges. The majority of selected respondents were having less than or equal to one hectare landholdings, showing their higher dependence on forest resources.

**Factors Affecting People's Participation in Forest Fire Control**

Apart from socio-economic factors there are many other factors which influence people's participation in forest fire control. An analysis of people's responses in this regard projected the legal and social pressures, religious beliefs as some of the factors influencing people's participation in forest fire control. A perusal of Table-4 reveals that religious beliefs and concern for forests are important factors affecting people's participation in Range-1 and Range-II respectively. Social pressures were ranked second and third by the respondents of Range-1 and Range-II respectively. Range-II respondents ranked religious belief as a second most important factor affecting their participation. Interestingly the study respondents also ranked legal pressure as fourth important factor.

In order to further analyze factors affecting people's participation in forest fire control, regression analysis was carried out and results have been presented in Table-5. The results suggest that the level of social participation of the people significantly increases the possibilities of their participation in control of forest fire. It is evident from the results for overall sample that size of the family, apart from the level of social participation, significantly influences people's participation in the forest fire control (Chauhan, 2002). However, in case of education, which revealed an inverse relationship with people's participation in forest fire control. The same is true in case of family size in Category-II regression equation at the overall level. Nevertheless, this analysis, again, brings out the importance of social participation in forest fire management. It seems that the people, who are socially active and connected with different social organizations, are also alive to their social obligations in other broader areas, other than the organizations of which they are the members.

**Table-4:** Factors Affecting People's Participation in Forest Fire Control

| Factors | Rank | | |
|---|---|---|---|
| | Forest Range I | Forest Range II | Overall |
| | $n_{r1} = 43$ | $n_{r2} = 45$ | $n_{r0} = 88$ |
| | Max. Score =169 | Max. Score = 211 | Max. Score = 369 |
| Legal pressures | IV | IV | IV |
| Concern for forests | III | I | I |
| Religious beliefs | I | II | III |
| Social pressures | II | III | II |

An analysis of the survey responses regarding important reasons for non-participation of the people in control of forest fires were also analyzed to identify factors that discourage people to participate in forest fire control. The results of this analysis have been presented in Table-6. It is evident from the table that the lack of interaction with the forest department seems to have alienated people from the forest. As a result, they have ranked it as the major reason for their non-participation in forest fire control. This seems to be result of the fact that people do not felt that they have any direct stake in

**Table-5:** Regression Analysis of Factors Affecting People's Participation in Forest Fire Control

| Variables | Forest Range I | Forest Range II | Overall |
|---|---|---|---|
| Education (score) $X_1$ | -2.511<br>(1.935) | -0.917<br>(2.638) | -2.928**<br>(1.597) |
| Family size (number)$X_2$ | 0.180<br>(0.459) | 0.779<br>(0.646) | 0.898*<br>(0.392) |
| Land holdings (Hectare) $X_3$ | -0.003<br>(0.141) | -0.003<br>(0.284) | -0.005<br>(0.148) |
| Total livestock holding (number) $X_4$ | 0.227<br>(0.594) | -0.206<br>(0.943) | -0.107<br>(0.495) |
| Annual gross family income (Rs.)$X_5$ | 4.472<br>(0.000) | 7.077<br>(0.000) | -9.043<br>(0.000) |
| Social participation (score )$X_6$ | 25.270*<br>(3.852) | 19.542*<br>(4.582) | 21.569*<br>(2.840) |
| Cooking energy (number of LPG cylinders per month) $X_7$ | -3.922<br>(3.667) | 4.745<br>(5.524) | -0.119<br>(3.038) |
| $R^2$ | 0.543 | 0.282 | 0.402 |

** Significant at 10% level * Significant at 5% level

Values in the parentheses are standard error

the local forest. Other important reasons were found to be the lack of incentive/compensation, traditional beliefs about positive effect of forest fire, lack of training, materialistic approach of the people, and migration of male members from the villages etc (Srivastava, 2000). No set pattern, except for the reason low stake in forest, has been noticed for the responses in two forest ranges under consideration.

**Table-6:** Reasons for Non-Participation of People in Control of Forest Fires

| Reasons | Range | | | | | |
|---|---|---|---|---|---|---|
| | Range I | | Range II | | Overall | |
| | Score | Ranks | Score | Ranks | Score | Ranks |
| Self interest | 43 | VIII | 13 | VIII | 56 | VIII |
| Lack of incentives/compensation | 146 | II | 189 | II | 335 | II |
| Engagement in own works | 26 | IX | 7 | IX | 33 | X |
| Male migration from village | 97 | V | 61 | VI | 158 | VI |
| Lack of interaction with forest department | 215 | I | 225 | I* | 440 | I |
| People's materialistic approach | 106 | IV | 101 | III | 207 | V |
| Lack of training in controlling forest fires | 128 | III | 96 | IV | 224 | IV |
| Traditional belief about positive effect of fire | 90 | VI | 225 | I* | 315 | III |
| No concern to protect | 16 | X | 39 | VII | 55 | IX |
| Fear of injuries and mishaps | 51 | VII | 66 | V | 107 | VII |

*Tie values

## CONCLUSION

The socio-economic analysis of the respondents revealed that majority (42.05%) of the respondents had a formal education up to high school level only and about 34 per cent were engaged in agriculture while those in government service accounted for about 35 per cent. More that 62 per cent of the sample households were marginal farmers. It was found the socio-economic factors; viz., land holding and social participation played a significant role in the management of forest fire. However education was found inversely related. The regression analysis also suggested the importance of social participation in this regard. Majority of the respondents (90.91%) believed that forest fires in their locality are generally accidental. Lighted cigarette/bidis thrown in the forests, accidental fires by fuel wood collectors, honey collectors are the main reasons causing accidental forest fires. Local social pressures and concern for forests are the main factors that positively influence people's participation in control of forest fires. Lack of interaction with and the lack of incentive/ compensation from the Forest Department significantly adversely affect people's participation in the control of forest fires. Hence it is suggested that if social participation is increased, it will lead to better forest fire management. Moreover the local users of the forest resources should also be given more powers in making various forest plans for increasing their role in forest fire control as lack of interaction between users and forest officers was found among one of the factor for non participation in forest fire control.

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