**FOREST** **FIRE AND ITS MANAGEMENT IN DISTRICT BANDIPORA JAMMU AND KASHMIR**

SUBMITTED FOR THE PARTIAL FULFILLMENT OF MASTERS OF SCIENCE DEGREE IN DISASTER MANAGEMENT

BY

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This is to certificate that the dissertation entitled “FOREST FIRE AND ITS MANAGEMENT IN DISTRICT BANDIPORA JAMMU AND KASHMIR “ is the bonafide work of MOHMAD YASEEN NAJAR Enrollment No: 17100120017, in partial fulfillment for the award of Masters Degree in Disaster Management. The work has been completed under my guidance and supervision.

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*IN THE NAME OF ALLAH THE MOST GRACIOUS, THE MOST MERCIFUL*

At the outset I bow before the Almighty Allah, Who has taught me the use of pen and whose benign benediction granted me the courage, patience and strength to embark upon his work and carry it to its successful completion.

I express special thanks to my supervisor Dr. GHULAM MOHAMMAD RATHER with his guidance and constant encouragement I have completed this work with success. His moral support and guidance was constant inspiration for me throughout the research work.

I extend my hearty thanks and sincere gratitude to Head of the Department Geography and Regional Development University of Kashmir, Dr. SHAMIM AHMAD SHAH and all other faculty members who always guided me during my studies and in my research work.

It is difficult to enlist all the people, classmates, friends, and teachers who directly or indirectly contributed for the completion of this work. I am highly indebted to our parents, brothers and sisters, whose sacrifices and blessings have brought me up to this stage of life. Their prayers have made my task easier and paid the dividends for me in hard times. I acknowledge the gratitude to fellow classmates whose timely and scholarly analysis gave a proper shape to my research works…. MOHMAD YASEEN NAJAR

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Chapter 1: forest fire-conceptual background

1.1 INTRODUCTION:- Uncontrolled blazes fueled by weather, wind, and dry underbrush, wildﬁres can burn acres of land—and consume everything in their paths—in mere minutes. On average, more than 100,000 wildﬁres, also called wildland ﬁres or forest ﬁres, clear 4 million to 5 million acres (1.6 million to 2 million hectares) of land in the U.S. every year. In recent years, wildﬁres have burned up to 9 million acres (3.6 million hectares) of land. A wildﬁre moves at speeds of up to 14 miles an hour (23 kilometers an hour), consuming everything—trees, brush, homes, even humans—in its path. Environmental historian Stephen J. Pyne, in his book entitled Fire: A Brief History , suggests that fire and flame can only exist on earth in the presence of the carbon based "living world". Our carbon based and flammable environment supplies all of the elements of chemistry for the creation of fire. I will review these elements in a moment. Fire is dependent on, cannot exist without, and must follow the biology of life.

There are fire based ecosystems where flora and fauna have evolved and adapted to wildfire for survival. The absence of fire in these forest systems is a change that negatively affects the biome.

HOW FIRE CAME TO BE:- It is interesting to note that, of the four billion years of earth's existence, conditions were not conducive for spontaneous wildfire until the last 400 million years. Naturally occurring atmospheric fire did not have the chemical elements available until major several earth changes occurred. The earliest life forms emerged without needing oxygen (anaerobic organisms) to live about 3.5 billion years ago and lived in a carbon dioxide based atmosphere. Life forms that needed oxygen in small amounts (aerobic) came much later in the form of photosynthesizing blue-green algae and ultimately changed the earth's atmospheric balance toward oxygen and away from carbon dioxide (co2). Photosynthesis increasingly dominated earth's biology by initially creating and continuously increasing the earth's percentage of oxygen in the air. Green plant growth then exploded and aerobic respiration became the biologic catalyst for terrestrial life. Around 600 million years ago and during the Paleozoic, conditions for natural combustion started developing with increasing speed.

WILDFIRE CHEMISTRY :- Remembering the "fire triangle", fire needs fuel, oxygen, and heat to ignite and spread.

There are three conditions that need to be present in order for a wildﬁre to burn, which ﬁreﬁghters refer to as the ﬁre triangle: fuel, oxygen, and a heat source. Fuel is any ﬂammable material surrounding a ﬁre, including trees, grasses, brush, even homes. The greater an area's fuel load, the more intense the ﬁre. Air supplies the oxygen a ﬁre needs to burn. Heat sources help spark the wildﬁre and bring fuel to temperatures hot enough to ignite. Lightning, burning campﬁres or cigarettes, hot winds, and even the sun can all provide suﬃcient heat to spark a wildﬁre. Although four out of ﬁve wildﬁres are started by people, nature is usually more than happy to help fan the ﬂames. Dry weather and drought convert green vegetation into bone-dry, ﬂammable fuel; strong winds spread ﬁre quickly over land; and warm temperatures encourage combustion. When these factors come together all that's needed is a spark—in the form of lightning, arson, a downed power line, or a burning campﬁre or cigarette—to ignite a blaze that could last for weeks and consume tens of thousands of acres. These violent infernos occur around the world and in most of the 50 states, but they are most common in the U.S. West, where heat, drought, and frequent thunderstorms create perfect wildﬁre conditions. Montana, Idaho, Wyoming, Washington, Colorado, Oregon, and California experience some of the worst conﬂagrations in the U.S. In California wildﬁres are often made worse by the hot, dry Santa Ana winds, which can carry a spark for miles.

Where ever forests grow, the fuel for forest fires is provided mainly by continued biomass production along with the resulting fuel load of that vegetative growth. Oxygen is created in abundance by the photosynthesizing process of living green organisms so it is all around us in the air. All that is needed then is a source of heat to provide the exact chemistry combinations for a flame. When these natural combustibles (in the form of wood, leaves, brush) reach 572º, gas in the steam given off reacts with oxygen to reach its flash point with a burst of flame. This flame then preheats surrounding fuels. In turn, other fuels heat up and the fire grows and spreads. If this spreading process is not controlled, you have a wildfire or uncontrolled forest fire. Depending on the geographic condition of the site and the vegetative fuels present, you might call these brush fires, forest fires, sage field fires, grass fires, woods fires, peat fires, bush fires, wildland fires, or veld fires.

THE INITIAL WILDFIRE PROBLEM:- Wildfire has been a natural force in North America for hundreds of thousands of years. Forest ecosystems have developed around fire occurring both naturally and intentionally. Lightning is the most common source of naturally caused fires. Native Americans first used forest fires to encourage and increase game forage potential and to reduce the forest understory for easy travel and to herd potential prey toward hunters. With European expansion over the last 400 years, these new Americans as a society have grown to fear most forms of uncontrolled fire. This has increased demands on state and federal agencies to suppress fire as completely as possible. Wildland fires now represent unique challenges to firefighting agencies and require vastly different approaches to its prevention, mitigation, and suppression. As more people choose to leave the cities and build their homes in the "wildland urban" interface, it is critical that these ongoing concerns are addressed.

HOW DO FOREST FIRES START:- Naturally caused forest fires are usually started by dry lightning where little to no rain accompanies a stormy weather disturbance. Lightning randomly strikes the earth an average of 100 times each second or 3 billion times every year and has caused some of the most notable wildland fire disasters in the western United States.

Most lightning strikes occur in the North American southeast and southwest. Because they often occur in isolated locations with limited access, lightning fires burn more acres than human-caused starts. The average 10-year total of U.S. wildfire acres burned and caused by humans is 1.9 million acres where 2.1 million acres burned are lightning-caused. Still, human fire activity is the primary cause of wildfires - having nearly ten times the start rate of natural starts. The average 10-year percent U.S. wildfire starts are 88% human caused and 12% lightning caused. Most of these human fires result from accidental causes. Accidental fires are usually caused by carelessness or inattention by campers, hikers, or others traveling through wildland or by debris and garbage burners. Some are intentionally set by arsonists. I want to stress that many human-caused fires are started to reduce heavy fuel buildup and used as a forest management tool. This is called a controlled or prescribed burn and used for wildfire fire fuel reduction, wildlife habitat enhancement, and debris clearing. They are not included in the above statistics and ultimately reduce wildfire numbers by reducing conditions that contribute to wildfire and forest fires.

HOW DOES WILDLAND FIRE SPREAD:- The three primary classes of wildland fires are surface, crown, and ground fires. Each classification intensity depends on the quantity and types of fuels involved and their moisture content. These conditions have an effect on fire intensity and will determine how fast the fire will spread.

Surface fires typically burn readily but at a low intensity and partially consumes the entire fuel layer while presenting little danger to mature trees and root systems. Fuel buildup over many years will increase intensity and especially when associated with drought, can become a rapidly spreading ground fire. Regular controlled fire or prescribed burning effectively reduces the fuel buildup leading to a damaging ground fire.

Crown fires generally result from intense rising ground fire heat and occur in the higher sections of draping trees. The resulting "ladder effect" causes hot surface or ground fires to climb the fuels into the canopy. This can increase the chance for embers to blow and branches to fall into unburned areas and increase the spread the fire. Ground fires are the most infrequent type of fire but make for very intense blazes that can potentially destroy all vegetation and organic manner, leaving only bare earth. These largest fires actually create their own winds and weather, increasing the flow of oxygen and "feeding" the fire.

**1.2 Objectives of the Study:**

The main objectives of the present study are as the following

1. To analyze the nature and magnitude of forest fire in the study area.

2. To identify the causes and consequences of forest fire in the study area.

3. To suggest the suitable mitigation measures of forest fire in the study area.

**1.3 Database and Methodology**

Besides the field and personal observations the present study is based on secondary sources from which the data is collected. These secondary sources from which material was collected are books, journals, and internet. These study materials are collected from the department library and surfing the different journals, research papers from the internet.

The focus of present study is to analyze the forest fires and its management in district bandipora

**1.4 Significance of the Study:-**

The present study relates to the forest fires and its management in district bandipora. The main significance of the study is determine the main causes, consequences, nature, magnitude and management of forest fires in district bandipora

Since ancient times forests have been integral parts of Indian society. Ancient literature of Hindu mythology like Puranas, Vedas, etc. have mentioned the significance of this natural resource for the community. Forests have not only proved significant for economic utility, but also influenced the social and economic life of the mankind, modified their views and provided new thoughts to poets and artists too. Number of different scriptures in the past have talked about these roles of forests. The Agni purana (Hindu scripture) while discussing the role of forests in human life goes so far as to say “That man who plant trees for the welfare of the public obtains obsolete bliss.” The Geeta (another Hindu scripture) mentions “Living beings survive on the food. Food is produced by rain, rain depends on forests. Therefore conservation of forests is necessary to keep it in a healthy state.”

Some of the significant features of forests are as follows:

1:- Socio – economic significance of the forests:-

* Over two-thirds of the rural and half of the urban population use fuel wood for cooking purposes.
* About a quarter of india’s livestock population, which is the largest in world, is almost totally dependent on forestlands.
* About 70% of india’s population uses traditional medicine (mainly forest based), and many of the rural poor have no access to other systems of medicine.
* Forest based activities are often an important source of cash income for the poor, especially during lean seasons.
* The wild relatives of avocado, banana, cashew, cacao, cinnamon, coconut, coffee, grapefruit, lemon, paprika, oil, palm, rubber, etc. worth billion of rupees are found in tropical forests.

2:- Livelihood Generation:-

As per Global Forest Resources Assessment (GFRA) 2010 about ten million people are employed in forest management and conservation globally, but many more are directly dependent on forest for their livelihood. It is estimated that about 250 million person days are generated annually under various plan schemes taken up for forestry development in forest areas and other government lands. In addition, about 75 million person days are generated annually under agro forestry and farm forestry. Non plan activities, which include protection, maintenance, and harvesting of forests, are estimated to generate about 100 million person days.

3:- Forest as integral component of water cycle:-

Forest is the best water manager of the earth ecosystem. Forests absorb rainwater and release it gradually into streams, preventing flooding and extending water availability into dry months, when it is most needed. Some 40% of third world farmers depend on forested watersheds for water to irrigate crops of for livestock. As per GFRA report 2010 around 330 million hectares of forests are designated for soil and water conservation, avalanche control, sand dune stabilization, coastal protection etc.

4:- Forest as a source of gene pool:-

Forest vegetation provides the gene pool that can protect commercial plant strains against pests and changing conditions of climate and soil and also provide the raw material for breeding higher yielding strains.

5:- Natural climate stabilizer:-

Forests stabilize climate and work as natural air conditioner. They work as store houses for carbon and as per estimate the world’s forest at present stores around 289 Gigatonnes of carbon in their biomass (GFRA,2010). Deforestation releases greenhouse gases, viz. carbon dioxide, methane, and nitrous oxide, which accounts for 25% of the warming effect of all greenhouse gas emissions. Replacing carbon storage function of all tropical forests would cost an estimated $3.7 billion – equal to the gross national product of japan. Forest, by working as natural air conditioner helps in climate stabilization.

6:- Forests – source for recreation:-

Forests serve people directly for recreation. National parks, wildlife sanctuaries, bird sanctuaries, and other forest associated recreation attract millions of tourists every year and earn good amount of revenue.

In addition to above mentioned benefits, forests contribute significantly in the following ways:-

* Forests afford protection to wildlife against strong cold or hot and dry winds.
* It affords protection against adverse effects of solar radiation.
* They help in balancing carbon dioxide and oxygen of the atmosphere.
* Forests maintain fertility of the soil by returning nutrients to it through litter.
* Forests regulate the earth’s temperature regime and water cycle.
* Forests check soil erosion, landslides, shifting of sands, and slitting.
* Forests reduce danger of floods.
* The forests help in biological rejuvenation of soils by opening soil and improve it by adding organic litter or humus.

Chapter 2: Study area

**The Study Area**:-

Bandipora district is one of the 22 districts in Jammu and Kashmir state in northern india. This district was curved out from the erstwhile baramulla district in 2007.The district has three diverse geographical, socio-cultural and economic zones. Thus the nature of hazards also varies. Lake shore region is prone to floods, the foothills are affected by landslides, flash floods, soil erosion and debris flow and high mountain experience avalanche and harsh winters. Earthquake and fire are constant hazards in these socio-econonmically vulnerable regions.

* **Political and administratative**

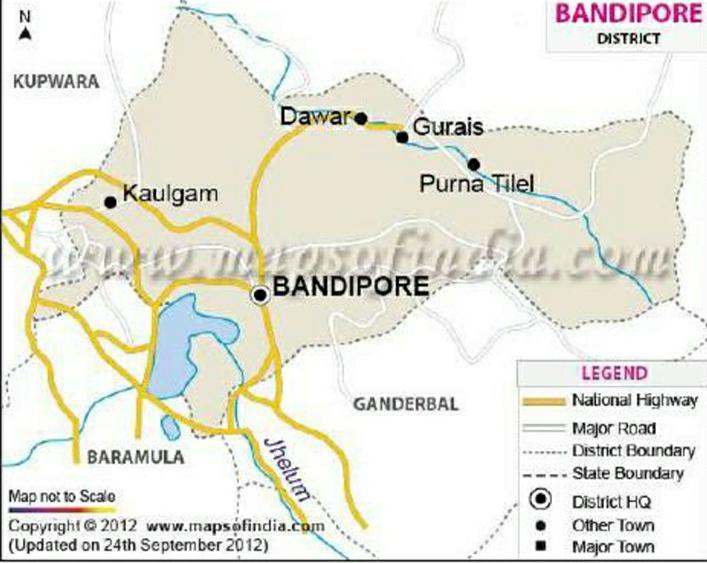
Bandipora is divided into three sub divisions -sumbal, bandipora and gurez. The sub districts are further divided into seven tehsils.

|  |  |  |
| --- | --- | --- |
| **Districts** | **Tehsil** | **Sub-divisions** |
| **Bandipora** | * SUMBAL | * SONAWARI * HAJIN |
| * BANDIPORA | * ALOOSA * AJAS * BANDIPORA |
| * GUREZ | * GUREZ * TULAIL |

Bandipora has 123 revenue Villages, 24 Niyabat Circles, 35 Patwari Halqas, 5 Educational Zones, 4 Medical Blocks, 12 CD Blocks and 114 Panchayat Halqas

* **Geography**

Bandipora lies in north-western Himalayan region between 340-25 'N and 740 -38' E. It has an area of 398 km². It is located on the north and east banks of the Wular lake - the largest fresh water lake in Asia. Most of area in the district is hilly terrain and shares border with Kupwara in the west, Ganderbal in the south-east, Kargil in the east, Baramulla in the south and on the north side it is bounded by LOC (Line of Control) with Pakistan occupied Kashmir (PoK). The district is bounded by Kupwara district in the west, Baramulla district in the south and Kargil, Srinagar and Ganderbal districts in the east.



* **Climate**

The Climate of the district is Temperate cum Mediterranean type. In the higher reaches the temperature remains cold throughout the year. Average minimum and maximum temperature varies from –5°C to 32°C. The winter season starts from the middle of the November and severe winter conditions continues till the middle of February/March. The district receives an average annual precipitation of about 1200 mm in the form of rain and snow for about 60 days. Gurez and Bandipora receive heavy snowfall during winter season in comparison to other places.

* **Demographics**

According to the 2011 census Bandipora district has a population of 392,232 souls. This gives it a ranking of 559 in India (out of a total of 640 districts). The district has a population density of 1,117 inhabitants per square kilometre (2,890/sq mi). Its population growth rate over the decade 2001-2011 was 28.65 %5. Bandipora has a sex ratio of 889 females for every 1000 males, and a literacy rate of 56.28%.

|  |  |  |
| --- | --- | --- |
| **Block** | **Population as per sensual 2011** | **No of households** |
| Bandipora | 177738 | 28360 |
| Sumbal | 69169 | 9731 |
| Hajin | 107333 | 15275 |
| Gurez | 18020 | 2525 |
| Tulail | 19972 | 2501 |
| Total | 392232 | 58392 |

* **Society and culture**

Bandipora lies on the ancient silk route and is famous for three A’s (in Kashmiri): Aab (Water), A’lem (knowledge) and Adab (good habits or sophistication). The district is a melting pot for several ethnicities, cultures, traditions and languages. Ethnicities: Kashmiris, Hanjis, Gojars, Bakarwals and Dards 7 Religions: As per census data 2011 there 99.98 % Muslims and 0.016% Hindus. Languages: Kashmiri, Gojari, Pahari, Dard Sheena and Urdu. Bandipora is primarily a rural district with almost 80% population residing in villages. District is emerging out from the two decades of militancy and fundamentalism which has also affected its social fabric.

* **Economy**

The local economy mostly hinges on the subsistence. The main sources of livelihoods are fishing, agriculture, animal husbandry, daily wage labourers (construction, debilitation and petty jobs) and handicrafts artisans including carpet weavers. The main crops include Shaly (Rice), Macca (maize),wheat and barley. Horticulture (apple orchards, peaches, plums , strawberries and dry fruits et al.), floriculture and sericulture are undertaken mainly by economically well-off households. Mining is also a growing source of employment. The existence of “middle man” in sectors such as fishing, agriculture, animal husbandry and carpet weaving/handicraft have kept the poor communities marginalized and dependent. These communities are dependent on the middle men for access to raw material and for markets. They get trapped in the cycle of vulnerability and indebtedness.

* **Technological**

The Bandipora district is the one of the most backward district in the state. The technological progress in the district is also negligible. There are very a few micro enterprises small scale industries or banking finance linkages to promote development.8 The land use in the district is highly dependent on the traditional agriculture practices. Even though the region has high potential for industries based on agriculture, horticulture, sericulture and livestock and fisheries, the produce is most often not processed due to the lack of processing units and storage facilities.

AT A GALANCE

|  |  |
| --- | --- |
| Area | 2890sq.km. |
| Population | 392232 |
| Population density | 1117 persons per sq. km. |
| Villages | 123 (19 inhabitated) |
| Tehsil | 3 |
| Towns | 3 |
| Blocks | 7 |
| Panchayats | 114 |
| Gross area swon | 0.95 lakh ha. |
| Forests | 0.44 lakh ha. |
| Orchards | 0.37 lakh ha. |
| Village electrified | 1898 sq. km. |
| Village with drinking water | 0.25 lakh ha. |
| Literacy rate | 56.6% |

source :- district action plan of bandipora

Chapter 3: Literature review

**Literature Review**

The origin of forest fire can be either natural or manmade. In certain countries at higher latitudes, lightening is the major cause of forest fire. However, in india, most of the forest fires have manmade origin, such as, cigarette or bidi stubs or left over embers (bahuguna and singh, 2002).

Flannigan et.al. (2000) reviewed the existing studies on climate change and forest fires by using two transient general circulation models (GCM’s), namely the Hadley Centre and the Canadian GCM’s, to estimate fire season severity in the middle of the next century. Ratios of 2\*CO2 seasonal severity rating (SSR) over present day SSR were calculated for the means and maximums for North America. The results suggest that the SSR will increase by 10-50% over most of North America; although, there are regions of little change or where the SSR’s should translate into increased forest fire activity. Thus, forest fires could be viewed as an agent of change for US forests as the fire regime will respond rapidly to climate warming. This change in the fire regime has the potential to overshadow the direct effects of climate changes on species distribution and mitigation.

Bowman et.al. (2009), said, “we are most concerned that fire has not been rigorously and adequately incorporated in the climate models. It’s remarkable that such an integral part of the landscape has been so sidelined.” Because fire on Earth predates humans, its ubiquitous activity is simultaneously accepted and overlooked. “Fire is extraordinarily obvious, but deeply subtle.” A more complete understanding of how the earth works requires recognizing how fire is interwined with and also a driver of human history and the earth’s history, the authors write.

Balch (2009) observed that “The synthesis is a prerequisite for adaptation to the apparent recent intensification of fire feedbacks, which have been exacerbated by climate change, rapid land cover transformation, and exotic species introductions” and further commented about “fires where we don'’ normally see fires,” and pointed to the occurrence of bigger and more frequent fires from the western U.S to the tropics.

Swetnam (2009) said that, in addition to the burning in the tropics, huge tracts of the boreal forests of Siberia, Canada, and northern Europe burn each year. “The role of fire in forests in the boreal zone is unappreciated,” he said, “Russain forests contain alone more than 50% of the carbon stored on land in the northern hemisphere,” and warming is happening fastest at high latitudes. In some recent years, the acreage burned in the forests of Siberia exceeded the size of the U.S state of Virginia, he said. As the world warms, more of those regions are likely to burn, accelerating the warming.

**Chapter 4: Results and discussions**

**4.1 forest fire report from last ten years in the study area**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Office of the Divisional Forest Officer Bandipora Forest DivisionChitternar** | | | | | | | | | | | | |  |  |
| **Forest Fire report of Bandipora Forest Division from last 10 Years** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of Division** | **Year** | **Date & time of occurence** | | **Date & Time of Extinguishing of fire** | | **Block** | **Beat** | **Compt. No** | **Measures adopted to extinguish the fire** | | **Details of Enquiry/Verification cariied out** | |  |  |
| **Date** | **Time** | **Date** | **Time** | **Extend of damage** | **Area engulfed (in Hacs)** |  |  |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | | **11** | **12** |  |  |
| **Bandipora** | **2008-09** | **1/8/2008** | **9:00 a.m** | **1/8/2008** | **8:00 p.m** | **Aloosa** | **Aloosa** | **10/Kh & 11-a/Kh** | By beating & Making fire circles | | Grasses & Bushes Only | 1.00 Hac |  |  |
| **9/3/2008** | **8:30 a.m** | **9/4/2008** | **4:00 p.m** | **Aloosa** | **Aloosa** | **9/Kh & 10/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.25 Hac |  |  |
| **11/29/2008** | **6:30 p.m** | **11/30/2008** | **11: 30 a.m** | **Kudara** | **Kudara** | **114/Kh** | Clearing of inspection paths, creation of fire lines/rings, plugging of stumps with soil, rocks etc | | Grasses, bushes and regenerated conifer 100 Nos | 2.00 |  |  |
| **12/17/2008** | **11:00 a.m** | **12/18/2008** | **3:00 p.m p.m** | **Bonakoot** | **Bonakoot** | **83-a/Kh & 83-b/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.25Hac |  |  |
| **Sub-toal:-** | | | | | | | | | | **0** | **3.50 Hac** |  |  |
| **2009-10** | **11/25/2009** | **10:00 a.m** | **11/25/2009** | **10:00 p.m** | **Chandaji** | **Chandaji** | **43/Kh & 44/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 3.25 Hac |  |  |
| **12/5/2009** | **11:30 a.m** | **12/5/2009** | **3:30 p.m** | **Aloosa** | **Aloosa** | **11-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.25 Hac |  |  |
| **12/23/2009** | **10:30 a.m** | **12/23/2009** | **6:30 p.m** | **Mulkhuihama** | **Mulkhuihama** | **142/Kh & 143/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.00 Hac |  |  |
| **Sub-toal:-** | | | | | | | | | | **0** | **5.50 Hac** |  |  |
| **2010-11** | **9/24/2010** | **11: 00 a.m** | **9/24/2010** | **7:00 p.m a.m** | **Ashtangoo** | **Ashtangoo** | **7/Kh** | By beating & Making fire circles | | 40-50 Kail = 02 Nos | 1.40 Hac |  |  |
| **9/26/2010** | **11:00 p.m** | **9/27/2010** | **10:40 p.m** | **Chandaji** | **Chandaji** | **27/Kh & 29/kh** | By using Soil, Beating, creating fire rings water to some extent etc. | | Grasses & Bushes Only | 1.50 Hac |  |  |
| **10/30/2010** | **10:00 a.m** | **10/30/2010** | **4:30 p.m** | **Arin** | **Arin** | **111/Kh & 112/Kh** | By using Soil, Beating, creating fire rings water to some extent etc. | | Grasses & Bushes Only | 0.75 Hac |  |  |
| **12/6/2010** | **5:00 p.m** | **12/7/2010** | **4:30 p.m** | **Malangam** | **Onagam** | **22/Kh** | By using Soil, Beating, creating fire rings water to some extent etc. | | Hallow Kail 03 Nos | 1.00 Hac |  |  |
| **Sub-toal:-** | | | | | | | | | | **02 Kail** | **4.65 Hac** |  |  |
| **2011-12** | **1/27/2011** | **3:00 p.m** | **2801-2011** | **2:30 p.m** | **Arin** | **Arin** | **110-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | 1.00 Hac |  |  |
| **1/20/2011** | **2:00 p.m** | **1/20/2011** | **9:30 p.m** | **Tragbal** | **Tragbal** | **87/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | 0.25 Hac |  |  |
| **1/25/2011** | **3:00 p.m** | **26-012011** | **4:30 p.m** | **Arin** | **Arin** | **110-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | 1.20 Hac |  |  |
| **Bandipora** | **2011-12** | **3/29/2011** | **11:00 p.m** | **3/29/2011** | **4:00 p.m** | **Aloosa** | **Aloosa** | **10/Kh, 11-a/Kh & 11-b/Kh** | By beating & Making fire circles | | Grasses & Bushes Only | 3.00 Hac |  |  |
| **3/29/2011** | **2:00 p.m** | **3/31/2011** | **800 p.m** | **Chitternar** | **Chitternar** | **108/kh** | Fire beating, creation of fire lines, clearance of inspection paths and use of water and soil | | Grasses & Bushes Only | 1.25 Hac |  |  |
| **Sub-toal:-** | | | | | | | | | | **0** | **6.70 Hac** |  |  |
| **2012-13** | **4/2/2012** | **6:00 a.m** | **4/2/2012** | **8:00 p.m** | **Panar** | **Panar** | **98/Kh** | Fire beating, creation of fire lines, clearance of inspection paths and use of water and soil | | Grasses Only | 2.00 Hac |  |  |
| **12/6/2012** | **12:30 p.m** | **12/6/2012** | **8:00 p.m** | **Chitternar** | **Chitternar** | **112/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 0.50 Hac |  |  |
| **Sub-toal:-** | | | | | | | | | | **0** | **2.50 Hac** |  |  |
| **2013-14** | **10/3/2013** | **8:30 a.m** | **10/4/2013** | **4:00 p.m** | **Aloosa** | **Aloosa** | **11-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.25 Hac |  |  |
| **11/17/2013** | **11:00 a.m** | **11/18/2013** | **10:00 p.m** | **Mulkhuihama** | **Mulkhuihama** | **142/Kh & 143/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.125 Hac |  |  |
| **11/17/2013** | **7:15 a.m** | **11/18/2013** | **2:15 p.m** | **Aloosa** | **Aloosa** | **11/Kh** | Creation/clearing of fire lines/fire rings and other fire fighting operations | | Grasses &Small bushes Only | 0.15 Hac |  |  |
| **11/18/2013** | **10:15 a.m** | **11/18/2013** | **8:35 p.m** | **S C Unit Khayar** | **S C Unit Khayar** | **83-a/Kh** | Creation/clearing of fire lines/fire rings and other fire fighting operations | | Grasses & Bushes Only | 0.15 Hac |  |  |
| **11/27/2013** | **12:30 p.m** | **11/28/2013** | **8:40 p.m** | **Malangam** | **Malangam** | **21-c/Kh** | By beating & making fire circles | | Grasses & Bushes Only | 0.20 Hac |  |  |
| **11/29/2013** | **10:15 a.m** | **11/29/2013** | **8:30 p.m** | **Bonakoot** | **Bonakoot** | **83-b/Kh** | Creation/clearing of fire lines/fire rings and other fire fighting operations | | Grasses & Bushes Only | 0.15 Hac |  |  |
| **12/7/2013** | **11:30 a.m** | **11/8/2013** | **3:30 p.m** | **Bonakoot** | **Bonakoot** | **82-a,b/Kh** | Creation/clearing of fire lines/fire rings and other fire fighting operations | | Grasses & Bushes Only | 0.20 Hac |  |  |
| **12/13/2013** | **7:00 p.m** | **12/14/2013** | **5:30 p.m** | **Malangam** | **Malangam** | **21/Kh** | By beating & making fire circles | | Grasses & Bushes Only | 0.10 Hac |  |  |
| **12/16/2013** | **8:00 a.m** | **12/16/2013** | **5:40 p.m** | **Aloosa** | **Aloosa** | **11-a/Kh** | By beating & making fire circles | | Grasses & Bushes Only | 0.075 Hac |  |  |
| **12/17/2013** | **11:15 a.m** | **12/18/2013** | **12:30 p.m** | **Bonakoot** | **Bonakoot** | **83-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.10 Hac |  |  |
| **Sub-total** | | | | | | | | | | **0** | **1.50 Hac** |  |  |
| **2014-15** | **1/2/2015** | **09:00:a.m** | **1/3/2015** | **6:20 p.m** | **Ashtangoo** | **Ashtangoo** | **9/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **0.50** |  |  |
| **Bandipora** | **2014-15** | **1/2/2015** | **11:00 a.m** | **1/3/2015** | **8:35 p.m** | **Chitternar** | **Chitternar** | **104/Kh** | By beating & Making fire circles | | Grasses & Bushes Only | **0.50** |  |  |
| **1/3/2015** | **10:00 a.m** | **1/4/2015** | **4:20 p.m** | **Arin** | **Arin** | **113-a/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **1.00** |  |  |
| **1/7/2015** | **7:00 a.m** | **1/9/2015** | **12:35 p.m** | **Arin** | **Arin** | **112/Kh & 113/Kh** | By beating & Making fire circles | | 50-60=01 No Kail | **2.00** |  |  |
| **1/7/2015** | **3:00 p.m** | **1/9/2015** | **6:30 p.m** | **Aloosa** | **Aloosa** | **10/Kh, 11-a/Kh & 11-b/Kh** | By beating & Making fire circles | | Grasses & Bushes Only | **3.00** |  |  |
| **1/7/2015** | **7:45 a.m** | **1/8/2015** | **6:30 p.m** | **Pannar/ Chitternar** | **Panner/ Ahamsharief** | **101-a/Kh, 103/Kh & 104/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **1.50** |  |  |
| **1/7/2015** | **9:30 a.m** | **1/7/2015** | **3:00 p.m** | **Bonakoot** | **Bonkoot** | **82-a/Kh & 82-c/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **0.08** |  |  |
| **1/8/2015** | **9:00 a.m** | **1/8/2015** | **7:30 p.m** | **Ashtangoo/ Aloosa** | **Ashtangoo/ Aloosa** | **7/Kh, 9/Kh & 10/Kh** | By beating & Making fire circles | | Grasses & Bushes Only | **0.03** |  |  |
| **1/9/2015** | **2:00 p.m** | **1/10/2015** | **6:00 p.m** | **Tragbal** | **Tragbal** | **87/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **1.00** |  |  |
| **12/26/2015** | **11:30 a.m** | **12/27/2015** | **3:00 p.m** | **Bonakoot** | **Bonakoot** | **82-b/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses & Bushes Only | **2.00** |  |  |
| **Sub-total** | | | | | | | | | | | **01 No Kail** | **11.61** |  |  |
| **Bandipora** | **2015-16** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0.00 |  |  |
| **Sub-total** | | | | | | | | | | **Nil** | **0.00** |  |  |
| **2016-17** | **9/29/2016** | **10:00 a.m** | **9/29/2016** | **7:00 p.m** | **Chitternar** | **Chitternar** | **108/Kh** | By beating & making fire rings | | Grasses Only | 1.00 |  |  |
| **10/4/2016** | **4:00 p.m** | **10/4/2016** | **10:45 p.m** | **Malangam** | **Onagam** | **22/Kh** | By beating & making fire rings | | Grasses Only | 1.00 |  |  |
| **10/12/2016** | **4:15 p.m** | **10/13/2016** | **12:10 a.m** | **Malangam** | **Quil** | **21-c/Kh** | By beating & making fire rings | | Grasses Only | 1.50 |  |  |
| **10/17/2016** | **1:30 p.m** | **10/19/2016** | **7:00 a.m** | **Arin** | **Arin** | **110-b/Kh** | By beating & Making fire circles | | 40-50 Kail = 03 Nos, 50-60 Kail=01 No | 2.00 |  |  |
| **10/18/2016** | **2:30 p.m** | **10/18/2016** | **7:00 p.m** | **Bonakoot** | **Bonakoot** | **82-b/kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.50 |  |  |
| **10/18/2016** | **1:00 p.m** | **10/18/2016** | **5:00 p.m** | **Bonakoot** | **Bonakoot** | **85-b/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.50 |  |  |
| **10/22/2016** | **1:00 p.m** | **10/25/2016** | **9:00 p.m** | **Panar** | **Panar** | **99/Kh & 100/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 0.40 |  |  |
| **10/25/2016** | **4:00 p.m** | **10/25/2016** | **11:00 p.m** | **Ashtangoo** | **Ashtangoo** | **9/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 2.00 |  |  |
| **Bandipora** | **2016-17** | **10/26/2016** | **2:00 p.m** | **10/29/2016** | **2:30 p.m** | **Chandaji** | **Chandaji** | **41/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.00 |  |  |
| **10/28/2016** | **6:30 p.m** | **10/29/2016** | **4:00 p.m** | **Aragam** | **Aragam** | **145/Kh** | Beatings, clearance of inspection paths & formation of firelines | | Grasses Only | 0.25 |  |  |
| **11/4/2016** | **3:00 p.m** | **11/5/2016** | **11:00 p.m** | **Chandaji** | **Chandaji** | **43/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.50 |  |  |
| **11/4/2016** | **3:00 p.m** | **11/5/2016** | **11:00 p.m** | **Chandaji** | **Chandaji** | **44/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 2.00 |  |  |
| **11/7/2016** | **8:00 p.m** | **11/8/2016** | **1:00 a.m** | **S C unit Khayar A** | **Unit A** | **CAMPA Closure** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | 90% Planting | 11.00 |  |  |
| **11/7/2016** | **8:00 p.m** | **11/8/2016** | **1:00 a.m** | **S C unit Khayar A** | **Unit A** | **State Sector Closure** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 5.00 |  |  |
| **11/13/2016** | **6:00 p.m** | **11/14/2016** | **2:30 p.m** | **Mulkhuihama** | **Mulkhuihama** | **144/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.00 |  |  |
| **11/23/2016** | **5:00 p.m** | **11/24/2016** | **4:00 p.m** | **Kudara** | **Kudara** | **114/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | Grasses Only | 1.00 |  |  |
| **11/29/2016** | **6:30 p.m** | **11/30/2016** | **11: 30 a.m** | **Kudara** | **Kudara** | **114/Kh** | Clearing of inspection paths, creation of fire lines/rings, plugging of stumps with soil, rocks etc | | Grasses, bushes and regenerated conifer 100 Nos | 2.00 |  |  |
| **12/18/2016** | **6:00 p.m** | **12/19/2016** | **1:00 p.m** | **Aragam** | **Aragam** | **145/Kh** | Creation/clearing of fire lines/fire rings and other fire fighting operations | | Grasses Only | 2.00 |  |  |
| **12/21/2016** | **12:00 p.m** | **12/21/2016** | **08:00 p.m** | **Mulkhuihama** | **Mulkhuihama** | **144/Kh** | Creation/Clearing of fire lines, rings, plugging of stumps with soil etc | | Grasses Only | 0.25 |  |  |
| **12/21/2016** | **03:00 a. m** | **12/26/2016** | **8:00 p.m** | **Tragbal** | **Tragbal** | **81/Kh** | Clearance of Inspection Paths, Creation of fire rings, plugging of stumps with soil etc | | 40-50 Kail=04 Nos, 50-60 Kail=03 Nos & 60-70 Kail=01 No | 12.00 |  |  |
|  |  |  |  |  |  |  | **Sub-total** |  | **12 Nos Kail** | **48.90** |  |  |
| **2017-18** | **9/20/2017** | **12:00 Noon** | **9/20/2017** | **9:00 a.m** | **Ashtangoo** | **Ashtangoo** | **7/Kh** | Beating & creation of fire circles around fire by removing inflammable materials | | Grasses Only | 0.40 |  |  |
| **Bandipora** | **2017-18** | **9/27/2017** | **1:00 p.m** | **9/28/2017** | **10:00 a.m** | **Chandaji** | **Chandaji** | **27/Kh & 29/kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 1.25 |  |  |
| **9/30/2017** | **9:30 a.m** | **9/30/2017** | **4:30 p.m** | **Aloosa** | **Binlipora** | **11-b/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 0.10 |  |  |
| **10/9/2017** | **1:00 p.m** | **10/10/2017** | **11:00 a.m** | **Arin** | **Arin** | **112/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 0.50 |  |  |
| **10/30/2017** | **11:00 a.m** | **10/30/2017** | **4:00 p.m** | **Bonakoot** | **Bonakoot** | **85-b/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 1.00 |  |  |
| **12/2/2017** | **5:15 p.m** | **12/3/2017** | **4:30 p.m** | **Arin** | **Arin** | **111/Kh & 112/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 1.00 |  |  |
| **12/4/2017** | **1:30 p.m** | **12/4/2017** | **5:00 p.m** | **Chitternar** | **Chitternar** | **112/Kh** | Beating & creation of fire circles around fire by inflammable materials | | Grasses Only | 0.50 |  |  |
| **1/27/2018** | **3:30 p.m** | **1/29/2018** | **2:30 p.m** | **Arin** | **Arin** | **110-a/Kh** | Fire beating, creation of fire lines, clearance of inspection paths and use of water and soil | | Grasses & Bushes Only | 50.00 |  |  |
| **3/25/2018** | **6:00 p.m** | **3/25/2018** | **9:30 p.m** | **Chitternar** | **Chitternar** | **109/Kh** | By using Soil, Beating, creating fire rings water to some extent etc. | | Grasses & Bushes Only | 0.50 |  |  |
| **3/25/2018** | **6:00 p.m** | **3/26/2018** | **2:30 p.m** | **Arin** | **Arin** | **110-a/Kh** | By using Soil, Beating, creating fire rings water to some extent etc. | | Grasses & Bushes Only | 0.75 |  |  |
| **3/29/2018** | **4:00 p.m** | **3/31/2018** | **5:00 p.m** | **Chitternar** | **Chitternar** | **109/Kh** | Fire beating, creation of fire lines, clearance of inspection paths and use of water and soil | | Kail poles 15 Nos | 30.00 |  |  |
| **3/29/2018** | **4:00 p.m** | **3/31/2018** | **5:00 p.m** | **Chitternar** | **Chitternar** | **108/kh** | Fire beating, creation of fire lines, clearance of inspection paths and use of water and soil | | Kail 50-60 = 03 Nos Hallow Burnt | 40.00 |  |  |
| **Sub-total:-** | | | | | | | | | | | **0** | **126.00** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Forest Fire report of Bandipora Forest Division for the year 2018-19 (Ending March-2019)** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of Division** | **Year** | **Date & time of occurence** | | **Date & Time of Extinguishing of fire** | | **Block** | **Beat** | **Compt. No** | **Measures adopted to extinguish the fire** | |  |  | **Details of Enquiry/Verification cariied out** | |
| **Date** | **Time** | **Date** | **Time** |  |  | **Extend of damage** | **Area engulfed (in Hacs)** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | |  |  | **11** | **12** |
| **Bandipora** | **2018-19 (Ending 03/2019)** | **....** | **....** | **...** | **...** | **...** | **...** | **...** | .... | |  |  | .... | .... |
| **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | |  |  | **0** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Forest Fire report of Bandipora Forest Division for the year 2019-20 (As on ending April-2019)** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of Division** | **Year** | **Date & time of occurence** | | **Date & Time of Extinguishing of fire** | | **Block** | **Beat** | **Compt. No** | **Measures adopted to extinguish the fire** | |  |  | **Details of Enquiry/Verification cariied out** | |
| **Date** | **Time** | **Date** | **Time** |  |  | **Extend of damage** | **Area engulfed (in Hacs)** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | |  |  | **11** | **12** |
| **Bandipora** | **2019-20** | 4/23/2019 | 5:00 p.m | 4/23/2019 | 11.00 p.m | Aragam | Aragam | 145/Kh | **By using Soil, Beating, creating fire rings , Clearing paths etc.Beat Staff, Aragam, Mulkhuihama, RO Ajas & DFO Bandipora participated in extinguishingthe fire** | |  |  | Grasses &Bushes only | 1.00 Hac |
| **Total** | | | | | | | | |  |  | **......** | **1.00 Hac** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Forest Fire report of Bandipora Forest Division for the year 2019-20 (As on 22-09-2019)** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of Division** | **Year** | **Date & time of occurence** | | **Date & Time of Extinguishing of fire** | | **Block** | **Beat** | **Compt. No** | **Measures adopted to extinguish the fire** | | **Cauase of fire** | **Type of Fire (Crown, Ground, creeping etc)** | **Details of Enquiry/Verification cariied out** | |
| **Date** | **Time** | **Date** | **Time** | **Extend of damage** | **Area engulfed (in Hacs)** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | |  |  | **11** | **12** |
| **Bandipora** | **2019-20** | 4/23/2019 | 5:00 p.m | 4/23/2019 | 11.00 p.m | Aragam | Aragam | 145/Kh | **By using Soil, Beating, creating fire rings , Clearing paths etc.Beat Staff, Aragam, Mulkhuihama, RO Ajas & DFO Bandipora participated in extinguishingthe fire** | | **Natural** | **Ground** | Grasses &Bushes only | 1.0 Hac |
| 9/11/2019 | 5:30 P.m | 9/12/2019 | 3:00 p.m | Kanzalwan | Bagtore | 69/KG | **By Beating, creating fire rings , Clearing paths etc.Beat Staff, local residents and RO Gurez participated in extinguishingthe fire** | | **Natural** | **Ground** | Grasses &Bushes only | 1.5Hac |
| 9/11/2019 | 6:00 p.m | 9/11/2019 | 11:30 p.m | Kanzalwan | Kanzalwan | 42/KG | **By Beating, creating fire rings , Clearing paths etc.Beat Staff, local residents and RO Gurez participated in extinguishingthe fire** | | **Natural** | **Ground** | Grasses &Bushes only | 0.6 Hac |
| 9/12/2019 | 2:00 p.m | 9/13/2019 | 1:00 p.m | Dawar | Dawar | 57/KG | **By Beating, creating fire rings , Clearing paths etc.Beat Staff, local residents and RO Gurez participated in extinguishingthe fire** | | **Natural** | **Ground** | Grasses &Bushes only | 1.0 Hac |
| **Total** | | | | | | | | | | | **......** | **4.1 Hac** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **NO:- DFO/Bpr/Estt/2019/** |  |  |  |  |  |  |  |  |  |  |  | **Divisional Forest Officer** |  |  |
| **Dt:- 25 /10/2019.** |  |  |  |  |  |  |  |  |  |  |  | **Bandipora Forest Division** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | **Chitternar** |  |  |

**World Forest Scenario**

At present the world’s total forest area is just over 4 billion hectares, which corresponds to an average of 0.6 hectares per capita ( global forest resources assessment 2010). This forest cover is not uniformly distributed throughout the land mass. As per state of world’s report 2011, Europe is the richest in forest cover of the world. In term of percentage of land under forest cover, south America is on the top, having nearly half of its land mass under forest and in term of per capita forest area, oceania stands the first.

Table – 1: Forest area by region wise 2011

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Country/area | Forest area  (1000 ha) | % of land area | Area per 1000 people | 1900-2000  (1000 ha) | % | 2000-2010  (1000 ha) | % |
| Africa | 674419 | 23 | 683 | -4067 | -0.6 | -3414 | -0.5 |
| Asia | 592512 | 19 | 145 | -595 | -0.1 | 2235 | 0.4 |
| Europe | 1005001 | 45 | 1371 | 877 | 0.1 | 676 | 0.1 |
| Caribbean | 6933 | 30 | 166 | 53 | 0.9 | 50 | 0.7 |
| North and central America | 705393 | 33 | 1315 | -289 | 0 | -10 | 0 |
| South America | 864351 | 49 | 2246 | -4213 | -0.5 | -3997 | -0.5 |
| Oceania | 191384 | 23 | 5478 | -36 | 0 | -700 | -4 |
| Total world | 4033060 | 31 | 597 | -8323 | -0.2 | -5211 | -0.1 |

Source : state of the world forests report, 2011; FAO.

Fig.-1: Forest Areas by Region (%)

Distribution of the forest cover over globe is dependent on many factors, mainly geographical characteristics i.e altitude, geology/ soil type and climate. Climatic conditions i.e the temperature and the rainfall are strategic factors in determining the forest distribution. Based on the two factors four types of forests have been identified globally i.e tropical, subtropical, temperate and boreal forests, which are further sub grouped into thirteen sub types.

**Indian Forest Scenario**:-

India is one of the few countries rich in biodiversity. As per the forest survey of india report, 2011, india has forest cover of 692,027 sq. km’s, comprising 21.05 % of the total geographic area of the country.

Table- 3: Forest Cover In States And UT’s In India

(Area in sq. km)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| State/  UT | Geographical area | 2011 Assessment | | | |
| Very dense forest | Mod. Dense forest | Open forest | Total (3+4+5) |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Andhra Pradesh | 275069 | 850 | 26242 | 19297 | 46389 |
| Arunachal Pradesh | 83743 | 20868 | 31519 | 15023 | 67410 |
| Assam | 78438 | 1444 | 11404 | 14825 | 27673 |
| Bihar | 94163 | 231 | 3280 | 3334 | 6845 |
| Chhattisgarh | 135191 | 4163 | 34911 | 16600 | 55674 |
| Delhi | 1483 | 7 | 49 | 120 | 176 |
| Goa | 3702 | 543 | 585 | 1091 | 2219 |
| Gujarat | 196022 | 376 | 5231 | 9012 | 14619 |
| Haryana | 44212 | 27 | 457 | 1124 | 1608 |
| Himachal Pradesh | 55673 | 3224 | 6381 | 5074 | 14679 |
| Jammu and Kashmir | 222236 | 4140 | 8760 | 9639 | 22539 |
| Jharkhand | 79714 | 2590 | 9917 | 10470 | 22977 |
| Karnataka | 197191 | 1777 | 20179 | 14238 | 36194 |
| Kerala | 38863 | 1442 | 9394 | 6464 | 17300 |
| Madhya Pradesh | 308245 | 6640 | 34986 | 36074 | 77700 |
| Maharashtra | 307713 | 8763 | 20815 | 21095 | 50646 |
| Manipur | 22327 | 730 | 6151 | 10209 | 17090 |
| Meghalaya | 22429 | 433 | 9775 | 7067 | 17275 |
| Mizoram | 21081 | 134 | 6086 | 12897 | 19117 |
| Nagaland | 16579 | 1293 | 4931 | 7094 | 13318 |
| Orissa | 155707 | 7060 | 21366 | 20477 | 48903 |
| Punjab | 50362 | 0 | 736 | 1028 | 1764 |
| Rajasthan | 342239 | 72 | 4448 | 11567 | 16087 |
| Sikkim | 7096 | 500 | 2161 | 698 | 3359 |
| Tamil Nadu | 130058 | 2948 | 10321 | 10356 | 23625 |
| Tripura | 10486 | 109 | 4686 | 3182 | 7977 |
| Uttar Pradesh | 240928 | 1626 | 4559 | 8153 | 14338 |
| Uttarakhand | 53483 | 4762 | 14167 | 5567 | 24496 |
| A&N Islands | 8249 | 3761 | 2416 | 547 | 6724 |
| Chandigarh | 114 | 1 | 10 | 6 | 17 |
| Dadra and Nagar Havelli. | 491 | 0 | 114 | 97 | 211 |
| Daman and Diu | 112 | 0 | 0.62 | 5.53 | 6 |
| Lakshadweep | 32 | 0 | 17.18 | 9.88 | 27 |
| Pondicherry | 480 | 0 | 35.37 | 14.69 | 50 |
| Grand Total | 3287263 | 83471 | 320736 | 287820 | 692027 |

Source : India state of forest report 2011

The country shows much variation in its forest vegetation due to its diversified climatic and physiographic conditions. The forest vegetation in india varies from tropical evergreen forests in the Andaman and nicobar islands to dry alpine forests high up in Himalayas. In between two extremes, the country has semi-evergreen, deciduous, littoral and swamp, thorn, sub-tropical broad-leaved hill pine, and Montana-temperate forests. In physical terms, the forests of the country vary from those that contain trees over 70 meters in height to those that have trees less than 7 meters in height and has stratification of trees that varies from single to many storied. According to forest survey of india, the country has sixteen types of major forests.

Table -2: Forest Types – Distribution & Extent

|  |  |  |  |
| --- | --- | --- | --- |
| S.No | Forest Type | % of forest area | Occurrence in states/UT’s of India |
| 1 | Tropical wet green forests | 2.92 | Aruanachal Pradesh, Assam, Karnataka, Kerala, Mizoram, Manipur, Nagaland, Tamil Nadu, Sikkim, Andaman and Nicobar, Islands and Goa |
| 2 | Tropical semi-green forests | 13.79 | Assam, Karnataka, Kerala, Maharashtra, Nagaland, Orissa, Tamil Nadu, Andaman and Nicobar, Islands and Goa |
| 3 | Tropical moist deciduous forest | 19.73 | Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, M.P, Maharashtra, Manipur, Meghalaya, Mizoram, Tripura, Nagaland, Orissa, Tamil Nadu, U.P, West Bengal, Andaman and Nicobar islands, Goa, and Dadra and Nagar Havelli |
| 4 | Littoral and swamp forest | 0.69 | Andhra Pradesh, Gujarat, Maharashtra, Orissa, Tamil Nadu, West Bengal, and Andaman and Nicobar islands. |
| 5 | Tropical dry deciduous forest | 41.87 | Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, M.P, Maharashtra, Punjab, Rajasthan, Tamil Nadu and U.P. |
| 6 | Tropical thorn forest | 2.25 | Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, M.P, Maharashtra, Punjab, Rajasthan, Tamil Nadu and U.P |
| 7 | Tropical dry evergreen forests | 0.13 | Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, M.P, Maharashtra, Punjab, Rajasthan, Tamil Nadu and U.P |
| 8 | Sub Tropical broad leafed hill forest | 2.69 | Assam and Meghalaya |
| 9 | Sub tropical pine forest | 2.63 | Aruanachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Haryana, U.P Punjab, Manipur, Nagaland, and Sikkim. |
| 10 | Sub tropical dry evergreen forest | 0.03 | Himachal Pradesh and Jammu and Kashmir. |
| 11 | Montane wet temperate forest | 0.69 | Arunachal Pradesh, Karnataka, Manipur, Nagaland, Sikkim, and Tamil Nadu. |
| 12 | Himalayas moist temperate forests | 4.12 | Himachal Pradesh, Jammu and Kashmir, and U.P. |
| 13 | Himalayan dry temperate forests | 0.84 | Himachal Pradesh, Jammu and Kashmir. |
| 14 | Sub alpine forest | 2.55 | Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir and U.P |
| 15 | moist alpine- scrub | 2.55 | Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir and U.P |
| 16 | alpine scrubs | 2.55 | Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir and U.P |
| 17 | Plantation/TOF | 5.07 | Others |
|  | TOTAL | 100 |  |

Source: India state of forest report 2011.

The forest cover of the country, though quite rich in biodiversity is under tremendous pressure as it supports more than on billion people i.e. equivalent to about 16% of world’s population and 450 million livestock heads. Immense biotic pressure, low productivity and acute degradation characterize the Indian forests. About 78% of the forest in the country is subjected to grazing and 51% is open to occasional forest fire. Against the world’s average forest productivity of 2.1 cu m/ha/yr., Indian forests has productivity of 0.7 cu m/ha/yr. only.

**Jammu and Kashmir Forest Scenario:-**

Jammu and Kashmir State is a forest rich State having 20,230 sq km of forest i.e about 10% of its geographical area. If Ladakh region is excluded which does not have significant expanse of natural forests, the proportion of natural forests in the state area increases to 47%. Per capita forests and tree cover in the state is about 0.15 ha which almost double the national average of 0.07 is ha. The forests in Kashmir region mostly fall in dry temperate class. These forests are predominantly having conifers comprising of Deodar, Kail and Fir. The distribution of these species varies with altitude.

These forests are not normally vulnerable to forest fires as they are predominately having evergreen species and lush green ground cover. The vulnerability increases during the Autumn season if it remains dry for long period. During Summer season hurricanes sometimes cause immense damage to forests. Pest attack also takes place at times in summer months in respect of few species where there is mono culture. Flush floods in forest areas are also common which cause immense damage to forests and at times block the connectivity between the villages.

The forest cover of the State as per 2011 assessment presents position as under:-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Very dense forest | Moderately dense forest | Open Forest | Scrub | Non Forest | Total |
| Area in sq. km | Area in sq. km | Area in sq. km | Area in sq. km | Area in sq. km | Area in sq. km |
| 4140 | 8760 | 9639 | 2105 | 197592 | 222236 |

District – wise forest cover of Jammu and Kashmir

(area in sq. km)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| District | Geographical area | 2013 Assessment | | | | Per cent of GA | Change | scrub |
| Very dense forest | Moderately dense forest | Open forest | Total |
| Anantnag | 3984 | 196 | 664 | 578 | 1438 | 36.09 | 0 | 23 |
| Baramulla | 4588 | 425 | 286 | 446 | 1157 | 25.22 | 0 | 86 |
| Budgam | 1371 | 99 | 69 | 52 | 220 | 16.05 | 0 | 8 |
| Doda | 11691 | 619 | 1689 | 1659 | 3967 | 33.93 | 0 | 5 |
| Jammu | 3097 | 0 | 210 | 672 | 882 | 28.48 | 0 | 43 |
| Kargil | 14037 | 0 | 3 | 21 | 24 | 0.17 | 0 | 19 |
| Kathua | 2651 | 112 | 672 | 615 | 1399 | 52.77 | 1 | 12 |
| Kupwara | 2379 | 472 | 366 | 322 | 1160 | 48.76 | 0 | 3 |
| Leh | 45110 | 0 | 48 | 57 | 105 | 0.23 | 0 | 6 |
| Outside LOC | 120848 | 1326 | 2472 | 2687 | 6485 | 5.37 | 2 | 1810 |
| Poonch | 1674 | 187 | 300 | 242 | 729 | 43.55 | 0 | 9 |
| Pulwama | 1398 | 110 | 106 | 78 | 294 | 21.03 | 0 | 10 |
| Rajouri | 2630 | 49 | 439 | 752 | 1240 | 47.15 | 0 | 8 |
| Srinagar | 2228 | 196 | 307 | 249 | 752 | 33.75 | 0 | 16 |
| Udhampur | 4550 | 349 | 1129 | 1208 | 2689 | 59.03 | -3 | 47 |
| Grand total | 222236 | 4140 | 8760 | 9638 | 22538 | 10.14 | -1 | 2105 |
|  |  |

More than 56% area of the State is under Glacier / permanent snow and naturally not available for Agriculture and tree planting. Out of the remaining area more than 74% is either under forest or not available for use. Approximately 3 % area is available for pasture and grazing. Though density of human population is concentrated in the lower portion of State in the valley yet sizable population lives in the mountainous tracks surrounding it. The people living in this high altitude track mainly sustain through raring of their livestock. Stall feeding is not common. During summer months the livestock permanently remains in the high altitude grazing lands locally called as ‘Bahaks. Because of the movement of this sizeable population through the forests and dependence on them accidental damages in the shape of forest fires are common. These fires during summer months do not have any impact because of lush green environment and soothing temperatures. However these accidental fires become disastrous during dry months of autumn and sometime early winter. This is the main issue before the Forest Department and reason for drawing up of this plan.

**Population of the State and its bearing on Forests**

The population is most highly concentrated in the Kashmir valley and to some extent in Jammu division. However, the population is highly sparse in Ladakh region having only 4 persons per sq km. This population distribution follows the climatic and physical characteristics of different regions/divisions. The State of Jammu and Kashmir has a sizable population of nomadic tribes. These tribes are distributed all over the State and constitute about 10.9% of the total population of the State (Census-2001). Most of the tribes are nomadic and livestock rearing is their primary occupation. The State of Jammu and Kashmir is bestowed with valuable natural resources. The forests covering hill slopes constitute vital water sheds which as on date are helping in maintaining environmental stability. These forests provide wood and wood products for sustenance of people, serve as pastures for both local and nomadic livestock and are abode for wild flora and fauna. The sustainability of these forests is crucial for present and future generations of the state. However, natural resources of state particularly the forests have degraded over for the last four decades.

The present ecological scenario of mountainous ranges in the state gets attributed to all these key issues. Concern about relentless destruction of state’s forests in the past and its impact on lives of people around has compelled for re- examination of management regime of forests in the State.

**Forest disasters**

The valuable forests of the State are to be shielded against the dangers which either can completely destroy them or at least damage them to such extent that they may no more remain able to perform the functions and confer benefits which they are expected to give. This is what can be termed as Forest Protection. Protection requires efforts as well as financial backup. As regards the causes of the forest damages they are immense. The important one is that of forest fire.

**Forest Fires**

Forest fire is the most important cause which results in immense damage to the extensive forests. The uncontrolled fires sometimes completely ruin a forest and finish the work of both the nature as well as the forest officers. The forest fires are common in sub-tropical forests of the Jammu Region whereas their intensity and frequency in Kashmir Region has not been much. However, with global changes in climate taking place, the precipitation in winter has not been normal for the last few years which has resulted in dry autumn which creates an environment for the forest fires to take place.

Classification of Forest Fires :

Forest fires can be classified in two ways:-

On the basis of its causes:

**A): On the basis of their causes forest fires can be:**

i. Accidental.

These accidental fires are direct result of the carelessness of the man through :

1. leaving the fire burnt by the people moving through the forests for either warming or preparing the meals for themselves.

2. throwing the burning match sticks or cigarettes in the forest while moving through them or grazing their animals.

3. burning of fields or grass lands in the villages adjacent to nearest forests and leaving such fires un-attended.

ii. Deliberate or intentional.

The forest fires are also caused because of deliberate and un-intentional actions at times.

These can be :-

I. burning the undergrowth and grass to collect minor forest produce.

II. inducing fresh blades of grass in summer by burning the dry grass.

III. scaring away wild animals from nearby villages.

IV. destroying or at least charring the stumps of illicitly felled trees in a forest.

**B): On the basis of their resultant action forest fires are classified into:-**

i. Creeping fire

It is the fire which spreads slowly over the ground with low flame. Such fires are common in forests where there is no ground cover or undergrowth. Usually ground in such forests is covered with layers of dry leaves which burn slowly in the absence of strong wind.

ii. Ground Fire

It is the fire that burns the ground cover only which comprise of herbaceous plants and low shrubs which cover the soil.

iii. Surface fire

It is the forest fire which burns not only the ground cover but also the dense and tall shrubs

iv. Crown fire

It is a forest fire which spreads through the crowns of the trees and consumes all or part of the upper branches and foliage

All these fires are not independent of each other. Once a fire of particular class starts it doesn’t remain confine to that class and may develop into some other class or the combination of the two classes depending on the prevailing circumstances.

**Fire environment**

Even if fire is caused with intention it is not going to spread to large areas normally unless and until there is a proper fire environment existing there. Fires occur as a result of certain circumstances which constitute its environment. For discussing the methods of controlling of forest fires, studying of environmental factors and behaviour and dynamics of forest fires are essential. The following factors make a fire environment:-

i. Weather

weather is the most important factor which determines the fire environment. Even in weather the temperatures and winds are important factors. In Kashmir Region normally the autumn season used to be brief and dry followed by winter precipitation in the shape of rain and snow. With the changes in climate taking place at global level the precipitation pattern has altogether changed. The autumn and Ist part of winter remains usually dry which results in spreading of forest fires engulfing large areas. Even if such fires occur by accident or intention in the summer months they don’t cover large areas and are extinguished with ease. The comparison clearly reveals the deviations from the normal pattern. This year the season is abnormal and there has been almost no winter precipitation in the form of snow. If intermitted summer rains through westerly depressions are not there then it can be a major cause for forest fires.

ii. Inflammable material

Forest fires cannot occur unless there is inflammable material available in the forest. In the favourable fire environment, fire occurs only when there is inflammable material in the shape of dry grasses, shrubs, fallen leaves and fallen wood available on the ground. The more the inflammable material, the more fierce and damaging will be the forest fire.

iii. Topography

In plains the fire environment and presence of sufficient quantities of inflammable material are enough to set the stage for a large and rapid fire to take place. Topography adds another dimension in the hilly terrain to the fire behaviour. Fire spreads very fast when travelling up a hill slope but its spread slows down when it travels downhill.

**Fire behavior and dynamics**

A common man usually takes the forest fires as normal fires taking place in habitations and expect a quick action and resultant control by the Forest Department. The study of behaviour and dynamics of forest fires shows how difficult and cumbersome is the control and extinguishing of forest fires that too in a mountainous topography.

The fire usually starts naturally or because of intention of the human beings at a particular spot in the forest area and then under the influence of winds, inflammable material and topographic factors spreads fast in one direction and slowly in others. From the place ignition, the direction of spread, speed, extent and shape of fire depends on wind, inflammable material and topography

i. Direction of spread

In case there is no wind blowing in the area at the time of start of the fire it spreads in all directions slowly and thus assumes a circular shape. On the other hand if the wind is blowing in a particular direction then the fire spreads in that direction fast and in other directions slowly. If inflammable material is available only on a particular side, fire spreads in that particular direction fast and slowly in other directions. The spread of fire in a hilly terrain is further affected by topographic factors, particularly the slope. Fire spreads fast uphill and slowly downhill. The fire normally spreads in a single plane along the ground with its height usually remaining between one to three meters but presence of dry climbers of trees, lichens on deodar trees induce it to spread at places vertical to normal plane burning the crowns of the trees and changes into crown fire at times.

ii. Speed of Fire

The speed at which the fire spreads is greatly influenced by wind. The stronger is the wind the faster will be the spread. The presence of dry inflammable material also determines the speed of the spread of fire. The topography has an effect on the speed of spread of fire if rising slope comes in front of moving fire it moves fast uphill. On the other hand, on the downhill slopes fire moves very slowly. But in such places the half burnt cones, round wood sometimes rolls down and starts the fire uphill from those places.

iii. Extent

The extent of the fire usually depends on wind, presence or absence of inflammable material and topography. However, it is also affected by the promptness with which the forest staff tries to extinguish it. The greater the delay in detecting the start of forest fire and in starting control operations, the greater is the area affected by it and the greater is the labour and money required in controlling it. On the basis of simple calculations it emerges that area of the fire varies from that in the first hour as the square of number of hours that lapse between the start of fire and start of fire-fighting operations. To make explicitly clear the area of fire in two hours will be 4 times than in the first hour, in the three hours it will be 9 times larger the area of first hour and in four hours it will be 16 times larger than that of the first hour. Thus real time monitoring and immediate mobility of staff to start fire- fighting operations can restrict the area of damage.

iv. Shape of the affected area

The area engulfed by a fire cannot be a regular geometrical figure. Under the influence of wind, inflammable material and the topography its shape is likely to be very irregular.

**4.2 Causes of Forest Fires:**

The causes of the forest fires are natural as well as man-made. The natural causes normally start forest fire by lightning . These fires are normally rare. Even in the country the natural causes are reported to be less than 5% of the total number of fires caused in a year. The most common cause of forest fire is man-made which can be either because of carelessness or deliberate and intentional.

The most of the forest fires in the valley are caused by man. The fires that are caused un-intentionally are termed as accidental fires. These accidental fires are direct result of the carelessness of the man through :

i. leaving the fire burnt by the people moving through the forests for either warming or preparing the meals for themselves.

ii. throwing the burning match sticks or cigarettes in the forest while moving through them or grazing their animals.

iii. burning of fields or grass lands in the villages adjacent to nearest forests and leaving such fires un-attended.

The forest fires are also caused because of deliberate and un-intentional actions at times.

These can be :-

I. burning the undergrowth and grass to collect minor forest produce

II. inducing fresh blades of grass in summer by burning the dry grass

III. scaring away wild animals from nearby villages

IV. destroying or at least charring the stumps of illicitly felled trees in a forest

**4.3 Consequences Of Forest Fires:**

Forest fires sometimes cause colossal damages to the forest unless they are mild and controlled in time. The damages caused are:-

i. Damage to trees

ii. Damage to regeneration

iii. Damage to soil

iv. Damage to productive capacity of the forest

v. Damage to protective capacity of the forest

vi. Damage to wild animals

vii. Damage to the recreational and scenic value of forests

These damages are result of the nature of the fires and time taken to restrict and extinguish the same.

**Chapter 5: Recommendations and suggestions**

**5.1 Forest Fire As A Disaster**

“Fire is a good servant but a bad master” the saying is true for forest fire too. Limited and controlled forest fires have been very useful and essential for healthy forest growth. But uncontrolled forest fire may engulf and destroy healthy thick forest cover within no time. Besides direct loss to forest cover, forest fire also kills wildlife, damages environment, degrade soil quality and retrogrades forest regeneration. Since historical times, forest throughout the world has been adversely affected by fire. Fire always causes many direct or indirect effects on forest ecosystem. They may merely be beneficial but at most of the times these effects are deteriorating. The damage to a forest by fire depends mainly on size of the fire.

The main adverse impact of the uncontrollable forest fire includes damage to growing stick of forests, loss of biodiversity, increase in soil erosion, scorching of soil and reduction in its permeability and water retaining capacity and volatization of the nutrients like nitrogen. Not only for forest vegetation and environment, the forest fire causes direct loss to human being also in the form of damage to life and property. Extreme forest fires burns thousand of houses and kills many human beings and cattle throughout the world. As reported in the Global Forest Resources Assessment (GRFA), 2010 the recent examples of human lives loss due to forest fire- victoria in austraila in 2003 causing 73 fatalities and Greece fires in 2007 resulting into 70 deaths. Large uncontrolled forest fires result into health problems due to fire generated smoke. Breathing problems, skin irritation, loss of visibility and other related problems are very common during forest fires. Researchers have revealed that extreme forest fires may create conditions, which ultimately result into floods and landslides, causing enormous loss to life and property. The loss to timber increment, loss of soil fertility, soil erosion, loss of employment, drying up of water resources and loss to biodiversity are immeasurable losses by forest fire.

Forest fires during the summer of 1995 and 1999 in the Himalayan hills give an idea about the damage forest fires may result into. These fires were very severe and attracted the attention of whole nation. Fires the affected an area of 677700 hectares resulted into quantifiable timber loss worth around crores of rupees. The fire also created heavy smoke in the region, which covered the surrounding area for quite a few days. These fires caused changes in the microclimate of the area in the form of soil- moisture balance and increased evaporation.

Not only the large fires, but in certain cases the small fires may also cause immense loss. In the month of February, 2001, one small fire in the Gwar forest area of Rudraprayag district, Uttarakhand claimed four lives and injured many more. The fire broke out in a grass field, when some women were busy in harvesting the fodder grass.

**5.2 Forest Fire Management**

As per indian constitution the central and state government are enabled to legislate on forestry issues; however, the implementation part of the programme / policy lies exclusively with the later. Fire prevention, detection, and suppression activities are the responsibilities of the state government, where it lies exclusively with the state forest department, which unfortunately has no wing or unit for carrying out this strategic activity. The regular staff of the forest department has to carry out this task without any extra support or assistance. In most of the cases there is no exclusive fund to look after fire management related activities and in such circumstances it becomes very difficult for the department to carry out its duties honestly. Taking into consideration this pitiable situation, the union ministry of environment and forests initiated a project “modern forest fire control project” in 1984-1990 assisted by United Nations Development Program in two states of U.P and Maharashtra. The purpose of this project was to introduce and evaluate integrated forest fire management systems in both the states and come out with an appropriate plan of action. The project was highly successful from the standpoints of technical soundness and economic efficiencies. Motivated by the success of this project the Ministry of Environment and Forests has introduced a centrally sponsored scheme namely “modern forest fire control methods” since 1992-93 in the eleven selected states of Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and Uttar Pradesh. The project continued during the first three years of the ninth plan period i.e. from 1997-2000. In 2000 the scheme was extended to all States and Union Territories of the country.

The objectives of this scheme are:

1. To control forest fires with a view to protect and conserve forests.
2. To devise, test and demonstrate the principles and techniques of forest fire management.
3. To improve the productivity of forests by reducing incidence and extent of fire.
4. To create awareness among the masses about the effects of forest fires on the forests and environment.
5. To conduct training programmes for the forest officials and local people to prevent, detect, and control forest fires.

To meet the aforementioned objectivities financial support is provided under following subheads:

**Prevention**: creation of fire lines, training and demonstration publicity

**Detection**: construction of watch towers, network of wireless sets, fire finders.

**Suppression**: hand tools, fire resistant clothing and fire tenders.

During the tenth plan period, the states and UT’s were financially supported for forest fire management under the new schemes “integrated forest protection scheme”.

The government of india also developed various guidelines and advisories to help state governments in managing forest fires in more effective and efficient manners. In addition to guidelines, the government of india also issued protocol on forest fire proforma for forest fire reporting at different levels. The main issue have been raised in the “ guidelines on fire management and preparedness”.

In addition to the on-going schemes for forest fires management the government is also setting up of a national institute of forest fire management with satellite centres in different parts of india with an objective to bring the latest forest fire fighting technologies to india through proper research, training of personnel and technology transfer on a long-term basis. Notwithstanding the existing efforts, it is still felt that there is an acute shortage of resources for forest fire prevention, detection, and control and also for research, training and equipment.

**Strategies –**

To make the plan successful and meet the objectives, there is need to have a systematic strategic planning including following components:-

* Publicity and extension- covering preparation of publication/extension material e.g. pamphlets, handouts, circulars, posters, and media programs through TV, radio, video tapes, etc.
* Training and education- designing syllabus for planning, management and ground level firefighting courses in forestry institutions.
* Strengthening of organizational framework- though appropriate modification and alteration in state forest departments structural framework and providing sufficient human power.
* Research and development, by strengthening the existing and introducing new R&D institutions dealing with forest fire management.
* National forest fire danger rating system- designing uniform system of forest fire danger rating and reporting for all states/UT’s. Also designing and installing a network of fire forecasting at national and state levels in collaboration with the meteorological department.
* Monitoring, evaluation and updating prescription- designing uniform formats for reporting, monitoring and evaluation.
* Promotion of people’s participation- through involvement of NGO’s , voluntary organizations, village forest committees(VFC’s).
* Creation of a national forest fire control broad- with the task of supervising the control of devastating forest fire in exigencies in fragile areas like Himalayan zone, western Ghats etc.
* Revision of indian forest act- the relevant section of the indian forest act needs to be revised to give due importance to legal protection against man-made forest fire.
* Revision of guidelines for working plan- introduction of a chapter on forest fire working circle.

**5.3 District Forest Fire Management Committee**

The Control Rooms already established at Divisional level will remain operative for fire fighting measures. However for real time monitoring of situation and mobilizing all available resources at District level, the committees will have to be constituted as was discussed in detail in the meeting taken by the Divisional Commissioner, Kashmir. The constitution of the committees will be as under:-

District Level Committee

District Dev. Commissioner Chairman

DFO Territorial Member Secretary

Superintendent of Police Member

Deputy Director Forest Protection Force Member

Wildlife Warden Member

DFO Social Forestry Member

District Soil Conservation Officer Member

The Committee shall monitor and coordinate the forest fire, prevention and control in the District and shall meet once in a month to take steps required for effective management of prevention of forest fire incidents. The committee will work in coordination with the District Disaster Management Committees**.**

**5.4: Mitigation measures:**

Protection against damage by fire

Fires are most destructive elements. They can destroy all the life forms, cause serious soil erosion, kill all micro-organisms and destroy the ecosystem that had been built up over a long period of time. The protection against the fire damage requires to be carefully devised and executed. The methods that can be both preventive and remedial are briefly given in the action plan drawn as under:-

**i. Direct preventive measures**

The measures to be adopted are:-

a) Organization and detailing of staff for fire control rooms:

Control rooms have already been established in all Divisions at Divisional Headquarters. What is required is connectivity by proving wireless sets / cell phones, mobility facilities (some pickup Vans) and proper gear for the staff to save themselves from any injury while extinguishing fires, first aid kits for emergencies and tools for carrying out the fire control operations.

b) Hazard reduction: Forest fires can be prevented by reducing or limiting the exposure of forests to fire risks. This may be achieved by creating fire lines and maintaining them in the subsequent years.

**ii. Remedial measures:**

These refer to measures which are to be taken to extinguish them when they break out inspite of the preventive measures. The action has to be quick. The delay can be avoided by quick detection, quick communication of occurrence of fire and quick action to suppress it.

a. Detection:

For quick detection there should be provision of engaging local fire watchers during the fire season for ground patrolling. There have to be facilities of communication to send information to the Range / Divisional Headquarters for mobilizing staff and labour. Again the transport facilities should be handy for moving the staff and the labour to the site

b. Quick action for suppression of fire

For quick action sufficient labour force and staff is required to be deployed. Arrangement of tools, food, water and lighting should be there as the process of fire extinguishing sometimes may take days together. The arrangement of transportation of men and material should be available.

**Methods of fire extinguishing**

Since large occurrence of fires is not there in the region except during the prolonged dry season as such conventional methods of fire extinguishing are in vogue at present which are :-

i. by water

ii. by earth

iii. by beating iv. by counter firing.

Extinguishing of fires by throwing water is only possible in plain area where water is readily available. Extinguishing of fire by throwing soil on it is a time consuming operation and the only and the best way to extinguish all surface fires is to beat them out with brooms, branches etc. counter firing is required where area of the fire is to be restricted to a small portion and then controlling it. For all such operations fire is to be restricted first to some area and for that fire traces are to be created by removal of inflammable material, cutting the branches and clearing the strip of sufficient width. The distance of fire trace from the advancing fire will be governed by :

a) Speed of advancing fire

b) Labour force available

c) Length of fire trace

d) Topography

**Safety measures in fire fighting**

Unsafe and careless fire-fighting strategy can be hazardous or even fatal to the men at the fire front. The safeguards to be taken are :

a) Wear non synthetic fire proof clothing to protect it from heat

b) Use head gear and goggles from radiant heat, sparks etc.

c) Use footwear preferably leather boots

d) Carry enough water to guard against desiccation by heat

e) Carry first aid kit for emergencies

f) To plan for escape route in case of danger

g) To maintain communication between fire fighters

**Fire-fighting tools**

With the advancement in fire control measures the tools are also likely to go on changing however, the common tools of use are :

a) Peg type fire rakes

b) Adjustable sticks

c) Nail type fire rakes

d) Fire beaters

e) Brooms

f) Fire pathal

g) Water bottles

h) Haversacks

i) Adjustable head lamps

j) Torches

k) Spades

l) Pick axes

m) Power chain saws

n) Axes

**5.5: Conclusion and suggestions**

Forest cover in India despite its richness in flora and fauna, is very less, when compared to its total population. This natural resource is under tremendous pressure due to various factors. Fire is one of the major causes of injury and loss to forest wealth. As in most of the cases the reasons behind forest fire are human induced and the frequency and subsequent damage due to forest fire are on the rise. Due to population growth and various other factors, the forest fire situation in india has become grim. Moreover, country’s forests are under constant threat from forest fires, that causes much loss to forest wealth and environment. Though small scale controlled forest fire is necessary for good forest growth, yet the uncontrolled large forest fire are very damaging and have long lasting and disastrous impact on forest. The main responsibility of forest fire management lies with the State Forest Department. The Minister of Environment & Forests, Government of india is the nodal ministry for forest fires.

People’s participation, creating awareness among citizens can play a significant role in prevention and control of forest fires. Advertisement through local media like radio, television, pamphlets, signboards, newspapers, panchayats, etc. may be very effective in this regard. Teaching people how to control forest fire may be effective tool of forest fire management techniques. Special emphasis should be laid on the research, training, and development.

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