# The outline of Forest Fire in Kosung, Kangwon province, Korea

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## 1. Introduction

A turning point in the history of Korean forest policy was witnessed in 1973 by the initiation of the two successive 10-year forest development plans. As a result, 2 million ha which is around 34 percent of total forest land area in korea was reforested. Thereafter, as the forest ages it has an increased woody fuel and ground litter which increase the hazard of forest fire. Also, the forests are put under the high risk of fire by increased number of visitors into forests. Therefore, korean forestry is facing ever-increasing problems of preventing and controlling forest fires.

Last year a catastrophic forest fire encompassing 3,762 ha broke out in Kosung mountainous area in Kangwon province in April, which was the most disastrous ever occurred since the establishment of Korean government, caused huge property damages and disturbed forest ecosystems in surrounding area.

## 2. Forest Information

According to the forestry statistics of republic of Korea in 1996, there are 6,452 thousand ha of forest land, occupying 65% of the total land area(Table1).

Table1. Land use in Korea (unit: 1,000ha)

| Total land area | Forest | | Cultivated land | | Others | |
|---|---|---|---|---|---|---|
| | Area | Ratio | Area | Ratio | Area | Ratio |
| 9,927 | 6,452 | 65% | 1,985 | 20% | 1,490 | 15% |

## 3. Forest Fire Problem

### 1) Forest fire damage by year

According to the statistics recorded in 1996 by the office of forestry in Korea, there has been 410 cases of forest fire, by yearly average, during last 5 years, and 1,911 ha of areas have been destroyed.

As for the scale of forest fire, the area destroy by fire is normally less than 10ha(area of 95% forest fires from 1992 to 1996 is less than 10ha), and the average area of fire is around 4.7ha(Table 2), But the average area affected by forest fire reached up to 3,762 ha last year.

Table 2. Forest fire damage in Korea

| Item \ year | '92 | '93 | '94 | '95 | '96 | Average |
|---|---|---|---|---|---|---|
| Number of fires(number) | 180 | 278 | 433 | 630 | 527 | 410 |
| Total area burned(ha) | 640 | 1,752 | 781 | 1,013 | 5,368 | 1,911 |
| Average fire size(ha) | 3.6 | 6.3 | 1.8 | 1.6 | 10.2 | 4.7 |
| Loss of forestry(thousands) | 198,632 | 255,370 | 254,454 | 450,678 | 13,319,270 | 2,895,681 |

### 2) Causes of Forest Fire

According to the official statistics which have been collected since 1992, there is no any record of fire caused by natural phenomena.

All fire are brought about by man-made, especially burning by the rural people

Table 3. Status of forest fire damage by cause (unit : number)

| Cause \ Year | '92 | '93 | '94 | '95 | '96 | Mean |
|---|---|---|---|---|---|---|
| Total | 180 | 278 | 433 | 630 | 527 | 410(100%) |
| Carelessness | 73 | 120 | 194 | 312 | 248 | 190(45%) |
| Weed Burning | 49 | 73 | 64 | 138 | 73 | 78(27%) |
| Children | 12 | 10 | 24 | 18 | 30 | 19(4%) |
| Visitor to Ancestor grave | 9 | 15 | 41 | 34 | 38 | 27(6%) |
| Others | 37 | 60 | 110 | 128 | 138 | 96(18%) |

who adjacent to forests. The main causes of forest fire are carelessness, weed burning, children visitor to ancestor's grave and others(Table 3)

Korea is located in continental temperate climate zones which has four distinctive seasons with relatively dry periods in spring and autumn.

Therefore, most of forest fire occurrence is more than 70% in Spring and Autumn(table 4). And periods from mid February to mid May and from early November to mid December, during which the most forest fires occur, are designated as "Forest Fire Prevention Period" and various activities are conducted.

Table 4. Status of forest fire damage by season (unit : number)

| Season / Year | Total | Spring (3~5 Month) | Summer (6~8 Month) | Autumn (9~11 Month) | Winter (12~2 Month) |
|---|---|---|---|---|---|
| Mean ('92~'96) | 410 (100%) | 264 (64%) | 10 (2%) | 26 (6%) | 110 (28%) |
| '92 | 180 | 96 | 14 | 10 | 60 |
| '93 | 278 | 214 | - | 13 | 51 |
| '94 | 433 | 267 | 33 | 66 | 67 |
| '95 | 630 | 414 | 2 | 27 | 187 |
| '96 | 527 | 326 | 3 | 12 | 186 |

4. The outline of Forest Fire in Kosung

1) Circumstances of the Forest Fire

a) period : 1996.4.23 12:20~4.25 18:20 (54hours)

b) place : Majuari Mountain 1. Chukwang town(myun)
Kosung district(kun) Kangwon Do.

c) cause : occurred when disposing explosives at the Military shooting gallery of army

2) Cause of magnified forest fire

a) Climate and circumstances of the land

- yearly average temperature : 11.9 °c
- yearly measured rainfall : 1,330 mm
- Climate of the day forest fire occurred
  - Maximum speed of wind : gale at speed 17~27 m/sec made difficulty in extinguishing fire by helicopter.

• Relative humidity : Very dry at 26% ~ 35% of humidity

- Because of Föhn occurred at Young-dong and Young-su region and gale from East coast, the fire was rapidly amplified by spot fire.

b) State of Forest

- a pine-grove covered about 63% and it had a lot of inflammable fules which caused the magnification of the forest fire.

Table 5. The origin state of forest at Kosung.

| Item | Total | Coniferous | Mixed | Hardwoods |
|---|---|---|---|---|
| Area(ha) | 3,762 | 2,359 | 1,162 | 241 |
| Ratio(%) | 100 | 62.7 | 30.9 | 6.4 |

c) Cause of spread forest fire

- Because the place of fire was military shooting gallery it was unable to extinguish at early stage and this caused the magnification of the fire.
- As the atmospheric pressure changed rapidly, the wind blew in many directions causing scatterings over to 6~7 places which made it hard to put out the fire.
- The day the forest fire occurred, 19 more forest fires broke out over nationwide which made delays of helicopter supplies.
- The extinguishing work was inefficiently progressed because there were not enough forest maps which made it hard for men and tools to do the work.

3) The Result of damages from forest fire

a) Size of forest areas damaged : total 3,762 ha.

Table 6. Division of areas by levels of damage.

| Division | Crown fire (high damage) | Stem fire (medium damage) | Surface fire (low damage) |
|---|---|---|---|
| Size of area(ha) | 1241 | 1129 | 1392 |
| Percentage | 33 | 30 | 37 |

b) Bad effects to forest eco-system

- Forest Fire disturbs forest eco-system and brings secondary damages.
  - The earth is burned down and the soil becomes barren.
  - Secondary damages are prospected such as landslides.
  - Damages by harmful insects and disease are prospected in the forest such as Pine bark beetle.
  - Habitats for wild animals get burned down making there hard to live
  - A big loss of pine mushroom production.

5. Conclusion

Korea is located in continental temperate climate zones which has four distinctive seasons with relatively dry periods in spring and autumn. Therefore, periods from mid February to mid May from early November to mid December, during which the most forest fires occur, are designated as "Forest Fire Prevention Period" and various activities are conducted.

As for the scale of forest fire, the area destroyed by fire is normally less than 10 ha (burned area of 95% forest fires from 1992 to 1996 is less than 10ha), and the average area of fire is around 4.7ha. And the major cause of forest fire is man-caused carelessness fire. Therefore the government strongly emphasizes the public relation for fire prevention through mass media campaign and education.

Main emphasis of the countermeasures against forest fires has been on promotion of enlightenment activities, and recently, fire-fighting technology focused on the aerial fire-fighting. Therefore, Forestry Administration have made a long term plan to purchase 7 more helicopters to reinforce aerial forest fire fighting ability up to 1997.

The forest fire which occurred at Kangwon Kosung in 1996, brought not only damages to almost 3,762 ha. areas of forest with houses and loss of farm animals and pine mushrooms, but also destroys to forest land, loss of food production, tree resources, wild animals, insects, micro-organisms, and also almost destroyed nature's eco-system.

It was the biggest forest fire ever occurred since the government establishment.

Under review of forest fire outbreak in Kosung area during April of 1996, Korea

founded forest fire squad and training branches, and immediately dispatch them to fire spots for prompt and effective fire suppression nationwide.

But for the fundamental prevention of forest fires, an organized 'forest fire prevention system' is needed, and people need to be much more cautions about forest fires.

## 6. References


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