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Analysis of the Field Burning Test and Characteristics of Forest Fire in Korea

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Recently, as forest resources were wealthy, people grow to seek mountain by degrees because of improving environment and enhancing the nation's livelihood. But the trends of forest fire were happened so many outbreaks and large scales that the damage increase little by little.

In April, 1996 it occurred the biggest forest fire, Kosung fire and Dongduchun's human life damage fire since the establishment of Korea Government. Those fires caused a huge damages of property, forest resources and natural ecosystem as well as honorable life.

Only four years after having broke out those forest fires, it occurred fire of the greatest and largest scale almost simultaneously at Kosung · Donghae · Kangneug · Samchuk · Uljin area. Thus it need to minimize damage of forest fire according to predicting exact process of forest fire behavior of the time large fire.

This study determined change of atmospheric phenomena at fire burning site, progress velocity of fire and combustion temperature using result of field burning test at the very first test in Korea, which it took effect at Yuknaeri, Duchonmyun, Hongchunkyun, Kangwondo in April 1, 1986.

Also, we manufactured digital elevation model using AutoCAD, LANDCAD, and GIS computer program that we analyzed progress of combustion proliferation and rate of spread concerning to facing combustion research site.

As a result, the maximum temperature of test site was 1,175℃, the first ignition was 875℃ and smoke temperature of proximate circumference was appeared 625℃. And after fire, rate of spread up to ridgeline was 0.15 m/s.

Following manufactured forest fire behavior model using AutoCAD, LANDCAD, ARC/INFO GRID, and AML computer program, as a result of comparing to fire's combustion proliferation model which was developed before was agreed approximately 87%.

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Natural Regeneration after Forest Fire and Restoration Policy in Korea

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Following the cessation of the East Coast fire occurred in mainly pine-dominated forests in April 2000, there have been serious controversies in Korean societies concerning the restoration policy of the affected forests. Most of issues are related to these questions. First, would they be able to recover by themselves without human intervention like planting trees? Second, what type of regeneration strategies would contribute to regenerating stands? And what factors would be more controlling for stand response? Third, would young regenerating stands develop and establish sound

forests? Fourth, what would be the best policy to restore the disturbed forests properly?

The East Coast fire, the record fire in Korea, affected 23,794 ha, creating a heterogeneous mosaic of burn severities across the regions. Spatial analysis of a vegetation map produced by a Joint Investigation Association indicated that 44% of the whole affected area was lightly burnt, and 55% was severely burnt. Also the map showed remarkable regeneration in the even fire year. Stand cover of three levels divided, low (>⅓ in cover), middle (⅓-⅔) and high (>⅔) class were 11%, 34% and 55% of the total area, respectively. Fire strongly led to the change of the floristic composition from formerly uneven aged pine-dominated regions to oak-dominated regions. That is because oak species were able to sprout from burnt stumps, while pine was not.

92% of stand cover was explained by stump sprouting and clonal sprouting, while the contribution of seedlings on stand cover was only 8%, suggesting the most important regenerating strategy is not seedling, but sprouting from which species presented before the fire. There seemed that most of species could regenerate by sprouting strategy. As a result of the effect of environmental factors and vegetation factors on the cover of woody species at postfire stands, the prefire biomass of woody species, which are able to sprout, turned out to be the most controlling factor. Also, slope and soil moisture also influenced significantly, but burn severity, altitude, topography and parental rock did not. These results support consistently that biotic response of postfire stands are mainly dependent on biotic variables like prefire biomass, stand stratification, floristic composition etc. Therefore, even though the stands were retrogressive in quantity terms by fire, floristic composition was very similar to the previous stands except for some coniferous species like *Pinus densiflora*

The development of severely burnt pine stands was investigated from aged 1, 3, 6, 13, 21 and 27 years stands in Kangwon Province, specially compared naturally regenerated stands with afforestation stands. In about 20 years after severe burning, both stands restored their four-layer stratified structure. At naturally regenerating stands, however, the structure was established faster and more biomass was accumulated. The slow development of plantation stands might have resulted from clear-cutting and planting method, aggravating soil qualities in the fragile burnt forests.

Overall, most of species under pine-dominated canopy have evolved strategies that allow them to survive frequent forest fires and ultimately contribute to establish forests very fast. Therefore, the burnt regions by the East Coast fire would be developing, even though time to reach mature forests among stands would vary because of various prefire stand properties and environmental factors.

Notwithstanding this natural regeneration, the forestry authorities of Korea have been clear-cutting burnt woods and sprouters on a large scale, and conventionally planting young trees,

even where soil fertility was very low. And then abandoned many plantation stands lacking of man power and management budget. Therefore, concerning the restoration policy of the affected forests by forest fire either for timber production or for specific landscape creation, afforestation areas should be limited on productive areas within management limitation so that the planted areas should be managed intensively. Also, planting trees at erosive and/or unfertile soil areas should be reconsidered, considering that clear-cutting progress on improper areas sometimes makes sites worse. In a long term basis, a plan for effective land use should be discussed.

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Forest Fire Impacts in Thailand

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In Thailand, 25.28% of total land area which are equivalent to 12.97 million hectares are covered by forests. The Deciduous forests share 53.46% of total forested areas, while the rest are 46.54% of evergreen forests. Fires have long been a man-caused component in various forest ecosystems. They occur annually during the dry season from December to May with the peak period in February and March. In normal year, the most common surface fires mainly take place in Dry Diptercarp forest, and Mixed Deciduous forest. While in the El nino year, fires spread, to a certain extent, in to Dry Evergreen, Hill evergreen or event in some parts of the Tropical Rain forest. Although other types of fire are not typical to the forest of Thailand, in the recent El nino year of 1997-1998, a notable numbers of crown fire took place in Pine plantation. While ground fires occurred in Peat Swamp forest.

Fire impacts are tremendous. However the degree of damage caused by fire depends on the type of fire as well as the type of forest burnt. The Deciduous forests are prone to fire and have long been subjected to annual burn by surface fire. Therefore these forests are well-adapted to fire and are fire-resistant. Surface fire is usually not lethal to mature tree. However, too frequent burn impedes and retards natural regeneration, and alters forest structure. The repeated-burnt forests will gradually deteriorated, change into more arid community and eventually into grassland dominated by *Imperata cylindica*. In contrary, fires cause abruptly severe damages in evergreen forests. Fires kill more that 50% of mature trees, and completely destroy all sapling and undergrowth. In addition, fires drastically increase soil erosion as well as surface runoff, destroy food and habitat of wildlife, hence jeopardize the whole forest ecosystem.

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The Influence of Fire in Japanese Landscapes

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The forest fire as well as typhoon in