The worst storm in canadian history

History

Ice storms, also referred to as glaze storms, cause considerable damage every year to trees in urban and natural areas. They vary considerably in their severity and frequency. Ice storms are result of the ice formation process, which is influenced by general weather patterns. Ice accumulates when super cooled rain freezes on contact with surfaces, such as tree branches, that are at or below the freezing point (0'C). This generally occurs when a winter warm front passes through an area after the ground-level temperature reaches or falls below freezing. Rain falls through layers of cooler air without freezing, becoming super cooled. Periodically, other climatic events, including stationary, occluded, and cold fronts, also result in ice storms.

The purpose of this paper is to gain a better understanding of the1998 ice storm. This paper features three main section: An introduction, the main body (damage to woodland), and finally, a conclusion. In the main body of this paper, the effect of fire and pest/disease is discussed in detail. In the conclusion, comparison is made between fire and pests/disease versus ice storm. By the end of this paper, one should gain a better understanding of the severity of the 1998 ice storm as well as other damaging agents that affect the woodland in eastern North America

Ice storms are often winter's worst hazard. More slippery thansnow, freezing rain or glaze is tough and tenacious, clinging to every object it touches. A little can be dangerous, a lot can be catastrophic. Ice storm in Northeastern America has been common but the 1998 ice storm was exceptional.

Ice storms are a major hazard in all parts of Canada except the North, but are especially common from Ontario to Newfoundland. The severity of ice storms depends largely on the accumulation of ice, the duration of the event, and the location and extent of the area affected. Based on these criteria, Ice Storm'98 was the worst ever to hit Canada in recent memory.

From January 5-10, 1998 the total water equivalent of precipitation, comprising mostly freezing rain and ice pellets and a bit of snow, exceeded 85 mm in Ottawa, 73 mm in Kingston, 108 in Cornwall and 100 mm in Montreal (Environmental Canada, Jan 12/1998). Previous major ice storms in the region, notably December 1986 in Ottawa and February 1961 in Montreal, deposited between 30 and 40 mm of ice - about half the thickness from the 1998 storm event! (Environmental Canada, Jan 12/1998).

The extent of the area affected by the ice was enormous. Freezing precipitation is often described as " a line of" or " spotty occurrences of". At the peak ofthe storm, the area of freezing precipitation extended from Muskoka and Kitchener in Ontario through eastern Ontario, western Quebec and the Eastern Townships to the Fundy coasts of New Brunswick and Nova Scotia.

What made the ice storm so unusual, though, was that it went on for so long. On average, Ottawa and Montreal receive freezing precipitation on 12 to 17 days a year. Each episode generally lasts for only a few hours at a time, for an annual average total between 45 to 65 hours. During Ice Storm'98, it did not rain continuously, however, the number of hours of freezing rain and drizzle was in excess of 80 - again nearly double the normal annual total.

One of the most appealing features of Eastern Ontario is the extensive forest cover. This is made up of woodlands of varying structure. These woodlands, as well as natural fencerows, windbreaks, and plantations of pine and poplar, dominate the landscape. Icing impacts may best be understood by treating spatially larger scales, starting with individual trees, proceeding to stands, and finally to forest landscapes.

Ice damage to trees can range from mere breakage of a few twigs, to bending stems to the ground, to moderate crown loss, to outright breakage of the trunk. In the 1998 Northeastern ice storm, icing lasted long enough that many trees which were bent over had their crowns glued to the snow surface by the ice in many instances for as long as 3 weeks. Some of those trees actually erect posture after release from the snow, while many others remain bent over after 2 years. The severity of damage is generally believed to be closely related to the severity of winds following the heaviest ice accumulations. Damage varies across a range of severity and subtlety: minor branch breakage; major branch loss; bending over of crowns; root damages; breakage of trunks and in some hardwoods, trunks can be split.

Depending on the stand composition, the amount of ice accumulation, and the stand history, damage to stands can range from light and patchy to the total breakage of all mature stems. Complete flattening of stands occurred locally in the Northeaster 1998 storm. In response to more moderate damage, effects on stands could include: shifts in over story composition in favor of the most resistant trees; loss of stand growth until leaf area is restored; and loss of value of the growth due to staining or damage to stem form.

The term landscape refers to a 'group" or a 'family" of trees. I use the term vaguely because the size and composition of landscapes differ from region to region. The degree of damage is typically highly skewed by area. For example, in the January 1998 Northeaster storm, 1, 800, 000 ha of damage in Quebec was assessed by the Ministry of Natural Resource: very severe 4. 2%, severe 32. 0%, moderate 29. 9%, and slight/trace 33. 9% (TheScienceof the TotalEnvironment, Volume: 262, Issue: 3, November 15, 2000, pp. 231-242). The effects on entire forest landscapes are highly patchy and variable. They also depend significantly on how landowners respond to the damage.

Disturbance caused by diseases, by themselves or in conjunction with disturbance by insects, abiotic factors such as drought, fire and wind, and, increasingly, human activities, has played a critical role in the dynamics of many forest ecosystems in North America.

In the predominantly coniferous forests in western North America there are considerable areas undisturbed directly by human activities. In these areas, diseases kill trees or predispose them to other agents of disturbance, resulting in gradual change in stand composition and structure. In areas disturbed by forest management practices of harvesting or exclusion of fire, increased disease incidence and severity has increased the damage caused by disease, and consequently, the rate of change.

In the absence of introduced diseases in the predominantly deciduous forests of the Appalachian region of eastern North America, forests are relatively healthy. Here, forests are disturbed significantly by disease only after they are disturbed or stressed by other agents, predominantly

defoliating insects and drought. In the eastern montane coniferous forest, chronic wind damage is a major predisposing factor to disease. Past harvesting practices, introduced diseases and insects, and fire exclusion have in some instances resulted in large areas of similar species and relatively similar ages that exacerbate the magnitude and severity of disturbance by disease.

Fire is predominantly a natural phenomenon that burnsthe forestvegetation, polluting the ozone and wiping out the biodiversity. One major distinction between ice storm and forest fire is the way disaster are caused. The majority of forest fire could arguably be a result of human action and ice storm as an 'act of god," an act that is out of human control.

Foresters usually distinguish three types of forest fires: ground fires, which burn the humus layer of the forest floor but do not burn appreciably above the surface; surface fires, which burn forest undergrowth and surface litter; and crown fires, which advance through the tops of trees or shrubs. It is not uncommon for two or three types of fires to occur simultaneously. Forest management has been able to reduce the occurrence of this event but many forest fires are out of arm" s length. Humans cause the majority of forest fires. Campers that do not put out their bond fire or campers littering lit cigarette bud are responsible for such an action. Natural occurrence such as lightning could spark a forest fire but the probability is small compared to human action. The convention way of putting out or reducing the spread of forest fire has been airliners. These airliners are filled with gallons and galloons of water. With limited capacity, these airliners fly above the flame and deposit galloons of water.

For the purpose of this paper, deforestationsimply means the lost of trees where the lost of trees exceeds the level of sustainable development. One of the major effects of forest fire is the burning of carbon dioxide into our atmosphere. This eventually creates a greenhouse affect andglobal warming. The effect damages our ecosystem as well as reduces one of Canada" s precious natural resource. Many projects, both from government funding and corporate sponsors, have done a good job increasing the awareness and risk related to deforestation.

Pests directly affect the quantity and quality of forest nursery seedlings and can indirectly cause losses by disrupting reforestation plans or reducing survival of out planted stock. The movement of infested stock can disseminate pests to new areas. Since control of nursery pests may be based on pesticide usage, pest outbreaks may lead to environmental contamination.

Woodland damage caused by livestock is a well-documented, yet persistent, foresthealthproblem. Soil compaction, root disturbance and trunk/root collar damage caused by livestock reduce the vigor of trees. This paves the way for armillaria root rot, borers and other opportunistic organisms. Livestock also destroy the forest under story (reproduction), which hastens soil erosion and limits the future productivity of the site. The resulting forest decline reduces the quality, value and longevity of current and future trees on the site. Eliminating livestock from woodlands is the first step toward a healthier, more productive forest.

As mentioned earlier in this paper, ice storm is a natural phenomenon caused by nature whereas forest fire are a result of human actions and preventable. One of the major differences between fire and ice storm is the rate of damage. Forest fire has a direct impact on the woodlands by changing the diversity of the landscape. Forest fire wipes out an entire landscape of trees causing a release of carbon dioxide. This 'in lieu" effect results in global warming as well as greenhouse effect.

The release of carbon dioxide has a long-term effect to our ecosystem. Carbon dioxide is trapped in our ozone layer making airways less preamble. This trapping effect eventually radiates heat causing global warming. The long-term effect is hazardous and changes our biodiversity. Ice storm has very little affect to our ozone layer. Damage to woodlands as a result of ice storm is concentrated within that area. Ice storm does not spread like fire does so areas that have been hit by an ice storm affect woodlands

Pests and disease slowly eroded the quantity as well as quality of woodland. Infected woodland slows the development of growth by eroding the soil limiting the production of trees. Pest control and good forest management could improve the quality and well as productivity in these areas. Pests and diseases cause a slow change in biodiversity. As the woodland become infested, animals feeding from leafs and branch find it less desirable, eventually leaving the area in search of more suitable woodland. Similarly, forest fire, pests and disease spread but at a much slower rate. These agents infect the trees, eventually penetrating the roots and moving on to the next host. As mentioned previous, ice storm does not spread, rather the effect stays within the area.

To conclude, fire and pests/disease are similar in the way these agents spread and infect their host. The preceding sentence can be best thought of as a virus infected it" s host as an analogy. Fire spreads at a much faster rate than pests/disease and the impact are instant. Both of these agents have long-term effect, which does not work in our favor. Ice storm affects the area it hits and will not spread. Furthermore, ice storms are predictable whereas fire is not since the cause of fire is human mistake and is hard to predict. Ice storms are not preventable but human actions can be prevented. The potential of damage from fire is far more severe than that of ice storm. We must increase the awareness to ensure that our woodland remains healthy and protect our ecosystem.