

Insect Outbreaks, Harvesting and Wildfire in Forests: Mathematical Models for Coupling Disturbances

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Abstract : A long-term goal of sustainable forest management is a relatively stable source of wood and a stable forest age-class structure has become the goal of many forest management practices. In the absence of disturbances, this forest management goal could easily be achieved. However, in the face of recurring insect outbreaks and other disruptive processes forest planning becomes more difficult, requiring knowledge of the effects on the forest of a wide variety of environmental factors (e.g., habitat heterogeneity, fire size and frequency, harvesting, insect outbreaks, and age distributions). The association between distinct forest disturbances and the potential effect on forest dynamics is a complex matter, particularly when evaluated over time and at large scale, and is not well understood. However, gaining knowledge in this area is crucial for a sustainable forest management. Mathematical modeling is a tool that can be used to broaden the understanding in this area. In this talk we will introduce mathematical models formulation incorporating the effect of insect outbreaks either as a single disturbance in the forest population dynamics or coupled with other disturbances: either wildfire or harvesting. The results and ecological insights will be discussed.

Keywords : age-structured forest population, disturbances interaction, harvesting insects outbreak dynamics, mathematical modeling

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