LCLUC Abstract

Mapping and Modelling Forest Change in a Boreal Landscape

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Timber harvesting is one of the major factors altering the species composition, age class distribution, and carbon fluxes over much of forested North America. Timber harvesting in Minnesota, the nation's largest paper producer, is expected to increase by approximately 25% in the next several decades to supply increased fiber demand for paper mill expansions. Similar expansions are also expected in adjacent northwestern Ontario. In contrast to these managed forested lands, the 2.0 million ha of the Boundary Waters Canoe Area (BWCA) and Voyageurs National Park (VNP) in Minnesota and adjacent Quetico Provincial Park in Ontario is the largest contiguous, forested wilderness area in North America. This wilderness landscape has its own disturbance regime generated mainly by large fires (Heinselman 1973) which is distinctly different from the anthropogenic disturbance regime imposed by timber harvesting immediately outside the BWCA-VNP-Quetico wilderness (Hall et al. 1991). Much of the forest is old-growth conifer, but there are large patches of early-mid successional forest as well.

There is no other place in the 48 contiguous states where there are large, matched, forested landscapes with contrasting natural and anthropogenic disturbance regimes. Therefore, Minnesota and adjacent northwestern Ontario is a natural "landscape laboratory" for determining the impact of extensive timber harvesting on landscape structure in comparison with an equivalent large landscape of uncut forest subject only to a natural disturbance regime.

We propose to use multitemporal data from Landsat Thematic Mapper (TM) 5 or 7 to classify forest cover to near species level (Wolter et al. 1995), then map the changes in the forest mosaic through time on a biannual basis to determine successional pathways under natural and managed disturbance regimes. Markov transition matrices will be developed from these data and analyzed using Markov theory (Pastor et al. 1993) to assess current trends in forest cover and steady state land cover distributions in order to help shape management policy at federal, state, and local levels.