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Effectiveness of various vegetation indices for the estimation of forest canopy structure

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Several vegetation indices, obtained from multi-spectral remote sensing data, have been widely used to indirectly estimate canopy structure parameters across different biomes. Although vegetation indices have shown certain relationship with several biophysical variables of vegetation canopy, such as leaf area index, biomass, and vegetation coverage, their effectiveness has not been fully confirmed over the very dense temperate forest vegetation. Further, some of vegetation indices have limitation to describe forest canopy structure due to the influence of background soil and atmospheric attenuation. In this study, we are attempting to analyze the effectiveness of various vegetation indices over the forest ecosystem having rather close canopy condition.

Two vegetation indices, including normalized differential vegetation index (NDVI), simple ratio (SR), and enhanced vegetation index (EVI), were compared in relation to the leaf area index (LAI) over the study area near the Seoul metropolitan area. The Kyongan watershed covers a total area of 561km² of coniferous plantation and natural stands of mixed deciduous species. During the growing season of 2003, field survey was conducted over 30 ground sample plots to measure LAI, stand density, and stand height were measured. Each plot has an area of 20 x 20 m² and includes five subplots for LAI measurement within it. Plot locations were determined using a differential global positioning system (GPS). Field measured LAI values were then compared with vegetation indices that were extracted from satellite remote sensing data, which were obtained about the same season with the field survey. Capability of various vegetation indices to estimate LAI over the close canopy forest ecosystem are discussed.