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**The Expansion Of Rubber And Its Implications For Water And Carbon Dynamics In Montane Mainland Southeast Asia**

MMSEA is experiencing major land-use change as subsistence farmers transition from shifting cultivation, which tends to maintain large areas of secondary forest, to commercial agriculture. Rubber is the major commercial crop replacing secondary forests, a direct result of strong market demands from China. Under a previous grant from NASA we documented that the timing and amount of water use by rubber during the dry season differs dramatically from that of secondary forest and traditional agriculture in the region. Others have shown that conversion of forest to plantation agriculture in other regions results in significant changes in stored carbon. Our objectives are to determine how the conversion from existing land covers to rubber affects local energy, water, and carbon fluxes, how extensive rubber will become in MMSEA, and what the consequences will be for regional hydrology and carbon sequestration. To characterize the extent of rubber in MMSEA, we will develop land-cover/use (LCLU) time-series maps for emerging, rubber-growing sites in MMSEA using knowledge-based classification of multi-sensor, multi-date remotely sensed imagery with a focus on identifying rubber cultivation as a distinct land use among forests, grasslands and other types of agriculture. Expansion of rubber to 2050 will be simulated by combining a regional suitability model for rubber with a dynamic, spatially-explicit, land cover/use change (LCLUC) model. We will use eddy covariance to measure water and carbon fluxes over rubber and secondary vegetation. The Ecosystem Demography model, parameterized by satellite-derived LCLU and observations of stand characteristics, including ground-based LiDAR, and calibrated by flux measurements, will be used to develop spatially-distributed estimates of water and carbon fluxes throughout MMSEA. This proposal is directly responsive to the goals stated in the NRA "to further understanding of the consequences of LCLUC on the carbon and water cycles" and directly relevant to the Monsoon Asia Integrated Regional Study.