Effects of silviculture on soil and water quality in southwestern China.

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ABSTRACT

In hopes of better understanding the relationship between silviculture and water and soil quality, field studies were conducted within three managed forest types in southwestern China. Relationships between forest type, forest age, and percent slope with soil (N-P-K and soil moisture) and water quality (dissolved oxygen (DO), electrical conductivity, total suspended solids (TSS), pH, and temperature) parameters were all examined. Within the soil, average nitrogen, phosphorus and potassium relative amounts (N-P-K) showed Chinese Fir to be statistically different (N-P-K=5.80) than Eucalyptus and Mason Pine (p=0.0035). Eucalyptus forests had the highest rates of fertility (N-P-K=6.79), though this could be due, in part, to fertilization efforts applied within Eucalyptus forests in the study area. Average soil moisture indicated Eucalyptus to be statistically different than both Chinese Fir and Mason Pine (p=0.0082) with a moderate decline with increasing soil depth. Additionally, water quality results indicated a positive significant relationship (p=0.05) between three of four water quality parameters (total suspended solids, electrical conductivity, and pH) and slope steepness. The results indicate Eucalyptus forests and stands with higher slope gradients will require greater management efforts to ensure soil and water quality suffer minimal further damage.

BACKGROUND

Over the years the Eucalyptus commercial forestry programs in Guangxi, China have been experiencing economic growth. In 2001 there were approximately 350,000 ha of eucalypt plantations in the Guangxi province (UNDP 2006). By the end of 2010, there were over 1.5 M ha of eucalypt plantations in Guangxi (ITTO 2011, Pei 2012) and in 2011, over 150,000 ha of new eucalypt plantations in Guangxi (ITTO 2011). By the end of 2010, there were over 1.5 M ha of eucalypt plantations in Guangxi (ITTO 2011, Pei 2012) and in 2011, over 150,000 ha of new eucalypt plantations in Guangxi (ITTO 2011). Over the years the Eucalyptus commercial forestry programs in Guangxi, China have been experiencing economic growth.