

Sustainability of Plantation Forestry

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Because of the rapid increase in the world's population, demand for forest products is increasing while large amounts of forest land are being lost or degraded. In addition, timber harvest is being restricted on many of the world's natural forests. The use of plantations managed for timber production must increase to meet the world's increasing demand for wood and fiber from this reduced land base. Concentrating timber production on the best-adapted sites will allow the world's demands to be met on fewer acres. Intensive management of plantation forests is perhaps the only way to meet the increasing demand for forest products and still reserve large areas of native forests for conservation and preservation purposes. Maintaining long-term soil productivity in these intensively managed plantations is critical. The impacts of intensive management on soil quality and subsequent tree growth can be positive, neutral, or negative; the direction and magnitude of the impact depends on the specific management practice soil physical, chemical, and biological properties. In order to understand and predict the impacts of intensive management, the factors limiting productivity on each specific site must be understood.

Forest harvesting by itself tends to have minor impacts on soil quality and long-term site productivity. Compaction during timber harvesting can degrade the soil quality. However, tillage during site preparation can in most cases restore soil physical properties to pre-disturbance levels. Site preparation practices that remove large quantities of organic matter and surface soil can detrimentally impact soil quality, most notably on sandy soils. Intensive management practices such as fertilization can improve soil quality and increase site productivity by ameliorating factors limiting growth. The increased growth rates in

intensively managed stands can indirectly improve soil quality by increasing organic matter. The increased production of coarse roots in intensively managed plantations is particularly important in this regard. These changes can lead to long-term improvement in soil quality and site productivity, especially on the degraded soils on which many forest plantations are established. Based on the available data, intensive management can be practiced sustainably on many soils. Land classification systems are needed to identify soils that are suitable for intensive management. Site-specific management regimes must then be developed to insure that intensive management is practiced sustainably on these soils