

Effects of land-use changes on runoff and sediment yield: Implications for soil conservation and forest management in Xishuangbanna, SW China

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Effects of vegetation traits and soil physical properties on runoff and sediment yield were investigated under different land uses in Xishuangbanna, Southwest China. The cutting ring method was applied, and field plot experiments were conducted to determine soil physical properties and monitor runoff and sediment yield in response to land-use change by comparing tropical rainforest (TR), rubber monoculture (Rm) and four rubber-based agroforestry systems. Results showed that conversion of tropical forest to rubber plantation resulted in lower leaf area index, canopy cover, less stand litter, and unfavorable soil environment (i.e. high bulk density, low porosity, etc.). The surface runoff from the Rm was 33.2 and 2.6 times higher than the TR and the rubber-based agroforestry systems, respectively. On average, sediment yield from the TR, Rm and agroforestry systems was 0.041, 11.54 and 2.73 t ha^{-1} , respectively. These trends suggested that the forest conversion caused negative hydrological consequences (i.e. excessive runoff and soil erosion). Compared to the Rm, rubber-based agroforestry systems could reduce more runoff volume and sediment yield effectively. Overall, the sediment yield were significantly negatively correlated with LAI, canopy cover, stand litter, and saturated water capacity, while positively correlated with bulk density and runoff. The effects of precipitation on the sediment yield of agroforestry systems in this region became less important due to their partly improved soil conditions and vegetation traits. Solely from the point of erosion control, we recommend that local governments and farmers should consider intercropping *F. macrophylla* and *T. cacao* tree species within rubber monoculture plantations.