Smallholder Agroforestry Systems as a Strategy for Carbon Storage

James M. Roshetko[1], Marian S. delos Angeles[2], and Katherine Warner[3]

Abstract

Many smallholder agroforestry systems in Southeast Asia are species-rich and tree-rich systems that produce non-wood and wood products for both home use and market sale. Due to their high biomass, these systems may contain large carbon (C) stocks. While the agroforestry systems of individual farmers are of limited size, on a per area basis smallholder systems accumulate significant amounts of C, equaling the amount of C stored in some secondary forests over similar time periods. Their ability to simultaneously address smallholders' livelihood needs and store large amounts of C makes smallholder agroforestry systems viable project prototype under the Clean Development Mechanism (CDM) of the Kyoto Protocol, which has the dual objective of reducing greenhouse gas emissions and contributing to sustainable development. Smallholder agroforestry systems promoted through a CDM project must be economically viable independent of C payments. Although often smallholder systems are environmentally and socio-economically viable, to enhance productivity and profitability smallholder-focused CDM projects should provide farmers with technical and marketing assistance. To assure success, project sites should meet a set of preconditions, including: areas of underutilized low-biomass landuse systems that are available for rehabilitation; smallholders interested in tree farming; accessible markets for tree products; a supportive local government and sufficient infrastructure; and a transparent and equitable relationship between project partners. Questions of leakage and additionally should not be problematic and can be addressed through the project design and establishment of quantifiable and equitable baseline data. However, smallholder-focused CDM projects would have high transaction costs. The subsequent challenge is thus to develop mechanisms that reduce these costs: (a) the costs associated with information (e.g., technology, markets) more accessible to multiple clients; (b) facilitating and enforcing smallholder agreements and (c) designing feasible monitoring systems.

Introduction

Tree-based land-use systems – natural forest, forest plantations and agroforestry systems – sequester CO_2 through the carbon (C) stored in their biomass. By promoting land-use systems which have higher C contents than the existing plant community net gains in C stocks (hence sequestration) can be realized. The most significant increases in C storage can be achieved by moving from lower-biomass land-use systems (e.g. grasslands, agricultural fallows and permanent shrublands) to tree-based systems. To qualify for 'certified emissions reductions' (CERs) under the Kyoto Protocol, reforestation and afforestation activities must be directly human-induced. As many efforts to achieve increased forest C storage may have negative implications for the rural

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[1]Winrock International / ICRAF, Bogor, Indonesia
[2]ICRAF, Bogor, Indonesia
[3]Winrock International, Arlington Virginia