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Shade Canopies and the Productivity, Sustainability and Resilience of Cacao Agroforestry Systems

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Abstract

Global changes have immense impacts on human societies. For instance, the livelihoods of poor rural families and the sustainable management of their natural resources have been shown to be severely impacted by economic globalisation and climate change. To tackle these adverse effects in tropical regions, global society and national governments seek to enhance the sustainability of the rural livelihoods, generate wealth and reduce both poverty and the vulnerability of rural economies, increase the resilience and adaptive capacity of households to climate change, and promote the shift to green economies with low carbon emissions and high carbon storage.

Three million smallholders cultivate 7 million hectares of cacao (*Theobroma cacao* L.) worldwide; at least 80% of the cacao is cultivated under a shade tree canopy. Farmers retain a large list of tree species in the plot to provide shade and shelter to sustain high cacao yields; and to produce timber, fruits, fiber and other goods for family consumption, use in the farm, or sale. Cacao agroforestry systems have been ranked as good land use alternatives to cope with climate change because their high levels of species diversity, year-round soil cover, high levels of store carbon in the soil and aboveground, and other positive attributes. Despite all these good features, shaded cacao systems are affected by global changes and it is safe to ask: how productive, sustainable and resilient these systems are today and in the presence of global changes? Can they be optimised for the simultaneous delivery of valuable goods for the household and the provision of ecosystem services for society? How to achieve this?.

In this presentation: 1) the concepts and criteria used to evaluate sustainability and resilience of socio-ecological systems are quickly reviewed for Central American cacao households; 2) a simple, qualitative model is used to explore (for various cacao farming typologies) the relationships between yields (from both cacao and shade trees), carbon storage, and shade canopy design and management. A practical methodology for the analysis, improved design and management of cacao shade canopies at any particular location is presented.

Keywords: Carbon stocks, Central America, cacao, diagnosis and design, resilience, shade canopy, sustainability, yield