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A Biophysical Approach to the Environmental Services by Land-use Systems Assessment; Functional Biodiversity in Tropical Agroforestry Systems (The Case of Tome-acu Community, Northern Brazil)

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Abstract

Currently, the environmental services concept and its assessment seems the most appropriate approach to estimate, evaluate, conserve and in general make environmental use sustainable. The most well known environmental services are water purification or carbon sequestration. However, there are knowledge gaps. In the case of biodiversity, for example, evaluation has mostly been based on quantitative or qualitative studies of individuals and functional groups.

We suggest functional biodiversity as an indicator for the sustainability of land-use systems, as it is closely related to the variability, resilience and dynamics of ecosystems.

The application of the Criteria & Indicators (C&I) approach addresses this intention, operationalizing the functions involved in three main clusters: productive, ecological and operational through the definition of a sufficient number of indicators to represent the most relevant interactions. Such indicators are mainly process based and underline the impact of human intervention on ecosystems.

In this framework, the objective of this research is to assess the factors influencing the biophysical processes that determine the capabilities of agroforestry systems to maintain functional biodiversity, underlining the importance of the management factor to make them more productive and sustainable.

The data collecting methods include: ecological field studies, interviews, secondary sources review supported by remote sensing approaches. The units of analysis are agroforestry plots in small farmer properties; data processing is supported by multi-criteria protocols: workshops at different levels of target groups and specialised software (CIMAT 2.0). The results will be used to develop a model of the agroforestry systems for deeper understanding and to support decision making by the farmers.

Keywords: Agroforestry Systems, Biophysical assessment, Criteria & Indicators, Environmental Services, functional biodiversity, Tropics