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Mapping local knowledge systems about cacao agroforestry management: a comparison of two Colombian mountainous zones

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Abstract

Agroforestry systems (AFS) have been recognised as an alternative to support the social-ecological transitions toward sustainability. These complex systems have mainly been promoted through a restricted set of technological packages. Thereby, they have not successfully spread beyond some farms or plots because they fail to consider the fine-scale variation of the particular local circumstances. Cacao agroforestry systems (CAFS) have been mainly promoted in tropical mountain social-ecological systems where detailed scientific data are usually lacking because of their intrinsic complexity. In this sense, the knowledge of smallholder cacao farmers to adapt their CAFS, which is based on their own experimentation under local circumstances, needs to be integrated to choose and promote appropriate management options.

The objective of this study is twofold: (1) to identify and represent local interdependent variables influencing CAFS management in two mountainous zones of Colombia, and (2) to explore a tool-based approach to integrating farmer’s knowledge into AFS promotion. Participatory cognitive maps on CAFS management variables were developed with cacao smallholder farmers based on semi-structured interviews (n=18). Cognitive maps are graphical representations of complex systems, consisting of multiple variables and the causal relationships between them. Smallholder farmers’ interviews were transcribed and their content analysed to refine the cognitive maps, which were then coded into adjacency matrices for further analysis with graph theory.

Results from the cognitive maps revealed an average of 28 ± 5 variables and 29 ± 5 links between management variables. All farmers interviewed recognised fertilisation, pruning, weed control, and pest management as the most important practices for successful cocoa production. Irrigation was added to these practices for one of the zones. Farmer use

of ecological processes to optimise these main cacao practices considering their resource limitations was also evidenced, such as the identification of a particular cover crop to reduce weed control. As complex agriculture systems like CAFS remain a prominent solution to sustainability, this representation of farmer knowledge based on cognitive mapping could be useful for integrating local knowledge systems into agricultural extension services and future agroforestry-related projects.

Keywords: Agricultural extension services, cognitive mapping, complex systems, local knowledge systems, sustainable agriculture