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Towards an Ontology of Ecosystem Services for Modeling the Management of their Flows to and from Agriculture

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Abstract: The notion of ecosystem service and afferent concepts are gaining importance in the ecology, environment and sustainability-oriented literature. They have been defined differently and rather loosely however. Although convergence toward undisputed definitions is not attained yet, much structuring material has been used and published in scientific or policy-oriented documents. Since different perspectives exist, confusion and inconsistencies predominate across disciplines and agents involved in this relatively new domain. There is clearly a need for a consistent conceptual basis that could provide well-founded semantics and methodological guidelines to be used in the elaboration, evaluation, exploitation and communications of models of complex systems in which biophysical and human environments interact.

The purpose of this contribution is to lay down a preparatory groundwork for an ontology of ecosystem services in the setting of agroecosystems viewed as social-ecological systems. This ontology aims at defining a set of representational primitives with which to model agroecosystem situations through the prism of ecosystem service flows to and from agriculture. It helps delineating between biophysical structures, processes, functions, ecosystem services and benefits. On the human side, it includes a conceptualization of the practices and rules that govern the provision and use of ecosystem services at different levels ranging from farmers to community groups and institutions.

The ontology strengthens the existing analytic basis of multidisciplinary research on ecosystem services in agroecosystems by prompting modellers to stick to a homogeneous dynamic-system and event-based decomposition of the target agroecosystem in its biophysical, ecological and socioeconomic dimensions. It provides the conceptual link between biophysical researches on ecosystem services and the social, political, economic, and production management aspects involved in agricultural and landscape decisions.

Keywords: *Ontology; Ecosystem service; Social-ecological system; Agroecosystem; Decision-making*