Approaches to Valuing Ecosystem Services in Agroecosystems From the Perspectives of Ecological Economics and Agroecology

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Abstract : Climate change, loss of ecosystems, increasing poverty, increasing marginalization of rural communities and declining food security are global issues that require urgent attention. In this regard, a great deal of research has focused on how agroecosystems respond to these challenges as they provide ecosystem services (ES) that lead to higher levels of resilience, adaptation, productivity and self-sufficiency. Hence, the valuing of ecosystem services plays an important role in the decision-making process for the design and management of agroecosystems. This paper aims to define the link between ecosystem service valuation methods and ES value dimensions in agroecosystems from ecological economics and agroecology. The method used to identify valuation methodologies was a literature review in the fields of Agroecology and Ecological Economics, based on a strategy of information search and classification. The conceptual framework of the work is based on the multidimensionality of value, considering the social, ecological, political, technological and economic dimensions. Likewise, the valuation process requires consideration of the ecosystem function associated with ES, such as regulation, habitat, production and information functions. In this way, valuation methods for ES in agroecosystems can integrate more than one value dimension and at least one ecosystem function. The results allow correlating the ecosystem functions with the ecosystem services valued, and the specific tools or models used, the dimensions and valuation methods. The main methodologies identified are multi-criteria valuation (1), deliberative - consultative valuation (2), valuation based on system dynamics modeling (3), valuation through energy or biophysical balances (4), valuation through fuzzy logic modeling (5), valuation based on agent-based modeling (6). Amongst the main conclusions, it is highlighted that the system dynamics modeling approach has a high potential for development in valuation processes, due to its ability to integrate other methods, especially multi-criteria valuation and energy and biophysical balances, to describe through causal cycles the interrelationships between ecosystem services, the dimensions of value in agroecosystems, thus showing the relationships between the value of ecosystem services and the welfare of communities. As for methodological challenges, it is relevant to achieve the integration of tools and models provided by different methods, to incorporate the characteristics of a complex system such as the agroecosystem, which allows reducing the limitations in the processes of valuation of ES.

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