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"The Loss of Territorial Efficiency: An Ecological Analysis of Land-Use Changes in Western Mediterranean Agriculture (Vallès County, Catalonia, 1853–2004)"

Marull, Joan, Joan Pino, and Enric Tello

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This study introduces a new concept, that of 'landscape efficiency', understood as the state in which the economic flows of social metabolism in a land matrix are improved while maintaining the patterns and processes of landscape ecology as healthy as possible. This concept is used to explore the hypothesis that a serious reduction in this efficiency, typified by significant landscape degradation, underlies the increase observed in external inputs and the corresponding loss of energy efficiency that the agrarian system has undergone over the last 150 years. In the present article, a structural and functional analysis of the landscape changes experienced by an area in the Vallès county (Barcelona Metropolitan Area in Catalonia, Spain) is conducted, employing an innovative methodology that combines two indicators taken over from landscape ecology (land cover diversity and ecological fragmentation) with two new socio-ecological indices recently developed by two of the authors of this study (landscape metrics and ecological connectivity). Our results point to an increase in land cover heterogeneity, ecological fragmentation and anthropogenic barriers, as well as to a growth in landscape diversity. All these changes are associated with a substantial reduction in the ecologically functioning areas and the county's ecological connectivity, and have resulted in a severe loss of landscape functionality and efficiency in the study area. The changes have gone hand-in-hand with a sharp reduction in agrarian energy returns on energy inputs, suggesting the need for a more in-depth cross-disciplinary dialogue between the natural and social sciences to develop, from a common historical background, new criteria and methods to ensure more sustainable types of energy and land-use planning. (Authors' abstract at The White Horse Press.)

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