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PANDORA: Procedure for mAthematical aNalysis of lanDscape evOlution and equilibRium scenarios Assessment

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From an ecological point of view, landscapes can be defined as spatially heterogenous complex systems organized hierarchically into structural arrangements determined by nonlinear interactions among its components through flows of energy and materials. Following the second law of thermodynamics, a natural ecosystem, spontaneously tends to move toward different ecological states with a consume of free energy and an increase of entropy. External constraints represent obstacles to the connected fluxes of energy and matter (barriers) and they may affect landscape evolution and equilibrium conditions leading to biodiversity reduction, accelerated erosion phenomena, hydrological instability and flood events that are well recognized consequences of antropic impact.
Equilibrium concept applied to landscape is still largely debated and maybe a mathematical definition of landscape equilibrium can be reconsidered even in such complex systems recurring to energy flows concept and species metabolism as fundamental keys in the evolution mechanisms.
In this work an innovative procedure, called PANDORA, Procedure for mAthematical aNalysis of lanDscape evOlution and equilibRium solutions Assessment (F. Gobattoni 2010, submitted), is presented to assess the effects of different planning strategies on final hypothetical stable energetic equilibrium states. An application model is here proposed as Decision Support System for choosing among possible urban sprawl planning strategies in a Mediterranean watershed in Central Italy.
PANDORA model, keeping an analytical solution method and a stability analysis as its foundations and using geographic data usually available by land managers, provides a large applicability tool for every “what if” scenarios evaluation in territorial planning.