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Rural poverty: a dynamical, ecological and economic perspective

The rural poor generally rely on their immediate natural environment for subsistence and suffer from high burdens of infectious diseases. We present a general framework for modelling the ecology of rural poverty, focusing on the exemplar drivers: infectious diseases, renewable resources, and land-use change. Interactions between these drivers and economics create reinforcing feedbacks resulting in three possible development regimes corresponding to globally stable wealthy/healthy development, globally stable unwealthy/unhealthy development, and bistability. We show that the proportion of parameters leading to poverty is larger than that resulting in healthy/wealthy development; bistability consistently emerges as a general property of generalized disease-economic systems and that the systems under consideration are most sensitive to human disease parameters. The framework highlights feedbacks, processes and parameters that are important to measure in future studies of development, to identify effective and sustainable pathways out of poverty.

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