

POVERTY TRAPS IN MULTILEVEL SYSTEMS

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Social-ecological systems are defined as coupled human-nature systems, where society and nature co-evolve rather than externally influence one another. The ecological aspect of such systems is often traced through population dynamics (representing stock growth) or through nutrient flow, the epidemiological component is introduced through disease dynamics, but the social aspect presents significant challenge for modelling. Great diversity of human activities and ways in which people affect environment and respond to changes in the ecosystem require tailored approach and careful choice of systems variables. Human activities, such as agricultural production or fishing, can be influenced by social norms, institutional decisions and individual behaviour, habits and opinion dynamics. This may require considering more than one level of organization, i.e. including individual, community or even country level and cross-level interactions in models.

We illustrate social-ecological modelling on the example of poverty traps, which are defined as undesired self-reinforcing mechanisms that keep individuals or communities below threshold of economic well-being. The ecological part in our models is represented by nutrient dynamics and the economic component is based on agricultural production. The social aspect includes decision making on individual and community levels and interactions between these two levels. Using stability and bifurcation analysis, we investigate how within and cross-level interactions shape long term behaviour of the multilevel system.

References

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