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Stability of Heterogeneous Ecosystem YANG-YU LIU, Brigham and Women's Hospital and Harvard Medical School, GANG YAN, Northeastern University, ALBERT-LASZLO BARABASI, Northeastern University and Harvard Medical School — Stability of ecosystem measures the tendency of a community to return to equilibrium after environmental perturbation, which is severely constrained by the underlying network structure. Despite significant advances in uncovering the relationship between stability and network structure, little attention has been paid to the impact of the degree heterogeneity that exists in real ecosystems. Here we show that for networks with mixed interactions of competition and mutualism the degree heterogeneity always destabilizes the ecosystem. Surprisingly, for predator-prey interactions (e.g., food webs) high heterogeneity is destabilizing yet moderate heterogeneity is stabilizing. These findings deepen our understanding of the stability of real ecosystems and may also have implications in studying the stability of more general complex dynamical systems.

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