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Efficient ecosystem services and naturalness in an ecological/economic model

Abstract

In an integrated economic/ecological model, the economy benefits from ecosystem services that include: (1) the consumptive use of a harvested species, (2) the non-consumptive use of popular species, and (3) naturalness, i.e., the divergence of the ecosystem's biodiversity from its natural steady state. The biological component of the model, which is applied to a nine-species Alaskan marine ecosystem, relies on individual optimizing behaviour by plants and animals to establish population dynamics. The biological component is used to define naturalness. By varying harvesting we arrive at different steady-state populations and humans choose from among these steady states. Welfare maximizing levels of the ecosystem services are derived, then it is shown that in the *laissez-faire* economy overharvesting occurs when the harvesting industry ignores ecosystem services (2) and (3). Lastly, we introduce efficiency restoring taxes and standards that internalize the ecosystem externalities.



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