



Stochastic Population Dynamics in Ecology and Conservation (Oxford Series in Ecology and Evolution)

By Russell Lande, Steinar Engen, Bernt-Erik Saether

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Random fluctuations in population dynamics are fundamentally important in pure and applied ecology. This book introduces demographic and environmental stochasticity, and illustrates statistical methods for estimating them from field data. The concept of long-run growth rate of a population is explained and extended to age-structured populations. Diffusion approximations show how stochastic factors affect extinction in single populations and metapopulations. Delayed density dependence in populations with discrete annual reproduction is estimated from time series of adult numbers combined with basic life history data. The spatial scale of population fluctuations and local extinction risk depend on the scales of spatial environmental autocorrelation and individual dispersal, and the strength of density dependence. Stochastic dynamics and statistical uncertainty in population parameters are incorporated in Population Viability Analysis and sustainable harvesting. Statistics of species diversity measures and species abundance distributions are described, with implications for rapid assessments of biodiversity, and methods are developed for partitioning species diversity into components. Analysis of stochastic community dynamics indicates that real communities are far from neutral.

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- Sales Rank: #3113273 in Books
- Published on: 2003-06-05
- Original language: English
- Number of items: 1
- Dimensions: 6.10" h x .60" w x 9.20" l, .88 pounds
- Binding: Paperback
- 224 pages

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Editorial Review

Review

"Our conservation effectiveness depends on our ability to understand biodiversity peril and biodiversity persistence in the face of random environmental shocks. Lande, Engen and Saether have produced THE seminal theoretical contribution to conservation biology - a brilliant exploration of stochastic influences on extinction and biodiversity. This is not a sterile theoretical treatise; it is a well-written and a certain-to-be-classic melding of theory and real-world examples." Peter Kareiva, Lead Scientist, The Nature Conservancy, USA

About the Author

Professor Lande is the winner of the Sewall Wright Award (1992), President, Society for the Study of Evolution, 1997, Fellow of the American Academy of Arts and Sciences, 1997- , MacArthur Foundation Fellow, 1997-2002.

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