

Chapman & Hall/CRC
Mathematical and Computational Biology Series

Although the spatial dimension of ecosystem dynamics is now widely recognized, the specific mechanisms behind species patterning in space are still poorly understood and the corresponding theoretical framework is underdeveloped. Going beyond the classical Turing scenario of pattern formation, **Spatiotemporal Patterns in Ecology and Epidemiology: Theory, Models, and Simulation** illustrates how mathematical modeling and numerical simulations can lead to greater understanding of these issues. It takes a unified approach to population dynamics and epidemiology by presenting several ecoepidemiological models where both the basic interspecies interactions of population dynamics and the impact of an infectious disease are explicitly considered.

The book first describes relevant phenomena in ecology and epidemiology, provides examples of pattern formation in natural systems, and summarizes existing modeling approaches. The authors then explore nonspatial models of population dynamics and epidemiology. They present the main scenarios of spatial and spatiotemporal pattern formation in deterministic models of population dynamics. The book also addresses the interaction between deterministic and stochastic processes in ecosystem and epidemic dynamics, discusses the corresponding modeling approaches, and examines how noise and stochasticity affect pattern formation.

Reviewing the significant progress made in understanding spatiotemporal patterning in ecological and epidemiological systems, this resource shows that mathematical modeling and numerical simulations are effective tools in the study of population ecology and epidemiology.

Features

- Focuses on mathematical modeling and numerical simulations using basic conceptual models of population dynamics
- Covers a wide range of nonspatial approaches to population dynamics and epidemiology, from elementary to state-of-the-art models
- Introduces ecoepidemiological models where both the basic interspecies interactions of population dynamics and the impact of an infectious disease are considered within the same theoretical framework
- Explores both deterministic and stochastic approaches to spatiotemporal pattern formation in population dynamics and epidemiology
- Includes a CD-ROM with examples of MATLAB® codes for computer simulation of population dynamics



Chapman & Hall/CRC

Taylor & Francis Group
an informa business

www.taylorandfrancisgroup.com

6000 Broken Sound Parkway, NW
Suite 300, Boca Raton, FL 33487

270 Madison Avenue
New York, NY 10016

2 Park Square, Milton Park
Abingdon, Oxon OX14 4RN, UK

C6749

ISBN 1-58488-674-9



www.crcpress.com