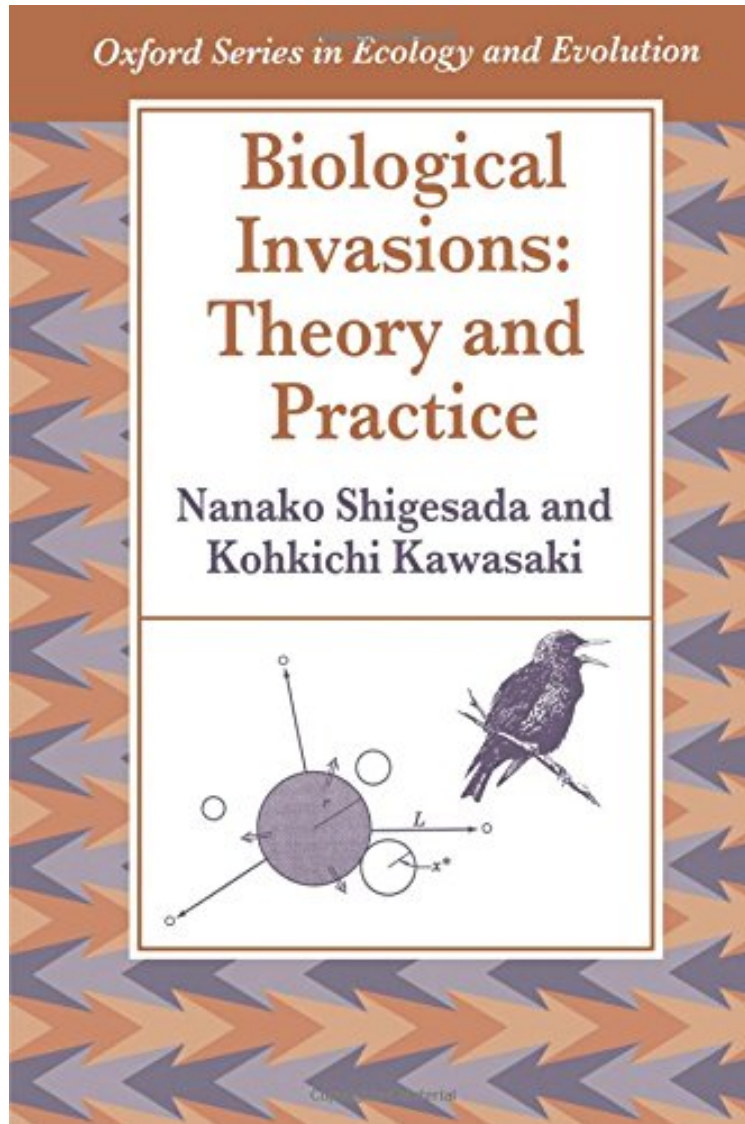


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Biological Invasions: Theory and Practice (Oxford Series in Ecology and Evolution)

Nanako Shigesada, Kohkichi Kawasaki
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When a species colonizes an area that it has not previously inhabited, it is called an "invasion", and it can result in the extinction of endemic species. The increase in numbers of humans travelling the world presents opportunities for invasions by organisms and the spread of diseases such as rabies and smallpox. Using the large amount of data from studies in pest control and epidemiology, it is possible to construct mathematical models that can predict which species will become invaders, which habitats are susceptible to invasion, and the biological impact. This book presents a clear and accessible introduction to the modeling of biological invasions. It demonstrates the latest theories and models, and includes data and examples from various case studies showing how these models can be applied to problems from deadly human diseases to the spread of weeds.

"The authors have collaborated on a wonderful exposition of how biological invasions take place. They review many instances of invasions and show how the spread of an invasion can be predicted by mathematical models. The book is beautifully written and exhibits a lovely balance between mathematical and empirical topics. Shigesada and Kawasaki present ten chapters in a length that allows depth while avoiding encyclopedic drudgery. . . . The authors are distinguished biologists who have contributed much of the original work about modeling invasions. Enough mathematical detail is presented in appendixes to allow all the results in the book to be rederived, making the book completely self-contained. It is a 'must buy' for any ecologist, ecological economist, conservation biologist or wildlife manager."--*The Quarterly of Biology* Biological Invasions: Theory and Practice focuses on one of the major topics in mathematical ecology--the dispersion of organisms from one locality to another. . . . The book consists of three major parts. The first two chapters present an introduction to the study of biological invasions, describe data on the nature of such invasions in different plants and animals, and discuss general patterns that result from analyzing the range of variation in the natural world. . . . The second major part of the book provides details on general models that have been developed to try to reproduce and explain both these general patterns of species expansion and the patterns observed for specific populations . . . The third part of the book introduces more topical issues related to dispersion and invasion of new environments when two or more species interact with one another."--*American Journal of Human Biology* From the Back Cover Biological invasions occur when species move into and become established in environments that they have not previously occupied. Deriving general principles from biological case studies, this book provides a clear and accessible exposition of the mathematical models of biological invasions that occur on a global scale. Topics include invasion into patchy environments, invasion by stratified diffusion involving both short- and long-range dispersal, competition for space between invading and native species, invasion of parasites, and the spread of epidemic diseases. Each chapter first introduces the biological issues and then analyses them using diagrams based on field data and simulations. Derivations of important equations for mathematically inclined readers are outlined in appendixes at the end of each chapter. Potential applications to environmental issues are discussed wherever appropriate. About the Author Nanako Shigesada is at Nara Women's University. Kohkichi Kawasaki is at Doshisha University.