1. Record Nr. UNINA9910450791603321

Titolo	Complex population dynamics [[electronic resource]] : nonlinear modeling in ecology, epidemiology, and genetics / / editors, Bernd Blasius, Jurgen Kurths, Lewi Stone
Pubbl/distr/stampa	Singapore ; ; Hackensack, NJ, : World Scientific, c2007
ISBN	1-281-91178-X 9786611911782 981-277-158-1
Descrizione fisica	1 online resource (257 p.)
Collana	World Scientific lecture notes in complex systems ; ; v. 7
Altri autori (Persone)	BlasiusBernd KurthsJ <1953-> (Jurgen) StoneLewi
Disciplina	577.8/8
Soggetti	Population biology - Mathematical models Ecology - Mathematical models Epidemiology - Mathematical models Genetics - Mathematical models Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and indexes.
Nota di contenuto	Contents; Preface; References; 1. Chaotic dynamics in food web systems; 1.1. Introduction; 1.2. Food web model formulation; 1.3. Detecting and quantifying chaotic dynamics in model food webs; 1.4. Dynamical patterns in food webs; 1.5. Chaos in real food webs and conclusion; References; 2. Generalized models ; 2.1. Introduction; 2.2. The basic idea of generalized models; 2.3. Example: A general predator-prey system; 2.4. Additional difficulties in complex models; 2.5. A generalized spatial model; 2.6. Local stability in small and intermediate models; 2.7. Some results on global dynamics 2.8. Numerical investigation of complex networks2.9. Discussion; References; 3. Dynamics of plant communities in drylands ; 3.1. Introduction; 3.2. Model for dryland water-vegetation systems; 3.3. Landscape states; 3.3.1. Mapping the landscape states along aridity gradients; 3.3.2. Coexistence of landscape states and state transitions;

3.3.3. Landscape states and aridity classes; 3.4. Plants as ecosystem engineers; 3.4.1. Facilitation vs. resilience; 3.4.2. Facilitation vs. competition; 3.5. Species richness: Pattern formation aspects; 3.5.1. The niche concept and the niche map
3.5.2. Landscape diversity3.5.3. Environmental changes; 3.6. Conclusion; Acknowledgments; References; 4. Metapopulation dynamics and the evolution of dispersal ; 4.1. Introduction; 4.1.1. What is a metapopulation?; 4.1.2. Levins metapopulation model; 4.2. Metapopulation ecology in different models; 4.2.1. Local dynamics; 4.2.2. Finite number of patches with the Ricker model; 4.2.3. Infinite number of patches; 4.2.3.1. Model presentation; 4.2.3.2. Resident equilibrium; 4.3. Adaptive dynamics; 4.3.1. Invasion fitness; 4.3.2. Pairwise Invasibility Plots (PIP); 4.4. Evolution of dispersal
4.4.1. Finite number of patches4.4.1.1. Fitness; 4.4.1.2. Fixed-point attractor; 4.4.1.3. Cyclic orbits; 4.4.2. Infinite number of patches; 4.4.2.1. Invasion fitness for the mutant; 4.4.2.2. Results; 4.4.3. Local growth with an Allee effect can result in evolu- tionary suicide; 4.4.3.1. Local population growth with an Allee effect; 4.4.3.2. Allee effect in the metapopulation model; 4.4.3.3. Bifurcation to evolutionary suicide; 4.4.3.4. Theory of evolutionary suicide; 4.5. Summary; References; 5. The scaling law of human travel - A message from; References
6. Multiplicative processes in social systems 6.1. Introduction; 6.2. Models for Zipf's law in language; 6.3. City sizes and the distribution of languages; 6.4. Family names; 6.4.1. The effects of mortality; 6.4.2. The distribution of given names; 6.5. Conclusion; Acknowledgments; References; 7. Criticality in epidemiology ; 7.1. Introduction; 7.2. Simple epidemic models showing criticality; 7.2.1. The SIS epidemic; 7.2.2. Solution of the SIS system shows criticality; 7.2.3. The spatial SIS epidemic; 7.2.4. Dynamics for the spatial mean; 7.2.5. Moment equations; 7.2.6. Mean field behavior
7.3. Accidental pathogens: the meningococcus

Sommario/riassunto

"This collection of review articles is devoted to the modeling of ecological, epidemiological and evolutionary systems. Theoretical mathematical models are perhaps one of the most powerful approaches available for increasing our understanding of the complex population dynamics in these natural systems. Exciting new techniques are currently being developed to meet this challenge, such as generalized or structural modeling, adaptive dynamics or multiplicative processes. Many of these new techniques stem from the field of nonlinear dynamics and chaos theory, where even the simplest mathematical rule can generate a rich variety of dynamical behaviors that bear a strong analogy to biological populations."