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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.

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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
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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."