

Environmental change, infectious disease, and biosecurity

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Earth's ecosystems are increasingly experiencing rapid climate change (warming and changes in precipitation), biodiversity loss, and invasions by exotic species. All three of these human-accelerated environmental changes are increasing transmission rates of infectious diseases, with potential consequences for biosecurity. Climate warming is facilitating the movement of tropical and subtropical diseases, such as dengue and malaria, into more temperate regions. The 2012 epidemic in West Nile fever appears linked to a combination of warm winter and hot, dry summer conditions, which are likely to increasingly prevail as the climate warms. The loss of vertebrate biodiversity is linked to increases in the risk or incidence of many diseases, including Lyme disease and West Nile fever. Invasions by exotic plants, such as Japanese barberry and Japanese honeysuckle, are linked to burgeoning tick populations and increased risk of several tick-borne diseases. This talk will describe the general principles underlying the relationships between environmental changes and infectious diseases and provide case studies to illustrate these principles.

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Richard S. Ostfeld is Senior Scientist at the Cary Institute of Ecosystem Studies, a not-for-profit research institution in Millbrook, New York, dedicated to providing the science behind environmental solutions. He is also Adjunct Professor at Rutgers University and the University of Connecticut. His training was at the University of California-Berkeley (PhD) and University of California-Santa Cruz (BA). He has published 175 peer-reviewed articles, written one book (*Lyme Disease: The Ecology of a Complex System*, 2011, Oxford University Press), and co-edited 5 books, including *New Directions in Conservation Medicine*, Oxford University Press, which appeared in June 2012. He co-edits (with William Schlesinger) an annual review series, *The Year in Ecology and Conservation Biology* and sits on the editorial boards of *Ecology Letters*, *PeerJ*, and *Vector-borne and Zoonotic Diseases*. His research focuses on ecological determinants of human risk of exposure to infectious diseases, emphasizing Lyme and other tick-borne diseases. His lab group has discovered novel mechanisms by which biodiversity protects human health by reducing rates of pathogen transmission.