



Kezia Barker and Robert A. Francis (Eds): Routledge handbook of biosecurity and invasive species

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UK-based geographers Kezia Barker and Robert Francis have edited a timely handbook of biosecurity and invasive species for Routledge. The main feature of their approach, presaged in the volume *Biosecurity: The socio-politics of invasive species and infectious diseases* that Barker also co-edited (Dobson et al. 2013), is to bring together the concerns of invasion biologists, epidemiologists, and other scholars studying what we might half-jokingly call “bad biodiversity”—weeds and pests, diseases, bioweapons, etc.—under the conceptual framework of biosecurity. While each of the volume’s twenty chapters will likely be of interest to at least some readers of *Biological Invasions*, and several will likely be of interest to most, the volume’s main strengths are its interdisciplinary orientation, its inclusion of diverse critical humanistic and social-scientific perspectives alongside straightforward reviews of ecological and epidemiological literature, and the resulting attempt to, as the editors put it, “grapple with ‘invasive’ life” (1) and practices of biosecurity in all their heterogeneity and complexity. The chapters are divided into three main parts, “Knowledges”, “Terrains”, and “Practices”, each emphatically plural, indicating that this “handbook” is *not* an attempt to provide a unified statement

of *the* scientific consensus on biosecurity and invasions, but rather to offer a plurality of cutting-edge perspectives from a wide range of experts in ecology, geography, sociology, anthropology, epidemiology, and indigenous studies, among others. Unsurprisingly, these strengths relate the volume’s main weaknesses. In their introduction, the editors ask whether they have “[taken] on too much ‘mess’”, declaring that the volume should be seen as a “meeting place where tensions become visible in a way that may yet draw our gaze across...disciplinary divides, widening the field of concern within all subdisciplines, posing alternative problem framings and challenging...theoretical silos and echo chambers.” (2) While one scholar’s tension may be another’s contradiction, I would like to use this review to amplify the editors’ insistence that exposing these can be generative, especially for fields like invasion biology that pursue multiple scientific and social goals.

A central productive tension revealed early on in the volume is that between seeing invasion biology as a positivist, value-free, unified natural science, and seeing it as a post-positivist, value-laden, and socially embedded set of diverse knowledge practices fundamentally tied to biosecurity goals. “Knowledges” contains an initial chapter (“Characterizing invasive species”) by ecologists Estibaliz Palma, Abigail Mabey, Peter Vesik, and Jane Catford, reviewing basic concepts and methods of the functional trait approach to invasion ecology, including currently accepted,

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although sometimes controversial, standards for defining non-native and invasive species, operationalizing and predicting invasiveness, and assessing risk for invasive plants. The next chapter by feminist geographer Juliet Fall (“What is an invasive alien species? Discord, dissent, and denialism”), discusses background historical, ideological, and philosophical debates about invasive species as an object of scientific knowledge, including recent allegations of invasive species denialism. These two chapters alone would be enough to fuel hours of debate in the seminar room on the subtle issues of delimiting the field of invasion biology and describing the consensus around functional traits and invasiveness, the interpretation of scientific evidence and disagreement, as well as appropriate and inappropriate roles of values in science. Whatever one’s view of Fall’s interpretation of the “denialism” controversy—she sees it as an unfortunate attempt to police the field’s boundaries by ruling out some disagreements as illegitimate—as a philosopher of science I believe it is important for biologists to be able to metabolize not just disagreements on the interpretation of evidence and theory, but also more fundamental disagreements about the norms and values that structure scientific practice (Frank 2019). Thus I applaud the editors for their inclusion of such critical perspectives alongside ecological reviews, even if they might be placed in the bin of “denialism” by at least some readers of this journal. “Knowledges” contains further valuable chapters on indigenous biosecurity, veterinary knowledge practices, landowners’ perceptions of invasive plants, and novel methods for studying emerging infectious diseases.

“Terrains” reveals further tensions between scales, geographic regions, and ecosystem types, for example between relatively “natural” ecosystems not dominated by human infrastructure, completely artificial systems like urban environments or industrial agriculture, and the “recombinant” ecologies in-between that characterize most places in the so-called Anthropocene. Along with valuable chapters that review the ecological literature on invasions in forests, on oceanic islands, in marine and freshwater ecosystems, and at the national level of the UK, this section also includes, for example, a survey study of Swedish gardeners’ perceptions of non-native and invasive plants, and an excellent and terrifying contribution by Robert G. Wallace and colleagues on the political economy of

biosecurity in industrial agriculture. These authors argue along ecological Marxist lines that “biosecurity is deployed first and foremost to protect the most lucrative markets in invasive agriculture” (194) often in ways that perversely increase downstream risks to public health, for example via evolution of antibiotic resistance. The pathogenic environments of industrial animal agriculture have also given rise to some of the cruelest and most disturbing “innovations” in the name of biosecurity like “snatch farrowing”—raising piglets in sterile isolation to prevent vertical transmission of industry-specific pathogens (196–197). Especially in the context of the ongoing and likely zoonotic Covid-19 pandemic, it is important that scientists continue to raise alarms about the well-known pandemic risks of industrial animal agricultural systems that facilitate rapid pathogen evolution and zoonotic spillover. The editors’ choice to include perspectives from critical geographers alongside those of descriptive ecologists and social scientists deserves praise, although the resulting “mess” can be as disorienting as it is intellectually thrilling.

“Practices” closes out the volume with a chapter comparing biosecurity regimes in the UK and China, chapters by social scientists on biosecurity surveillance and a Foucauldian analysis of “the emergency modality” in state responses to disease outbreaks (including a brief “opuscule” on Covid-19), a review of risk assessment methods for invasive species, and chapters on laboratory biosecurity and rewilding and invasions. This section emphasizes tensions of scale and scope, for example between practices of biosecurity that focus on invasive macrobes and those focusing on microbial disease threats, whether in the context of state regulations and restrictions on trade and travel, the management of life science laboratories pursuing risky dual-use research, or the (re)introduction of megafauna to conservation areas. Some topics that I would have liked to see covered would have been biosecurity concerns related to the wildlife trade, biocontrol practices, as well as controversies surrounding the management and control of invasive vertebrates like cats, pigs, horses, or camels. However, such a kaleidoscopic collection is bound to leave out at least some topics.

Following the logic of the editors’ own initial comments, the reader may be left with the question whether this “messy” framework of biosecurity that

includes all of these diverse components of “bad biodiversity” is useful. Indeed, scholars have sometimes asked the same thing about invasion biology, given the difficulty of generalizing across the bewildering variety of populations determined to be damaging non-natives, as well as roles of human values in defining ‘damage’ and what is native. But if biosecurity—including knowledges and practices of invasion biology, epidemiology, public health, and more—is more like medicine than biology or ecology considered as natural sciences, as Michael Soulé (1985) famously suggested about conservation biology, then such a framework is not just useful, it is necessary. Consider that the concept of ‘disease,’ like the concept of ‘invasive species,’ also arguably brings together the biological and the evaluative. As the editors emphasize, facing this complexity requires knowledge from the natural sciences to be sure, but also social scientific and humanistic insights. This volume will be an excellent fit for advanced undergraduate and graduate courses in invasion biology, disease ecology, or geography that emphasize the importance of this kind

of interdisciplinary and critical inquiry, as well as a helpful resource for scholars interested in biosecurity.

Declarations

Conflict of interest The author has no relevant financial or non-financial interests to disclose.

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