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Viewpoint

Parallels between biological invasions and human migration are flawed and undermine both disciplines. Response to Ahmed et al.

Josie South, Roxana Barbulescu, Rafael L. Macêdo, Camille L. Musseau, Simone Guareschi, Tim Alamenciak, Gabriella Alberti, Sylvie Allen, Sven Bacher, Emma Baker, Michaela Benson, Maud Bernard-Verdier, Rashida Bibi, Manuela Boatcă, Rossano Bolpagni, Timothy M. Brown, Bridget Byrne, Susan Canavan, Esther Neira Castro, Deirdre Conlon, Jean-Paul Demoule, Alison M. Dunn, Thomas Faist, Glenda Garelli, Paula Gervazoni, Ben Gidley, Jérôme M. W. Gippet, Matthew Harwood, Tina Heger, Theresa Henke, Sara Hill, Joshua Hobbs, James Hodson, George Holmes, Phillip E. Hulme, Hannah Jones, Dumisani Khosa, Majella Kilkey, Danai Kontou, Anne Lavanchy, Hannah Lewis, Rosa Mas Giralt, Laura A. Meyerson, Ana Novoa, Zarah Pattison, Pavel Pipek, Anna F. Probert, Petr Pyšek, Anthony Ricciardi, Jonathan David Roberts, Florian Ruland, Wolf-Christian Saul, Ross Shackleton, Nando Sigona, Daniel Simberloff, John Solomos, Li Sun, Louise Waite, Pip Wilson, Florencia A. Yannelli, Zana Vathi, Tesfalem Yemane, Ulrike M. Vieten, Giovanni Vimercati, Elena Zambelli and Deah Lieurance

Josie South, Sylvie Allen, Emma Baker, Timothy M. Brown, Alison M. Dunn, Matthew Harwood, James Hodson, Danai Kontou, and Pip Wilson are affiliated with the School of Biology in the Faculty of Biological Sciences at the University of Leeds, in Leeds, England, in the United Kingdom. Roxana Barbulescu and Li Sun are affiliated with the Department of Sociology and Social Policy in the Faculty of Social Sciences at the University of Leeds, in Leeds, England, in the United Kingdom. Rafael L. Macêdo, Camille L. Musseau, Tina Heger, Florian Ruland, and Wolf-Christian Saul are affiliated with the Leibniz Institute of Freshwater Ecology and Inland Fisheries, in Berlin, Germany. Rafael L. Macêdo, Tina Heger, Florian Ruland, and Wolf-Christian Saul are also affiliated with the Institute of Biology at Freie Universität Berlin, in Berlin, Germany. Simone Guareschi is affiliated with Rey Juan Carlos University, in Madrid, Spain. Tim Alamenciak is affiliated with the Institute of Environmental and Interdisciplinary Science at Carleton University, in Ottawa, Ontario, Canada. Gabriella Alberti is affiliated with the Leeds University Business School, at the University of Leeds, in Leeds, England, in the United Kingdom. Sven Bacher, Jérôme M. W. Gippet, and Giovanni Vimercati are affiliated with the Department of Biology at the University of Fribourg, in Fribourg, Switzerland. Michaela Benson is affiliated with the Department of Sociology at Lancaster University, in Lancaster, England, in the United Kingdom. Maud Bernard-Verdier is affiliated with the Centre d'Écologie et des Sciences de la Conservation, at Sorbonne Université's Museum National d'Histoire Naturelle, in Paris, France. Rashida Bibi, Sara Hill, Majella Kilkey, and Hannah Lewis are affiliated with the School of Sociological Studies, Politics, and International Relations at the University of Sheffield, in Sheffield, England, in the United Kingdom. Manuela Boatcă is affiliated with the Institut für Soziologie at Albert-Ludwigs-Universität Freiburg, in Freiburg, Germany. Rossano Bolpagni is affiliated with the Department of Chemistry, Life Sciences, and Environmental Sustainability at the University of Parma, in Parma, Italy. Timothy M. Brown is also affiliated with the School of Philosophy, Religion, and History of Science, in the Faculty of Arts, Humanities, and Cultures, at the University of Leeds, in Leeds, England, in the United Kingdom. Bridget Byrne is affiliated with the Department of Sociology at the University of Manchester, in Manchester, England, in the United Kingdom. Susan Canavan is affiliated with the School of Natural Sciences, at the Ollscoil na Gaillimhe (University of Galway), in Galway, Ireland. Esther Neira Castro is affiliated with the School of History, Anthropology, Philosophy, and Politics at Queen's University Belfast, in Belfast, Northern Ireland, in the United Kingdom. Deirdre Conlon, Glenda Garelli, Rosa Mas Giralt, and Louise Waite are affiliated with the School of Geography at the University of Leeds, in Leeds, England, in the United Kingdom. Jean-Paul Demoule is affiliated with the Université de Paris I Panthéon – Sorbonne, in Paris, France. Thomas Faist is affiliated with the Faculty of Sociology at Bielefeld University, in Bielefeld, Germany. Paula Gervazoni, Theresa Henke, and Ana Novoa are affiliated with the Estación Experimental de Zonas Áridas, in Almería, Spain. Ben Gidley is affiliated with the School of Social Sciences at Birkbeck University of London, in London, England, in the United Kingdom. Tina Heger is also affiliated with the School of Life Sciences at the Technical University of Munich, in Munich, Germany. Joshua Hobbs is affiliated with IDEA, The Ethics Centre, in the School of Philosophy, Religion, and History of Science at the University of Leeds, in Leeds, England, in the United Kingdom. George Holmes and Pip Wilson are affiliated with the School of Earth and Environment in the Faculty of Environment at the University of Leeds, in Leeds, England, in the United Kingdom. Phillip E. Hulme is affiliated with the Bioprotection Aotearoa, Department of Pest-Management and Conservation, at Lincoln University, in Lincoln, New Zealand. Hannah Jones and John Solomos are affiliated with the Department of Sociology at the University of Warwick, in Warwick, England, in the United Kingdom. Dumisani Khosa is affiliated with Scientific Services at South African National Parks, in Pretoria, South Africa. Anne Lavanchy is affiliated with the Department of Social Work at the University of Applied Sciences and Arts of Western Switzerland, in Delémont, Switzerland. Rosa Mas Giralt is also affiliated with the Lifelong Learning Centre at the University of Leeds, in Leeds, England, in the United Kingdom. Laura A. Meyerson is affiliated with the Department of Natural Resources Science at the University of Rhode Island, in South Kingston, Rhode Island, in the United States. Ana Novoa, Pavel Pipek, and Petr Pyšek are affiliated with the Institute of Botany at the Czech Academy of Sciences, in Prague, Czechia. Zarah Pattison is affiliated with the School of Biological and Environmental Science at the University of Stirling, in Stirling, Scotland, in the United Kingdom. Pavel Pipek and Petr Pyšek are also affiliated with the Department of Ecology, in the Faculty of Science at Charles University, in Prague, Czechia. Anna F. Probert is affiliated with the Zoology Discipline, in the School of Environmental and Rural Science at the University of New England, in Armidale, Australia. Anthony Ricciardi is affiliated with the Department of Biology at McGill University, in Montreal, Quebec, Canada. Jonathan David Roberts is affiliated with the School of Biology and the School of History at the University of Leeds, in Leeds, England, in the United Kingdom. Florian Ruland is also affiliated with the Náttúrustofa Vesturlands, in Stykkishólmur, Iceland. Ross Shackleton is affiliated with the Swiss Federal Research Institute for Forest, Snow, and Landscape Research, in Birmensdorf, Switzerland. Nando Sigona is affiliated with the Department of Social Policy, Sociology, and Criminology at the University of Birmingham, in Birmingham, England, in the United Kingdom. Daniel Simberloff is affiliated with the Department of Ecology and Evolutionary Biology at the University of Tennessee, in Knoxville, Tennessee, in the United States. Florencia A. Yannelli is affiliated with the Argentine Institute for Dryland Research, CONICET, and Universidad Nacional de Cuyo, in Cuyo, Argentina. Zana Vathi is affiliated with the Department of History, Geography, and Social Sciences at Edge Hill University, in Ormskirk, England, in the United Kingdom. Tesfalem Yemane is affiliated with the Department of Geography and Planning at the University of Liverpool, in Liverpool, England, in the United Kingdom. Ulrike M. Vieten is affiliated with the School of Social Sciences, Education, and Social Work at Queen's University Belfast, in Belfast, Northern Ireland, in the United Kingdom. Elena Zambelli is affiliated with the Department of Sociology at Maynooth University, in Maynooth, in the Republic of Ireland. Deah Lieurance (dzl5661@psu.edu) is affiliated with the Department of Ecosystem Science and Management at Penn State University, in University Park, Pennsylvania, in the United States.

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A recent article by Ahmed and colleagues (2025) attempt to draw parallels and assess distinctions between biological invasions and human migration. This comparison conflates two globally occurring phenomena in a scientifically flawed way and risks the misappropriation of scientific concepts for ideological and political agendas. The repeated use of *similarity* and *parallels* throughout the text, including in the title, could easily lead to misconceptions among broader audiences, such as educators and policymakers, who can help shape public discourse. Despite their acknowledgement that comparing introductions of nonnative species with human migration "may be inappropriate and cause confusion," Ahmed and colleagues argue that it reveals "complex parallels that are potentially fruitful to explore." However, they fail to make their case.

Although interdisciplinary analogies can sometimes yield fresh insights, applying concepts of biological invasions to human migration is both conceptually flawed and ethically problematic. Invasion science examines ecological processes and the subsequent environmental, economic, and public health impacts. In contrast, migration studies explore the drivers of human movement and their effects on individuals, communities, and countries, emphasizing that human migration—unlike biological invasions—is a single-species phenomenon in which individuals are not passive agents. Although external forces such as war or famine can drive their movement, humans actively make decisions and respond to these pressures. This distinction is overlooked by Ahmed and colleagues when they wrongly compare human migration to interspecific invasional meltdown—a process involving the accumulation of multiple nonnative species and their compounded ecological impacts, not merely a group of conspecifics (Simberloff and Von Holle 1999).

Such analogies are not only scientifically inaccurate but also carry serious ethical implications. In framing human migration through the lens of biological invasions, Ahmed and colleagues falsely portray migrants as threats. For example, they misapply the concept of establishment, which in invasion biology, refers to the formation of self-sustaining populations of a species outside its historical range, often as a precursor toward spread and negative impacts. When this logic is extended to human migrants, it risks implying that their integration or success is inherently problematic, potentially reinforcing anti-immigration sentiments. This error is compounded by their application of frameworks designed to categorize the impacts of non-native species on human society (e.g., Socio-economic Impact Classification of Alien Taxa [SEICAT]; Bacher et al. 2018) in evaluating human migrants. This is incompatible and inappropriate for human-to-human interactions.

Similarly, by forcing comparisons between the standard framework describing pathways of nonnative species introductions (Hulme et al. 2008) and of human migrants, the authors frame migration as a process largely controlled by the recipient country, equating deprecatory terms, including *contaminant*, *stowaway*, and *escape*, with the deeply complex sociocultural phenomenon of immigration. Likewise, Ahmed and colleagues equate language used for neutral classification in medicine and invasion science with human migration, resulting in unacceptable comparisons that liken refugees to at-risk species or harmful diseases, depict successful migrants as filling ecological niches, and equate the containment of migrants with the containment of infectious disease, harmful contaminants, or invasive species. This approach dehumanizes these groups by reinforcing the comparisons Ahmed and colleagues themselves cautioned against and prevents scientific interdisciplinary progress.

In contrast, robust interdisciplinarity, such as the use of welfare economics by invasion scientists to develop the SEICAT (Bacher et al. 2018), or the integration of sociological analysis to incorporate context-sensitive Indigenous knowledge (Brondízio et al. 2021), prioritizes conceptual rigor and fosters genuine dialogue between disciplines to avoid misconceptions. Ahmed and colleagues, by contrast, neglect the scientific collaboration needed to bring social sciences and invasion ecology together for effective interdisciplinary work in invasion science (Guareschi et al. 2024). As a result, they neither advance invasion science nor provide meaningful insights into human migration. For social scientists in migration studies, drawing parallels between biological invasions crossing biogeographic or jurisdictional boundaries and human migration occurring within or across jurisdictional boundaries reflects a conceptual mismatch rather than a scientifically sound comparison. Such comparisons fail to apply key distinctions, particularly the role of agency and intentionality in human migration, and risk oversimplifying or misrepresenting the complex social, political, and economic drivers that shape human migration.

Apart from failing to demonstrate heuristic value, Ahmed and colleagues' misguided comparison of humans to nonnative species, even as an academic exercise, is needlessly provocative, especially at a time when scientific concepts and associated data are increasingly misused for ideological and political purposes that disproportionately harm marginalized groups. This also highlights the responsibility of scientific journals and editors in this regard. Even if studies such as Ahmed and colleagues' review were scientifically sound, those with strong ethical implications and high potential to affect marginalized groups should be scrutinized more carefully for their ethical implications during decision for publication. This is especially relevant as ecologists increasingly engage with their peers in the social sciences. We urge that future research and publication practices should prioritize ethical integrity, especially when addressing topics with significant social impacts.

In summary, by drawing untenable equivalencies between biological invasions and human migration, Ahmed and colleagues open the door for both intentional and unintentional misuse instead of preventing it. Their stated caveats in the review are undermined by the fact that the authors themselves disregard them in their own synthesis. We strongly recommend such comparisons should be avoided altogether and reiterate Ahmed and colleagues' own warning that this analogy is "fundamentally flawed and dangerous and so these two phenomena should not be directly compared."

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