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Raising concerns on the dangers of linking biological invasions to human migration

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ARTICLE COMMENTARY

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Roxana Barbulescu[a], Josie South[b], Bridget Byrne [c], John Solomos[d], Michaela Benson [e], Carlos Carlos Vargas Silva[f], Tesfalem Yemane[g], Elena Zambelli[h], Remus Gabriel Anghel[i], Sven Bacher[j], Anastasia Maria Bermudez Torres[k], Maud Bernard-Verdier[l], Rashida Bibi[m], Manuela Boatcă [n,o], Rossano Bolpagni[p], Deidre Colon[q], Jean-Paul Demoule[r], Alison M. Dunn[b], Sam Durrant[s], Thomas Faist[t], Claudia Finotelli [u], Glenda Garelli[q], Ben Gidley [v], Jerome M. W. Gippet[j], Sara Gonzalez[q], Simone Guareschi[w], Tina Heger[x], Sara Hill[m], Joshua Hobbs [y], George Holmes[z], Philip E. Hulme[aa], Hannah Jones [d], Marie-Andree Jacob[ab], Dumisani Khosa[ac], Majella Kilkey [m], Ayu Kusumastuti[ad], Anne Lavanchy[ae], Hannah Lewis[m], Rafael L. Macêdo[af], Rosa Mas Giralt[ag], Camille L. Musseau[ah], Mona Makinejad[ai], Esther Regina Neira Castro[aj], Zarah Pattison[ak], Anna Probert[al], Jonathan David Roberts[am], Florian Ruland[af,ah,an], Wolf-Christian Saul[ah,ao], Giuseppe Sciortino[ap], Ross T. Shackleton[aq], Nando Sigona [ar], Simona Sokolovska[as], James Souter[at], Li Sun[a], Zana Vathi [au], Ulrike Vieten[av], Giovanni Vimercati[j], Louise Waite[q], Pip Wilson[b,z] and Florencia A. Yannelli[aw]

[a]School of Sociology and Social Sciences, Faculty of Social Sciences, University of Leeds, Leeds, UK; [b]School of Biology, Faculty of Biological Sciences, University of Leeds, Leeds, UK; [c]Department of Sociology, University of Manchester, Manchester, UK; [d]Department of Sociology, University of Warwick, Coventry, UK; [e]Department of Sociology, Lancaster University, Lancaster, UK; [f]Centre on Migration Policy and Society (COMPAS), University of Oxford, Oxford, UK; [g]Department of Geography and Planning, University of Liverpool, Liverpool, UK; [h]Department of Sociology, Maynooth University, Maynooth, Ireland; [i]National University of Political Studies and Public Administration & Romanian Institute for Research on National Minorities, Bucharest, Romania; [j]Department of Biology, University of Fribourg, Fribourg, Switzerland; [k]Department of Social Anthropology, University of Seville, Seville, Spain; [l]Centre d'Écologie et des Sciences de la Conservation (CESCO), Sorbonne Université – Museum National d'Histoire Naturelle – CNRS, Paris, France; [m]School of Sociological Studies, Politics and International Relations, University of Sheffield, Sheffield, UK; [n]Department of Sociology, Albert Ludwigs-Universität Freiburg, Freiburg, Germany; [o]Gender Studies and Centre for Baltic and Eastern European Studies, Södertörn University, Flemingsberg, Sweden; [p]Department of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Parma, Italy; [q]School of Geography, University of Leeds, Leeds, UK; [r]University of Paris I Panthéon-Sorbonne, UFR Art et Archéologie, Paris, France; [s]School of English, Faculty of Arts, Humanities and Cultures, University of Leeds, Leeds, UK; [t]Faculty of Sociology, Bielefeld University, Bielefeld, Germany; [u]Department of Sociology II, Complutense University Madrid, Madrid, Spain; [v]School of Social Sciences, Birkbeck University of London, London, UK; [w]Biodiversity and Conservation Area, Rey Juan Carlos University (URJC), Madrid, Spain; [x]School of Life Sciences, Technical University of Munich, Munich, Germany; [y]IDEA, The Ethics Centre, PRHS, University of Leeds, Leeds, UK; [z]School of Earth and Environment, Faculty of Environment, University of Leeds, Leeds, UK; [aa]Bioprotection Aotearoa, Department of Pest-Management and Conservation, Lincoln University, Lincoln, New Zealand; [ab]School of Law, Faculty of Social Sciences, University of Leeds, Leeds, UK; [ac]Scientific Services, South African National Parks, Skukuza, South Africa; [ad]Department of Sociology, Universitas Brawijaya, Malanj Java, Indonesia; [ae]School of Social Work, University of Applied Sciences and Arts Western Switzerland HESSO, Geneva, Switzerland; [af]Institute of Biology, Freie Universität Berlin, Berlin, Germany; [ag]School of Geography and Lifelong Learning Centre, University of Leeds, Leeds, UK; [ah]Leibniz

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Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany; [ai]School of Sociology and Social Policy, Faculty of Social Sciences, University of Leeds, Leeds, UK; [aj]School of History, Anthropology, Philosophy and Politics, Queen's University Belfast, Belfast, UK; [ak]School of Biological and Environmental Science, University of Stirling, Glasgow, Scotland; [al]Zoology Discipline, School of Environment and Rural Science, University of New England, Armidale, Australia; [am]School of Biology & School of History, University of Leeds, Leeds, UK; [an]Náttúrustofa Vesturlands, Hafnargötü, Hafnargötü, Iceland; [ao]Institute for Biology, Freie Universität Berlin, Berlin, Germany; [ap]Department for Sociology and Social Research, University of Trento, Trento, Italy; [aq]Swiss Federal Institute for Forests, Snow and Landscape Research WSL, Birmensdorf, Switzerland; [ar]Department of Social Policy, Sociology and Criminology, University of Birmingham, Birmingham, UK; [as]Faculty of Social Sciences and Humanities, University of Deusto, Basque Country, Bilbao Basque Country, Spain; [at]School of Politics and International Relations, Faculty of Social Sciences, University of Leeds, Leeds, UK; [au]Department of History, Geography and Social Sciences, Edge Hill University, Ormskirk, UK; [av]School of Social Sciences, Education and Social Work, Queen's University Belfast, Belfast, UK; [aw]Argentine Institute for Dryland Research, CONICET and Universidad Nacional de Cuyo, Mendoza, Argentina

ABSTRACT

A recent paper by Ahmed et al. (2025. "Parallels and Discrepancies between non-native Species Introductions and Human Migration." *Biological Reviews* 100 (3): 1365–1395), published in *Biological Reviews*, suggests a comparative analysis of biological invasions (concerning interactions between different species) and human migration (concerning interactions among members of the same species) presenting prospective similarities between the two phenomena and proposing the existence of an "*untapped potential in interdisciplinary research*". In this commentary, we assemble scholars from migration and biology domains to raise concerns on the conceptual inconsistencies present in said article and discuss implications for social sciences, migration, ethnic and racial studies. South et al. (2025. "Parallels between Biological Invasions and Human Migration Are Flawed and Undermine Both Disciplines. Response to Ahmed et al." *BioScience*. Advance online publication), in turn, review the limitations from a biological science perspective. In this way, we seek to provide an interdisciplinary response and reach audiences across disciplines.

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Migration; race; culture; invasion science; biology; interdisciplinarity

Biological invasions are a global phenomenon whereby species are intentionally or accidentally transported by humans from their native range into new biogeographic areas, where they have no eco-evolutionary context (Essl et al. 2019). After a non-native species is introduced into a new area, it may establish persistent populations and potentially become widespread, in some cases causing negative environmental and social-economic impacts (Blackburn et al. 2011 and Hulme et al. 2008). Invasion science is a field of study concerned with understanding the drivers, mechanisms, and consequences of non-native species, and management measures to restrict their spread and mitigate negative impacts. Such management measures include prevention, eradication, removal, suppression, containment or asset protection (Robertson et al. 2020). In contrast, migration studies interrogate the complex social, political, cultural and economic dimensions of human movement within and between localities and territories, including their effects on individuals, communities, states and nations.

While the authors acknowledge that equating non-native species introductions with human migration "*may be inappropriate and cause confusion*" (4) they nonetheless

CONTACT Roxana Barbulescu r.barbulescu@leeds.ac.uk

pursue the comparison and suggest, without providing adequate detail, that it presents "*complex parallels that are potentially fruitful to explore*" (2). In presenting this comparison in such a chimeric fashion, Ahmed et al. (2025) inadvertently enable the misappropriation of scientific concepts for ideological and political agendas despite warning against doing so. Research *can* critically analyse the construction of analogies and metaphors, always cognizant of the fundamental conceptual and epistemological differences between disciplines and the dangers of misappropriation. Ahmed et al. frame their analysis as a scholarly explorative exercise, albeit not delimitating the parameters of the proposed parallel within scientific inquiry. As pointed out in South et al. (2025), the comparisons presented in Tables 1-3 lack the interdisciplinary rigour and engagement that such comparative frameworks require. Furthermore, misrepresentation of key understandings of theories and concepts in migration studies is systematic. For example, the major political and social conflict of the India/Pakistan partition is reduced to a mere migration event which caused "*significant disruptions to both India and Pakistan*" and then used to justify the thesis that "sudden influx of refugees created immense social and economic strain" (15). However, in migration studies, there is consistent evidence that no significant negative economic impact on employment or wages has been identified in various cases (for example, Peri and Sparber 2009). In consequence, the impact of economics but also geopolitics, colonial legacies and conflict on migration is misconstrued, introducing instead erroneous historiographies of borders and nations.

Different cultures (a key aspect of migration) are not the same as different species (a key aspect of biological invasions). Ahmed et al. equate biological and cultural differences, reducing the latter to a mere distinction between "native" and "non-native". This treats culture as fixed and natural, a framing that has repeatedly led to exclusionary practices marginalising racialised communities and postulates methodological nationalism and ethnocentrism. Citing scholarly work that in fact refutes the ideological claim of migrant failure to integrate (Waters 2011), Ahmed et al. place undue emphasis on the issue that migrants might "*reject the cultures of host societies*", yet do not mention barriers to "integration" such as racism and xenophobia, and the systematic exclusion that migrants often face in the country of immigration (Oliver and Gidley 2015). Doing so, Ahmed et al. also assume that all "natives" share the same culture, an assumption that has long been sociologically and anthropologically debunked. We argue it is essential to recognise that cultures are dynamic and fluid, shaped by continuous interactions and exchanges.

Biological invasions are considered as inherent threats to the recipient environment, thus human migration as biological invasions inherently constructs migrants as potential threats (to the receiving society, its economic functioning and cultural values) with presumed negative impact and conceptualises migration as a passive process where humans have no agency or free will. If extended to migrants, the invasion militaristic language of "contaminant", "stowaway", and "escapee" pathologise and criminalise migrants. This framing also ignores the research on positive contributions of migrants to the economy, society and cultural life of the host country, as well as the role of human mobility in sharing ideas, knowledge, technologies and capabilities in human history. Thereby disregarding the complex nature of human societies which are shaped by long histories of social, cultural and material exchange between those who were

born in particular areas, those who come to join them (permanently or temporarily) and those who leave.

Given these differences, the attempt to integrate natural and social sciences by comparing non-native species invasion and human migration as proposed by Ahmed et al. is unproductive regardless of intention. The extension of invasion biology frameworks to human migration is analytically unsound and poses risks of misappropriation, e.g. being used for justifying the application of exclusionary and repressive policies against migrants. The history of pseudo-scientific racial categorisation provides a stark warning against the conflation of certain biological and social phenomena (Alper 1978; Gould 1981; Lévi-Strauss 1952; Sussman 2014). Eugenicist and social Darwinist discourses similarly engaged biological metaphors to justify colonial expansion, racial hierarchies and segregationist policies (Allen 1994; Bowler 1995; Weingart 1995). The proposed application of invasion science frameworks and concepts to frame migration studies risks a resurgence of similar misappropriation, which Ahmed et al. postulate to warn against while perpetuating their own warnings. Dehumanising language and metaphors towards migrants and refugees such as "floods", "cockroaches", "weeds", "rats", "plagues", "virus and disease carriers", "bodily secretions" and "invasion" (see Benson and Sigona 2024; Boatcă 2021; Cresswell 1997; Johnson, Jacobsen, and Ehrkamp 2024; Sciortino and Colombo 2004) have long been in used, contrary to Ahmed et al.'s claims, did not originate within invasion science. Instead, these tropes have a much longer history in xenophobic, racist and far right rhetoric and, as acknowledged by Ahmed et al., are increasingly used in "mainstream" politics and media. Conflating these harmful discourses with scientific terminology, without clear evidence, risks misrepresenting the origins and intent of ecological concepts, and may obscure the need to address the political and social causes of dehumanisation in migration debates.

It is essential that scholars engaging in interdisciplinary research priorities such as Ahmed et al. work – which builds on research funded by national and European research councils, prioritise conceptual precision, ethical reflexivity, and a sustained commitment to fostering meaningful dialogue between disciplines. A theoretically grounded approach requires that researchers engage substantively with the epistemological and methodological frameworks of each field, critically interrogating their foundational assumptions, and actively collaborating with scholars across both domains to cultivate genuinely integrative forms of knowledge production.

In summary, in the current political climate, as invasion discourses about migrants are indeed a global trend from Europe and the US to South Africa, India or Hong Kong, drawing parallels between biological invasion and human migration risks facilitating the misappropriation of invasion science research by political ideologies, potentially criminalising migrant communities and legitimising exclusionary measures of migrants. In agreement with Ahmed et al. we argue that such comparisons are inappropriate, misleading, but in contrast, we do not find any evidence of furthering our scientific understanding of either phenomenon. As such, we urge the academic community – scholars, editors, publishers – to remain vigilant against the ideological misuse of scientific paradigms. As Ahmed et al. acknowledge, human migration and non-native species introductions call for categorically "*separate frameworks for analysis and management*" (24).

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Bridget Byrne http://orcid.org/0000-0003-3519-4709
Michaela Benson http://orcid.org/0000-0003-0400-5741
Manuela Boatcă http://orcid.org/0000-0003-1255-9955
Claudia Finotelli http://orcid.org/0000-0001-9645-8662
Ben Gidley http://orcid.org/0000-0003-2492-1384
Joshua Hobbs http://orcid.org/0000-0001-5478-3117
Hannah Jones http://orcid.org/0000-0002-2508-0284
Majella Kilkey http://orcid.org/0000-0002-0842-7290
Nando Sigona http://orcid.org/0000-0001-7882-1851
Zana Vathi http://orcid.org/0000-0002-9091-8637

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