Drawing parallels between biological invasions and human migration is flawed and undermines both fields of study. Response to Ahmed et al. 2025

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A recent article by Ahmed et al. (2025) attempts to draw parallels and assess distinctions between biological invasions and the migration of humans. This comparison conflates two globally occurring phenomena, and therefore risks the misappropriation of scientific concepts for ideological and political agendas. Despite their acknowledgement that comparing introductions of non-native species to human migration "*may be inappropriate and cause confusion,"* Ahmed et al. argue that it reveals "*complex parallels that are potentially fruitful to explore.*" They fail to make their case.

Invasion science examines ecological processes and environmental, economic, and public health impacts, whereas migration studies explore drivers of migration and their effects on people, communities, and countries. Human migration, in contrast to biological invasions, is a single species phenomenon and humans are not passive agents, even though their movement can be forced by external forces, such as wars or famine. Framing human migration through the lens of biological invasions also falsely portrays migrants as threats. Ahmed et al. compound this error by applying frameworks developed to categorise impacts of non-native species to human migrants. This is incompatible and inappropriate for human-to-human interactions. Similarly, by forcing comparisons between the standard framework describing pathways of non-native species introductions and applying it to human migrants, the authors

frame migration as a process largely determined by the recipient country, equating deprecatory terms including 'contaminant', 'stowaway', and 'escape' with the complex socio-cultural phenomenon of immigration. The role of humans as biological invasion *vectors* is indisputable but applying invasion concepts to migration is flawed. For example, Ahmed et al. wrongly compare human migration to an invasional meltdown—which involves the accumulation of non-native species and their ecological impacts, not simply a group of conspecifics. They also misapply the concept of *establishment*, which refers to the formation of self-sustaining populations of a species outside its historical range. Finally, Ahmed et al. equate language used for neutral classification in medicine and invasion science with human migration, leading to problematic comparisons that liken refugees to at-risk species or a harmful disease, depicts successful migrants as filling ecological niches, and equate the containment of migrants to the containment of disease, harmful contaminants, or invasive species. This approach dehumanizes these groups and reinforces the comparisons Ahmed et al. themselves cautioned against.

Ahmed et al. present their comparisons as an academic exercise yet neglect the scientific collaboration needed for bridging social and invasion sciences for effective interdisciplinary work (see Guareschi et al. 2024). Robust interdisciplinarity, such as the use of welfare economics by invasion scientists to develop the Socio-Economic Impact Classification of Alien Taxa (SEICAT) (Bacher et al. 2018), or the integration of sociological analysis to incorporate context-sensitive Indigenous knowledge (Brondízio et al. 2021), prioritises conceptual rigor and fosters genuine dialogue between disciplines to avoid misconceptions.

However, Ahmed et al. neither advance invasion science nor provide meaningful insights into human migration. Also, for social scientists in migration studies, the parallels drawn between biological invasions moving across biogeographic or jurisdictional boundaries and human migration are scientifically flawed as they fail to apply key distinctions — human migration often occurs within national borders where individuals retain agency and free will, and framing migration through the lens of invasion obscures the complex drivers behind it.

Apart from failing to demonstrate heuristic value, Ahmed et al.'s misguided comparison of humans to non-native 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 often aimed at targeting marginalized groups. We strongly recommend such comparisons should be avoided and reiterate Ahmed et al.'s own warning that this can be "*fundamentally flawed and dangerous and so these two phenomena should not be directly compared*".

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