

# Climate Change, Aboveground-Belowground Interactions, and Species' Range Shifts

Wim H. Van der Putten ([/search?value1=Wim+H.+Van+der+Putten&option1=author&noRedirect=true&sortField=prism\\_publicationDate&sortDescending=true](/search?value1=Wim+H.+Van+der+Putten&option1=author&noRedirect=true&sortField=prism_publicationDate&sortDescending=true))<sup>1</sup>

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## Abstract

Changes in climate, land use, fire incidence, and ecological connections all may contribute to current species' range shifts. Species shift range individually, and not all species shift range at the same time and rate. This variation causes community reorganization in both the old and new ranges. In terrestrial ecosystems, range shifts alter aboveground-belowground interactions, influencing species abundance, community composition, ecosystem processes and services, and feedbacks within communities and ecosystems. Thus, range shifts may result in no-analog communities where foundation species and community genetics play unprecedented roles, possibly leading to novel ecosystems. Long-distance dispersal can enhance the disruption of aboveground-belowground interactions of plants, herbivores, pathogens, symbiotic mutualists, and decomposer organisms. These effects are most likely stronger for latitudinal than for altitudinal range shifts. Disrupted aboveground-belowground interactions may have influenced historical postglacial range shifts as well. Assisted migration without considering aboveground-belowground interactions could enhance risks of such range shift-induced invasions.

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