Uncoordinated trade policies aid alien bee invasions

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Bombus dahlbomii visiting a Vicia grandiflora Credit: Pablo Vial

Patagonia may lose its only native bumblebee species due to invasions by alien bee species sanctioned by government policy.

In a paper published today in *Journal of Applied Ecology*, Marcelo Aizen from the Universidad Nacional del Comahue, Argentina, and colleagues from four countries draw attention to the severe conservation, economic and political consequences of intentional species introductions supported by government policies.

They illustrate these consequences based on the recent spread of invasive European bumblebees, especially the buff-tailed bumblebee (*Bombus terrestris*) from Chile to southern Argentina.

Chile formally allows continuous importation of alien bumblebees to pollinate agricultural crops. Since 1997, this policy has authorized importation of more than a million bumblebee colonies. During 2015 alone, more than 200,000 colonies and queens were imported.

Unfortunately, bumblebees are mobile and do not respect international boundaries, even those established along major geographic barriers. As a consequence, the alien species have spread widely in Chile and Argentina, and one species is on the verge of entering Bolivia and Perú. The invasion of Argentina across the Andes and its unintended consequences have occurred despite Argentina having banned importation of non-native bumblebees.

The most serious biological impact of this invasion is the decline of the Patagonian giant bumblebee (*Bombus dahlbomii*), the only native bumble bee in southern South America and one of the world's largest bumblebees.

Bombus terrestris and Bombus dahlbomii visiting a thistle. Credit: Alvaro Cuevas Becerra

Dr Marcelo Aizen says "the alien invaders, *Bombus ruderatus* and especially *Bombus terrestris*, are potent competitors and carry foreign bee diseases.

"As they spread, *Bombus dahlbomii* disappeared from much of Chile and Argentina. The demise of *Bombus dahlbomii* is so severe that it is now recognized in Chile and internationally as an endangered species."

Aizen and colleagues also document detrimental effects on native and

crop plants by the invasive *Bombus terrestris* in NW Patagonia. To access nectar, this bee damages flowers of many plant species (nectar robbing), reducing nectar for other flower visitors, but often not pollinating flowers effectively. Nectar robbing and other flower damage caused by *Bombus terrestris* in commercial raspberry fields reduces fruit quality and might compromise honey production by honey bees.

Invasion by *Bombus terrestris* also promotes the spread of alien plants, which compete with native species. For example, in Argentina pollination by *Bombus terrestris* increases seed production and establishment of scotch broom, a pernicious plant invader. The environmental costs of this invasion should alert governments about the convenience of importing alien bumblebees or any other pollinator.

A retrospective lesson of the *Bombus terrestris* case is that coordinated risk assessment and cautious implementation are essential components of regional policy development to avoid transnational invasions.

Aizen says that "a coordinated approach is urgently needed to reduce the potential for transnational species invasions. In particular, policies concerning the importation of potentially invasive species must be established regionally among neighboring countries with suitable habitat".

International coordination and cooperation are also needed if transnational invasions occur, despite best intentions. Unilateral investment and effort will be futile if the countries involved adopt conflicting policies.

More information: Aizen MA, Smith-Ramírez C, Morales CL, et al. Coordinated species importation policies are needed to reduce serious invasions globally: The case of alien bumblebees in South America. *J Appl Ecol*. 2018;00:1–7. DOI: 10.1111/1365-2664.13121

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