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Deporting Plants and Animals to Protect Them from Climate Change

What if we relocated North African animals and plants to southern Europe to stop climate change-caused extinctions?

By David Biello

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As San Diego and Los Angeles have grown, the scrub land of southern California has been paved and built over. That has squeezed out the Quino checkerspot butterfly's habitat, and with the climate changes coming as a result of human greenhouse gas emissions, its listing as an endangered species by the U.S. government may not be enough to save the pretty little butterfly from extinction.

But a group of biologists suggest in this week's *Science* that simply moving the butterfly into similar habitat in nearby mountain ranges might solve the problem by overcoming the unnatural barriers humans have erected in the path of any potential shift in its natural range to follow such changing conditions. They call the idea "assisted colonization."

"Humans have dominated the landscape to such an extent that natural dispersal cannot take place in many areas," says biologist Camille Parmesan of the University of Texas at Austin, who helped craft the proposal. "It is in those cases that assisted colonization makes the most sense—use it on species that would have been able to do it on their own, if not for humans."

Specifically, Parmesan and an international group of biologists are proposing moving certain carefully selected species, such as the Quino checkerspot butterfly, as their historic habitats change rapidly because of global warming. They aren't calling for drastic moves, though. "We are not recommending placing rhino herds in Arizona or polar bears in Antarctica," the group writes, as, for example, the polar bear would then devastate Antarctic penguin and seal populations that have never encountered such a predator. "We are, however, advocating serious consideration of moving populations from areas where species are seriously threatened by climate change to other parts of the same broad biogeographic region," meaning in nearby locations sharing similar ecosystems.

The cost of such an effort is unknown, but could range from nearly free for a small-scale effort such as shifting the Quino a few 100 miles (kilometers) north to multimillion dollar projects such as, for example, moving a monkey species from one cloud forest to another, according to marine biologist Ove Hoegh-Guldberg, of the University of Queensland in Brisbane, Australia, and lead author of the proposal. Not every potential project makes sense: The researchers offer a list of conditions under which such assisted colonization would be appropriate, including imminent extinction, feasibility and a favorable cost–benefit analysis.

The idea still has some hurdles to overcome, not least the inherent horror of many conservation biologists at tampering with nature, no matter how human-dominated it is. After all, the human record with introduced species is not good, as the continent of Australia proves. European settlers there introduced rabbits, blackberries and cane toads, to name just a few. The latter of which was deliberately assisted in its colonization to control agricultural pests, but instead is displacing unique native animals, such as the northern quoll, a small carnivorous marsupial. There are similar examples of both intentional and unintentional introductions of so-called invasive species all over the world.

That history leaves at least one environmental group devoted to preserving endangered species opposed to the idea. "We do not under most conceivable scenarios support or encourage introduction of species to habitats outside of their historical range," says Matt Lewis, a spokesman for the species program of the Washington, D.C.–based global environmental group, the World Wildlife Fund. "It is rare to find an example of such an introduction that hasn't led to dire consequences for one or more indigenous species of the area of introduction, and it is naive to think that such consequences would not also be a factor under the framework the authors propose."

Conservation biologist Dov Sax of Brown University, who was not part of the group making the proposal, says these are reasonable concerns but that they can be overcome. "It can probably be done in a way that is responsible and will not lead to environmental catastrophes," says Sax, who is helping organize a group with funding from the U.S. National Science Foundation to assess the idea. But "no matter how we learn, we will always occasionally make mistakes. There will be unintended consequences on occasion."

In fact, some people are not waiting for all of the scientific and policy issues to be worked out on this extreme conservation idea. A group of naturalists, botanists and ecologists known as the Torreya Guardians has begun to transplant a spindly pine from the Florida panhandle—where *Torreya taxifolia* has dwindled as a result of disease and, potentially, climate change—to receptive arborists in more northerly climes. And several marine biologists, including Hoegh-Guldberg, have suggested extending the range of heat-tolerating staghorn corals—and the algae they host—to replace their less tolerant brethren in formerly colder waters. "There is no place on this planet that humans have not interfered with and it is probably time for us to now become actively involved in engineering solutions," Hoegh-Guldberg says. "There are no other options except extinction at this point."

The best, first example of this may just be the Quino in southern California, simply because it would be cheap and easy—a few days' labor by a few people to relocate an insect that is neither prolific nor aggressive—to help it find a safer clime. "This should be considered a last resort after other traditional conservation measures have been considered and/or tried," Parmesan says. "I think we need to try it on a very small scale as a small experiment on the most clear-cut case out there. I'm proposing this [to the U.S. Fish & Wildlife Service] for the Quino checkerspot butterfly."

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