

THE POLITICS AND BUSINESS OF CLIMATE CHANGE

3. SCIENCE:**Study identifies 'natural strongholds' for species displaced by climate change**

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A diverse array of ecosystems piles into the folds and faults of central Appalachia, a chain of peaks extending through Pennsylvania, Maryland, West Virginia and Virginia. Floodplain forests and river shore grasslands dot the lower reaches, while high-elevation swamps, shale barrens and stands of dwarf oak mark the highland places.

The complex geology and high rates of biodiversity in the region -- currently home to an estimated 7,452 plant and animal species -- make it a potential "natural stronghold" in the fight against climate change, according to a new, multimillion-dollar study by the Nature Conservancy.

Titled "Resilient Sites for Terrestrial Conservation," the study analyzed more than 156 million acres of land stretching from Virginia to Maine and into adjacent portions of Canada. Based on its results, Nature Conservancy scientists identified a number of geologically and ecologically complex sites throughout the Northeast that could function as strongholds.

"These strongholds will be critical to all life as the threats of climate change continue to grow," said Mark Anderson, regional director of conservation science with the Nature Conservancy. "They could serve as breeding grounds and seed banks for many animal and plant species that otherwise may be unable to find habitat due to climate change."

Besides central Appalachia, the report identified sites in the Chesapeake Bay lowland, the high Allegheny plateau, lower New England, northern Appalachia and the north Atlantic Coast.



The Otter Creek Wilderness in West Virginia is one region researchers have singled out that may help wildlife adjust to climate change. Photo by Kent Mason.

Seeking refuge in the eco-niche next door

As temperatures rise around the world, scientists believe many species will be pushed out of their long-standing habitats and into new, more challenging terrains. Areas like central Appalachia, which contain a diverse array of regions, offer the best chance that slow-moving species like plants will find a hospitable climate close by.

"The kind of sites we identified were those with a complex landscape that contained a lot of micro-climates -- mountains, valleys, slopes, caves, et cetera," said Anderson. Because climate shifts quickly with elevation, such variation is most often found in mountainous sites, he noted, adding that a few dozen meters of elevation shift can offer a change of climate equivalent to several hundred miles of flatland travel.

While large vertebrate mammals, like deer or bear, might be able to make that overland journey to keep up with northward-shifting temperatures, smaller animals and plants just don't move that fast, Anderson said.

Enclaves like the central Appalachian Mountains offer enough climate variability that even slow-moving species should be able to "hop" from one region from another.

"Climate change is going to shake things up," Anderson said. "What we want to do is preserve the stage -- even if things on the stage are rearranged, they'll find a place."

Keeping the lane open for climate migration

All this is pointless, however, if the species within a designated stronghold are restricted in their movements. Artificial barriers like roads, housing developments, pipelines and other infrastructure create such restrictions, Anderson said.

The degree to which certain landscapes permit plant and animal movement is referred to as "permeability." The sites identified by the Nature Conservancy study are all highly permeable, meaning there are few barriers to movement.

The study also identifies migratory corridors by which plants and animals can move from one stronghold to another without impediment.

Preserving the natural integrity of these corridors, as well as the permeability of the strongholds themselves, will be key to their long-term success as natural havens, Anderson said.

The Nature Conservancy is now extending its research to encompass the rest of the continental United States. Researchers hope their findings will result in increased protection for the sites, many of which already occur on nationally protected land.

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