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## Effect of global climate change on rare trees and shrubs

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**Pondberry, *Lindera melissifolia* – a rare species for which climate change poses a threat**



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In the past, climate has fluctuated with periods of cooler, warmer, drier or wetter weather than at present. Plants have been able to adapt, but widespread, rapid warming could be disastrous for rare trees and shrubs – i.e. those native species that are among an area's most infrequent and most in need of conservation efforts. Rare plants and rare plant communities often exist as relicts of times past, and have survived locally owing to very particular combinations of environmental conditions.

Rare forest trees and shrubs face particular conservation challenges. A drier climate could be stressful for rare plants, but a wetter climate could cause flooding. Wetlands, especially if degraded, will be vulnerable to drying out in a warmer atmosphere. Rare trees and shrubs will likely be more vulnerable to extinction as a result of warmer climate. Many rare species have characteristics that place them at risk, such as small populations, habitat specialization or limited geographic range. In the southern United States, for example, a number of rare tree and shrub species are confined to areas spanning 100 km or less in latitude, and very few have continuous distributions of more than 100 km with no disjunctions. Plants occurring in mountainous regions may find refuge by ascending in elevation, where possible. Plant communities at lower elevation are vulnerable to rising sea levels. In many areas, land development has restricted the

options for rare plant species to adapt. With climate change, rare plants may also become increasingly vulnerable to invasive plant and animal species. In the absence of human intervention, many rare trees and shrubs will probably become extinct.

An example of a rare species that will likely be threatened by global climate change is pondberry (*Lindera melissifolia*) in the southeastern United States. Pondberry is a shrub up to 2 m tall that occurs in seasonally flooded wetlands and on the wet edges of sinks, ponds and depressions. The species is dioecious, and female clones are usually smaller than male clones or sometimes absent from stands. As in many clonal species, seedlings are rarely observed. The distribution and abundance of pondberry have already been affected by habitat destruction and alteration, especially timber cutting, clearing of land and local drainage or flooding of wetlands. The species was listed as endangered by the United States Fish and Wildlife Service in 1986. Many of the existing pondberry colonies are small and occupy only a portion of the apparently suitable habitat. The Lower Mississippi Alluvial Valley, in which two-thirds of the present pondberry populations occur, is one of the most endangered ecosystems in the United States. Much of the habitat suitable for pondberry dispersal is fragmented today; thus populations that die out usually will not be replaced.