

# Science for Environment Policy

## Stepping stone patches of habitat help reduce effects of fragmentation

**The importance of 'stepping stone' patches of habitat for biodiversity has been underestimated, a new study suggests. The researchers developed a new connectivity model, which better captures the effects of stepping stones on species movement.**

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1. <http://ec.europa.eu/environment/nature/ecosystems/>

**Land use change** and climate change are fragmenting habitats and shifting the optimal areas for species, with major impacts for [biodiversity](#). Small habitat patches have limited resources for wildlife and often support fewer species than larger patches. Habitat fragmentation and intensification can also cause populations to become isolated, which can lead to inbreeding and declines in genetic diversity. These negative impacts can be reduced, however, through appropriate conservation strategies. For example, stepping stones and 'wildlife corridors' can help connect areas of habitat, allowing species move between them.

Existing research into habitat connectivity networks has been limited because it has not fully accounted for the fact that stepping stones allow long-distance dispersal and may provide refuges for species to breed in. It is especially important to consider these long-term processes, because species may need to move into new habitats to survive under [climate change](#). For instance, they may shift to higher ground or move northwards.

To address these issues, the researchers created two improved connectivity models which use the movements of populations through networks of habitat patches to explain species distributions. One incorporated stepping stones and the other considered only direct movements between source and destination habitat patches.

These models were compared to two standard connectivity models currently used in research and conservation. The standard models also incorporated either stepping stones or only direct movements. The researchers used all four models to examine a real world example: the expanding range of the black woodpecker (*Dryocopus martius*) in north-eastern Spain over two decades between 1980 and 2000.

The new stepping stone model was the only model which could adequately explain changes in the woodpecker's range, with stepping stones playing a dominant role in determining the total amount of habitat reached. The researchers also found that the standard models significantly underestimated both the likelihood and importance of long-distance movements. They also underestimated the key role played by stepping stones in enabling rare, but crucial, movements that allow species ranges to expand over the long term.

The results indicate that increasing the size or quality of the source habitat patch, or the population of a species in that patch, will not fully compensate for a lack of stepping stones to other habitats. However, the stepping stones do need to be of sufficient size and quality to be of conservation value.

Overall, the results highlight the long-term importance of suitably large stepping stones in helping species colonise new habitats. They suggest that protection and maintenance of stepping stones may prove crucial to conservation efforts and policies.

Additionally, incorporating these new stepping stone models into larger models which investigate habitat change under global warming may also prove useful. These can be used to develop effective policies, such as the EU-wide strategy on Green Infrastructure<sup>1</sup>, to reduce biodiversity loss and invasive species impacts caused by future land use and climate change.

