

# Afforestation with non-native trees alters island soils

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Severe erosion in Guam's savanna grasslands causes expansive barren scars to develop. Most native plants are unable to reestablish on these inhospitable scars.  
Credit: Thomas Marler

A healthy global debate has occurred concerning the benefits of using non-native trees for restoring some aspects of ecosystem function in degraded habitats. In many cases, the stresses associated with establishing seedlings disallow most native tree species from becoming successfully established in harsh planting sites. The tolerant non-native trees enable successes that would otherwise be unachievable.

A recent study from the Micronesian island of Guam has added to this global debate, and the results appear in the current issue of the *Journal of Coastal Zone Management*. The University of Guam research focused on the established use of non-native [Acacia trees](#) to re-vegetate barren scars in savanna grasslands.

"Most of these sorts of government-sponsored projects that use non-native trees are very mindful of the issue of invasiveness," said author Thomas Marler. "Non-native species that have proven restoration attributes are only used in restoration projects if they exhibit no signs of invasiveness."

In the Guam case, the Acacia trees are pursued to restore barren scars because these degraded soil surfaces do not become re-vegetated by the grass species that comprise the savanna vegetation. The barren areas are prone to increases erosion and sedimentation over time and often have the surface soil horizons completely removed. The chemistry of Guam's volcanic subsoil is inhospitable for root growth of most plants. When these subsoils become the surface soils after erosion in the barren scars, very few plants can become established.

According to Marler, the use of Acacia trees has been enticing because the species that have been used are adept at becoming established in the inhospitable sites. And their positive influence on erosion control has been proven throughout decades of projects. But no case studies have been conducted until now to shed light on what these non-native trees are

doing to Guam's soil traits.

The results indicated the soil chemistry and root-zone nutrient budgets have been altered by the Acacia tree cover, and the trajectory of change is in a direction that does not conform to any of the naturally vegetated sites from Guam. As expected, the various components of the nitrogen cycle were among the traits that were most altered by these alien legume trees.

This Guam research contributes to the ongoing global discussions about the role of afforestation for revegetating tropical degraded habitats. Some restoration ecologists consider tropical grassland habitats off limits for tree-planting projects. These unique changes in Guam's tropical volcanic soils reveal one means by which non-native trees perpetrate collateral ecosystem deviations within the habitats being restored. These [soil](#) deviations often go unnoticed during restoration projects, and exemplify yet one more human activity that inadvertently alters the natural biogeochemical cycle.

**More information:** Thomas E Marler, Soil Chemistry Following Afforestation of Barren Coastal Soils in Southern Guam Does Not Conform to that of Continuously Vegetated Surfaces, *Journal of Coastal Zone Management* (2017). [DOI: 10.4172/2473-3350.1000444](https://doi.org/10.4172/2473-3350.1000444)

Provided by University of Guam

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