

The challenge of forest restoration: Where to obtain tens of billions of quality seeds

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A seedling growing out of cracked earth. Credit: Neil Palmer / CIAT

With commitments to restore more than 47.5 million hectares of degraded land and forests by 2030, the Philippines, Indonesia, Malaysia and India hope to become exemplar land custodians. While

commitments ending deforestation are critical to obtaining that image—Indonesia is one of the world's poster children for forest loss—even a full halt to natural landscape destruction is only part of the battle to fight climate change and restore myriad ecosystem services, which the United Nations Food and Agriculture Organization simply states, "make human life possible."

Countries in the tropics account for more than 80% of global land [restoration](#) commitments to date. These have been made under several frameworks including the Bonn Challenge and the New York Declaration on Forests. Restoration generally forms part of emissions reductions commitments under the UN Framework Convention on Climate Change, which concludes this weekend in Glasgow. Successful trailblazing in this (relatively) new area of environmental stewardship in the tropics is therefore essential to global land restoration success.

Restoring such a massive area requires a vast amount of seed, something which tends to be overlooked in restoration commitments. The strengths and weaknesses of seed-supply systems to support tree-based restoration projects in the Philippines, Indonesia, Malaysia and India are evaluated in a new publication in *Diversity*. The authors estimated that some 157 billion seeds (which is used to mean seeds, seedlings and wildings, among other regenerative materials) are needed to meet the restoration target of 47.5 million hectares.

While the study found promising trends—such as increased [government support](#) and funding—the researchers found at least two concerning shortcomings: a lack of access to quality seeds and untapped opportunities for local communities to participate in seed procurement. Clearing out these bottlenecks will be crucial to long-term success.

"This research shows very explicitly that there are major limitations at national capacity to deliver at scale, particularly when it comes to quality

of planting material and native species diversity which are critical to making restoration socially and ecologically resilient," said Chris Kettle, a co-author and global lead on tree biodiversity at the Alliance of Bioversity International and CIAT. "Many prominent tree planting projects have been shown to fail to deliver benefits to local communities."

To better understand how the national-level organization of the tree seed systems affects restoration efforts on the ground, the study made a priority of consulting people implementing [restoration projects](#) in the four countries.

"Their responses showed that challenges in obtaining seeds from their preferred species and origin were quite common, and that information on seed quality was often not provided by seed suppliers. This reflects the lack of effective quality control at the national levels and highlights the need to improve information flow within the seed system," said Ennia Bosshard, the study's lead author from ETH Zurich.

The study builds on similar [research](#) done in Latin America that proposes a series of indicators to evaluate national seed systems, which is an umbrella term to describe how the provision, distribution and use of seeds functions in a given context or location.

"Monitoring progress of the performance of national seed systems for restoration through a global set of indicators will help countries evaluate how well they are achieving restoration goals," said Evert Thomas, a co-author from the Alliance. "We also hope this work facilitates 'horizontal learning' where countries that are doing well on some indicators can serve as inspiration to other nations how to do further improve their seed systems."

There is no one-size-fits-all approach. With tens of thousands of [tree](#)

[species](#) and dozens of ecosystem types in the tropics, restoring landscapes with locally desirable species that best provide ecosystem services—such as carbon storage, freshwater regulation and the provision of wood and fruits—requires tailored local approaches as part of a large-scale matrix of success. Understanding the traits of certain trees is critical: some fruit and provide seed only every few years, while others produce abundant seed that requires near-immediate harvesting and planting before the seeds become inviable.

As Alliance researchers and colleagues have emphasized in several recent [scientific papers](#) on [restoration](#), the goals of a particular restoration project need to be defined collaboratively at the outset to increase the chances of success.

"Our definition of restoration has become quite broad given that there can be several desired outcomes when improving the functionality of landscapes," said Riina Jalonen, a co-author from the Alliance. "It's not just about restoring natural forests, it's about restoring landscape function and ecosystem services. Restoration does not always have to happen with native species but native species should not be excluded either. Improving the quality and availability of native tree [seed](#) will be key for Asian countries to meet their restoration targets in ways that deliver such diverse benefits for both people and the planet."

More information: Ennia Bosshard et al, Are Tree Seed Systems for Forest Landscape Restoration Fit for Purpose? An Analysis of Four Asian Countries, *Diversity* (2021). [DOI: 10.3390/d13110575](https://doi.org/10.3390/d13110575)

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