Too often forest restoration efforts are failing because of the lack of diversity and genetic quality of planting material.

**The challenge**

Tree-based restoration of degraded areas is a global priority. An important but often overlooked aspect of ensuring the success of restoration projects, relates to the selection of appropriate forest reproductive material (FRM), at least for active restoration activities that involve tree planting. As a minimum condition, FRM should be selected to (i) correspond to the restoration objectives; (ii) be well adapted to survive and thrive under the degraded site conditions; and (iii) have sufficient genetic diversity to ensure the potential to adapt to changing conditions in the future. However, today, many if not most restoration projects in the Tropics are opportunistic in the way they select and collect FRM, using material that is easily available, but often of poor quality, putting at risk long-term success.

**Our solution**

As most restoration practitioners lack the capacity to plan adequately for the selection of species and seed sources that best respond to the restoration goals, while enhancing resilience against climate change and other stress factors, the development and use of user-friendly knowledge-based tools and protocols should be promoted. Using seasonally dry tropical forest in Colombia as a model, here we present a scalable map-based tool, which is intended to assist restoration practitioners with the identification of appropriate tree species and sources of FRM.

Decision-making combines information on (i) suitability modeling under current and future climate conditions; (ii) the intended objectives of the forest under restoration; (iii) locally prevailing stress conditions; (iv) functional trait diversity of tree species; and (v) the genetic quality of FRM. To the best of our knowledge, this is the first attempt worldwide to integrate all these aspects in one single tool. In the selection of tree species priority is given to more than 300 species for which information about its propagation is available, which will be compiled in an illustrated book that will be available in physical and digital format. Acknowledging that restoration has different, audience-specific meanings and interpretations, our tool is intended to support the decision-making of anyone interested in planting trees on land that is suitable for seasonally dry tropical forest for whichever purpose.

**Results**

The tool can be consulted online at [www.retool.org](http://www.retool.org) and its applicability is currently being field-tested to restore seasonally dry tropical forest in the biodiversity compensation area of the largest hydroelectric power dam in Colombia.

**Potential for impact**

We are exploring opportunities for scaling out to other ecosystems and countries around the world. At present we are developing a similar tool for seasonally dry tropical forests in Peru.
RESTORATION DECISION-SUPPORT TOOL FOR THE SELECTION OF MOST APPROPRIATE TREE PLANTING MATERIAL

Seasonally dry tropical forest in Colombia as a model

1. Suitability modeling to assess species’ adaptive potential under current and future climate conditions

A list of all possible tree species with known propagation protocols and habitat suitability under current and future climate for any given area.

2. Functional and other traits for selection of tree species that are best-matched to restoration goals and site-specific stress conditions

Different options of species combinations
- Prioritize species with functional traits that correspond best with restoration objectives and have adaptive potential to stress conditions at planting sites
- Maximize niche complementarity for other traits.

3. Ensuring the genetic quality of planting material and recommendation on best practices for collecting seeds

3.1. Promote site-adaptedness and adaptability of planting material, anticipating expected alterations of habitat conditions in light of climate change

3.2. Ensure genetic diversity: of planting material; source populations should be large, and seeds should be obtained from a high number of (>30–60) mother trees

3.3. Seed provision: List of seed providers (nurseries, small-scale farmers, private land owners, indigenous and local communities, protected areas...)

References and further reading


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