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STABLE FORESTS ARE AN UNDER-RECOGNIZED SOLUTION TO CLIMATE CHANGE

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Quick challenge—picture a solution to climate change. What's the first thing that comes to mind? Maybe you envisioned a solar panel, a wind turbine, or another clean energy technology. Perhaps an electric car or other zero-emissions vehicle. If you're an Earth Innovation reader, there's a good chance you thought of a natural climate solution like planting a tree or keeping a forest standing in the face of threats. I'm guessing you didn't think of a mature forest that isn't facing imminent threat of deforestation. But as it turns out, even "stable forests" are an important and under-recognized solution to climate change, as explained in a new paper in *Climate Policy* written by Jason Funk, Naikoa Aguila-Amuchastegui, and other co-authors convened by WWF (including me). Although conserving stable forests may be secondary to reducing deforestation and promoting reforestation, more can be done to reduce risks to stable forests and their carbon stocks than is commonly appreciated. And while stable forests can't solve climate change on their own—indeed no single solution can—they merit a larger share of scientific, policy, and funding attention than they currently receive. **The climate benefits of stable forests** Stable forests are defined in the paper as forests that "are not already significantly disturbed nor facing predictable near-term risks of anthropogenic disturbance." This cuts across categories of ownership and management. It can include, for example, forests inside of officially protected areas; unowned or state-owned forests that are passively protected from deforestation by their remoteness; forests in indigenous territories; forests licensed for timber production but not yet subjected to logging; or even forests in areas once dominated by people that have long since been allowed to regrow. This type of forest provides enormous climate benefits. Stable forests make up a large portion of total global carbon storage in forests, which is around 861 billion tons of solid carbon (C) in tree trunks, branches, and foliage. If all that burned, the carbon dioxide released would be equivalent to seventy years-worth of current global greenhouse gas emissions. And that's even before considering the additional carbon forests store belowground and in soils. Carbon dioxide flows between stable forests and the atmosphere had once been thought to be in equilibrium, with a rough balance between emissions from natural tree deaths and sequestrations through forest regrowth. But recent research finds that on net, mature forests are in fact removing carbon from the atmosphere in substantial quantities. Mature forests in the Amazon alone absorbed 1.6 billion tons of carbon dioxide every year between 1980-2010, according to one recent study—almost three times as

much as fossil fuel emissions from the nine Amazon countries over the same time period. **Stable forests: a carbon sink at risk** It is tempting to think that just because stable forests aren't facing immediate threat of being cleared (deforestation) or thinned (degradation), they're safe in perpetuity and in little need of policy and funding attention. But in fact stable forests face a variety of risks and the long-term continuation of their important carbon sink is not guaranteed. For one thing, stable forests may be at risk of deforestation and degradation in the future, even if that risk is difficult to precisely quantify today. In areas that are fully forested, deforestation tends to begin slowly then accelerate rapidly. For another thing, stable forests can be affected by what happens at active frontiers of deforestation. Deforestation at the forest edge can lead to amplifying feedbacks in the interior through edge effects or savannization. Conversely, efforts to curb deforestation at its frontier have the potential to shift pressure into stable forests elsewhere (leakage). Threats to stable forests and their carbon stocks extend well beyond deforestation and degradation. These threats include defaunation (in which the elimination of large seed-dispersing animals hinders the reproduction of tree species), introduction of exotic tree species, droughts, pests and disease, potentially exacerbated by climate change. Stable forests can be threatened by increasing fires where they are naturally rare, or ill-conceived attempts to suppress fire where they are naturally common. Forests can also be damaged by sulfur dioxide, nitrogen oxides, and other pollutants carried in by the wind from distant human areas. Even when the human fingerprint of these threats is indirect, human interventions have the potential to reduce these threats or prevent them entirely. Furthermore, protecting stable forests provides more benefits than just fighting climate change. Stable forests are treasure houses of imperiled biological diversity, and support development goals spanning clean water, health, energy, and agriculture. For example, stable forests in the Brazilian Amazon generate rainfall to the benefit of downwind forests, farmers, and hydroelectric dams. **Protecting stable forests** So how can people ensure that the climate benefits provided by stable forests endure? The paper offers several ideas. First, there is still much to learn when it comes to understanding and detecting changes in carbon dioxide flows in stable forests. These changes tend to be relatively small, spread over vast areas, and have a low ratio of signal-to-noise. Increased scientific research and technological innovation in measuring the carbon dioxide flows to and from stable forests would help better quantify their contribution to climate stability. This ought to be paired with improved forest monitoring to detect and anticipate emerging threats to stable forests. Second, public policies and management practices should pay greater attention to stable forests. As mentioned above, this extends beyond attention to active deforestation and degradation to threats of defaunation, pests, disease, fires, and airborne pollution. The WWF-led paper recommends broader sustainable landscape

management plans, citing as an illustrative example the Amazon Region Protected Areas Program (ARPA). The "jurisdictional approach" championed by Earth Innovation Institute and others provides a holistic framework for protecting stable forests. Third, more funding resources should be brought to bear conserving stable forests. The Paris Climate Agreement, in which signatory countries reaffirmed their commitment to "take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases," offers a potential vehicle. The international funding program for reducing emissions from deforestation and forest degradation, REDD+, includes conservation, sustainable management, and enhancement of forest carbon stocks. Parties to the UNFCCC could further clarify how protection of stable forests can fit within the "plus" in REDD+. **Part of a portfolio** Despite the climate importance of stable forests, far more scientific, policy, and funding attention has gone to preventing forests from going up in smoke (avoiding deforestation and degradation) and bringing back forests to places they used to be (promoting reforestation). That's not without reason, as explained in the paper. These activities have better data and more certain science than stable forests. They are often perceived as addressing higher-priority areas at greater risk. And they fit neatly into the tons-of-carbon-dioxide-per-year framework of carbon finance in a way that stable forests do not. The paper doesn't argue that attention to stable forests should come by diverting attention from these other activities. Rather, stable forests should be part of a portfolio that relies heavily on avoiding deforestation and promoting reforestation. And ideally the share of that portfolio going to stable forests should grow over time as success is achieved on the other two fronts. But currently, stable forests are an under-recognized opportunity to help stabilize the climate. Attention to stable forests has plenty of room to grow. *Read the paper:* Funk, J.M., Aguilar-Amuchastegui, N., Baldwin-Cantello, W., Busch, J., Chuvasov, E., Evans, T., Griffin, B., Harris, N., Napolitano Ferreira, M., Petersen, K., Phillips, O., Soares, M.G., van der Hoff, R.J.A. (2019). "Securing the climate benefits of stable forests." *Climate Policy.* DOI: 10.1080/14693062.2019.1598838.