

It seems clear that in some form, carbon removal is going to be an important component of climate policy, especially later in the century to deal with carbon levels that overshoot the targets in the Paris Climate Agreement. The problem is not with the concept but with its misuse. One of the risks that comes with such good ideas is that they provide cover for poorly conceived and badly executed policies. A trio of recent articles in the leading research journal *Science* highlights that risk.

The most recent article of the three focuses on a specific carbon removal strategy, forest restoration. Forest restoration seems like an unambiguously good idea. It promises to undo the damage to ecology and the climate done by logging and other human activities. The problem is not with the basic idea but with its implementation. In this February 10 [article](#), a group of English and South African researchers examine an initiative called AFR100. This initiative seeks to reforest 100 million acres in Africa. Thirty-five countries have pledged 133 million hectares (329 million acres), an area almost twice as big as Texas.

That sounds terrific. But appearances can be deceiving. Eight of the countries actually have no forested areas at all, and other countries are promising to restore forest acreage well in excess of their actual forested lands. In addition, not all forests are in need of restoration. Altogether, researchers estimate, only about half of the pledged lands actually qualify for forest restoration. The other half of the lands would be forested for the first time, potentially eliminating savannah and other intact ecosystems. And of course, mass tree planting may not be successful: there could be good reasons why forests are not already present in those areas.

The other two articles focus more broadly on CO<sub>2</sub> removal as a mitigation strategy. A [article](#) in November spotlighted how much some countries are counting on carbon removal in their climate strategies. Wealthy countries are relying on over 2 billion tons of carbon removal — 18% of current emissions. About a quarter of the long-term climate plans submitted to the UNFCCC rely on burning biomass and capturing the carbon, and 13% rely on direct air capture as an option, while admitting that neither is yet feasible.

There could also be other serious problems with implementation, including the possibility that carbon removal might not be permanent and that deployment may have other serious problems, such as ecological impacts. Relying on techniques that may turn out not to work, at least at the projected scale, would then require heroic efforts to cut emissions overnight in order to compensate — at best a very costly response, and one that might not be feasible.

A February 2 [article](#) shows that such issues are not limited to forest restoration. The researchers hail from Australia, England, France, Germany, and the U.S. — a truly international team. They focus on nature-based solutions like reforestation and on burning biofuels with carbon capture. Those strategies are heavily emphasized in national climate plans. The researchers agree that restoring degraded ecosystems is an attractive strategy, but they raise important concerns about the sustainable scale for other approaches. Taking into account issues such as food security, ecological impacts, Indigenous rights, and water availability, they estimates that low- and medium-risk strategies could produce around eight billion tons of carbon removal globally — less than the amount of carbon removal that rich countries alone are counting on.

Carbon removal clearly has important potential. But as these articles show, over-reliance on carbon removal methods such as forest restoration poses real risks. They may not work at the scale that countries are predicting, and overly aggressive implementation could pose serious costs. Carbon removal is well and good, but it should not distract us from the urgent need for emissions reductions.