

Turning down the heat: on forest restoration

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During the run-up to the Paris climate change meeting in 2015 (COP-21) under the United Nations Framework Convention on Climate Change, each country decided the level and kind of effort it would undertake to solve the global problem of climate change. These actions were later referred to as nationally determined contributions (NDCs).

India made a number of promises that would lead to the reduction of greenhouse gas emissions, or mitigation, and actions to adapt to living in a warmer world, or adaptation. Many of its described programmes and plans were intended to enable India to move to a climate-friendly sustainable development pathway. Primarily, by 2030, there will be reductions in the emissions intensity of the GDP by about a third and a total of 40% of the installed capacity for electricity will be from non-fossil fuel sources. India also promised an additional carbon sink — a means to absorb carbon dioxide from the atmosphere — of 2.5 to 3 billion tonnes of carbon dioxide equivalent through additional forest and tree cover by the year 2030. Trees and other vegetation fix carbon as part of photosynthesis and soil too holds organic carbon from plants and animals. The amount of soil carbon varies with land management practices, farming methods, soil nutrition and temperature.

Enhancing green cover

India has yet to determine how its carbon sink objectives can be met. In a recent study, the Forest Survey of India (FSI) has estimated, along with the costs involved, the opportunities and potential actions for additional forest and tree cover to meet the NDC target. Given that forest and green cover already show a gradual increase in recent years, one might use this increase as part of the contribution towards the NDC. Or one might think of the additional 2.5-3 billion tonnes of CO₂ equivalent sink as having to be above the background or business-as-usual increase.

The additional increase in carbon sinks, as recommended in this report, is to be achieved by the following ways: restoring impaired and open forests; afforesting wastelands; agro-forestry; through green corridors, plantations along railways, canals, other roads, on railway sidings and rivers; and via urban green spaces. Close to three quarters of the increase (72.3 %) will be by restoring forests and afforestation on wastelands, with a modest rise in total green cover.

The FSI study has three scenarios, representing different levels of increase in forest and tree cover. For example, 50%, 60% or 70% of impaired forests could be restored. The total increase in the carbon sink in these scenarios could be 1.63, 2.51 or 3.39 billion tonnes of CO₂ equivalent by 2030, at costs varying from about ₹1.14 to ₹2.46 lakh crore. These figures show that the policy has to be at least at a medium level of increase to attain the stated NDC targets.

Natural forests

A recent study in *Nature* by Simon Lewis and colleagues provides insights into what works well with regard to green cover. Locking up the carbon from the atmosphere in trees, ground vegetation and soils is one of the safest ways with which to remove carbon. If done correctly, the green cover increase will provide many other benefits: it will improve water quality, store water in wetlands, prevent soil erosion, protect biodiversity, and potentially provide new jobs. The authors estimate that allowing land to be converted into forests naturally will sequester 42 times the carbon compared to land converted to plantation, or six times for land converted to agroforestry.

Another study in *Science* by Jean-François Bastin and colleagues estimates that it is possible to add 0.9 billion hectares of canopy cover worldwide, potentially mitigating up to two-thirds of historical greenhouse gas emissions. This would then prevent or delay the worst impacts from climate change.

Restoration type is key

Taken together, these studies indicate that while there is enormous potential in mitigating climate change through forest restoration, the amount of carbon stored depends on the type of forest restoration carried out. The most effective way is through natural forest regeneration with appropriate institutions to facilitate the process. Vast monocultures of plantations are being proposed in some countries, including in India, but these hold very little carbon; when they are harvested, carbon is released as the wood is burned.

Besides, some of the trees selected for the plantations may rely on aquifers whose water becomes more and more precious with greater warming. Such forms of green cover, therefore, do not mitigate climate change and also do not improve biodiversity or provide related benefits. India, therefore, needs first to ensure that deforestation is curtailed to the maximum extent. Second, the area allocated to the restoration of impaired and open forests and wastelands in the FSI report should be focussed entirely on natural forests and agroforestry.

While using a carbon lens to view forests has potential dangers, involving local people and planting indigenous tree varieties would also reduce likely difficulties. Instead of plantations, growing food forests managed by local communities would have additional co-benefits. Once natural forests are established, they need to be protected. Protecting and nurturing public lands while preventing their private enclosure is therefore paramount. Active forest management by local people has a long history in India and needs to expand to meet climate, environment and social justice goals.

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