POLICY BRIEF

NATURE RESTORATION IS NO SUBSTITUTE FOR STEEP EMISSION REDUCTIONS

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FOSSIL FUEL NON-PROLIFERATION TREATY

IN SUMMARY

As the window to prevent catastrophic climate change becomes increasingly smaller, corporations and governments worldwide are looking to nature as a potential mechanism for removing greenhouse gas emissions from the atmosphere. However, while nature restoration activities such as tree planting or reforestation are crucial to planetary health, their capacity as a carbon sink can neither detract nor compensate for the need of steep fossil fuel emission reductions. A study led by University of Melbourne researchers Dr Kate Dooley, Dr Zebedee Nicholls and Dr Malte Meinshausen reveals that, while nature restoration could remove only 100 GtC between now and 2100, current government policies would see us release about 650 GtC in that same time period.

Nature restoration is an important solution for the climate toolbox

Industrial development over the past several centuries has caused significant environmental degradation, and this is undermining the future development opportunities and prosperity, considering natural resources are the base for the growth and development. It has been pointed out that half of the world's GDP is highly or moderately dependent on nature. For every dollar spent on nature restoration activities, at least $30 of economic benefits can be reaped[1]. Further, in the context of the deep emissions reduction required to limit average global temperature rise to 1.5C, the fossil fuel industry, other corporations and governments around the world have looked to nature-based solutions for withdrawing greenhouse gas emissions from the atmosphere.

This has led to calls for the restoration of nature and reforestation to fight against climate change. In 2020, the World Economic Forum launched the One Trillion Trees initiative[2], with a vision to grow, restore and conserve 1 trillion trees around the world. A similar initiative led by three of the world's largest conservation organisations – WWF, Birdlife International and the Wildlife Conservation Society - aims to restore, conserve and protect a trillion trees around the world by 2050[3].

1. https://wedocs.unep.org/bitstream/handle/20.500.11822/36251/ERPNC.pdf
2. https://www.weforum.org/agenda/2020/01/one-trillion-trees-world-economic-forum-launches-plan-to-help-nature-and-the-climate/
3. https://www.wwf.org.uk/what-we-do/projects/trillion-trees-venture-saving-our-trees

But nature restoration alone will not help us meet our global emissions target

While nature has a vital role to play in addressing change, 'nature restoration' activities have a limited capacity to limit global temperature rise. The recent University of Melbourne paper 'Carbon removals from nature restoration are no substitute for steep emission reductions' demonstrates that nature restoration is critical for responding to global crises like climate and biodiversity but cannot be a substitute for ending emissions from fossil fuels, which have been responsible for about 86% of carbon emissions in the past decade alone[4].

Carbon reduction from nature restoration could lower peak global temperatures by 0.01°C, and lead to average global temperatures in 2100 being 0.1°C lower than without nature restoration. With current policies putting the world on pace for roughly 3°C of warming by 2100, this would see temperatures peaking at 2.99°C, and falling to 2.9°C at the end of the century. This brings the planet nowhere close to the 1.5°C goal prescribed by the Paris Agreement.

In terms of emissions, nature restoration could remove 100 GtC between now and 2100 while current government policies would see us release 650 GtC in that same time period. This suggests that nature restoration could offset only 15% of 'planned' emissions with no recourse for the remaining 85%.

The paper is based on a model which analysed five ecosystem restoration pathways: forest restoration, reduced forest harvest, reforestation, agroforestry and silvopasture. Each of these five pathways were identified as aligning with the principles of responsible development, that is, not causing harm to food systems, and protecting biodiversity, the rights of Indigenous people and human rights. Approaches which degrade nature, such as monoculture tree plantations, were excluded. The study prioritised interventions that enhanced food production and biodiversity while also increasing carbon storage.

4.https://static1.squarespace.com/static/5dd3cc5b7fd99372fbb04561/t/629621606337cb2779a632f9/1654006125016/FFN_MVSA003+Report+-+Fossil+Fuels+vs.+the+Sustainable+Development+Goals_V4-FA-Screen-Single.pdf

Nature restoration alone cannot deliver results at the speed or scale required to offset current fossil fuel emissions and their projected growth

Nature restoration is beneficial beyond removing or reducing carbon emissions. It also offers positive externalities in terms of protecting biodiversity, preserving scenic beauty and conserving other natural resources. However, certain limitations and risks are associated with nature restoration. Most prominently, the time delay or phase-in period required for restored land areas to reach CO2 removal potential equivalent to old forests. The study estimated that the peak warming is expected to occur within the next 10–20 years, and the removals via land sequestration during peak warming do not strongly affect the peak temperature due to the lag time of approximately 20 years between land-management interventions and carbon removals. However, the land management interventions do contribute to a temperature decline, on the order of 0.1°C only, by the end of the century.

It is also found that global regions matter, as different ecosystems[5] have different capacities to absorb carbon. Moreover, the choice of species composition selected for the restoration also plays a vital role. Historically, reforestation efforts have only chosen commercial species, which can reduce long term carbon sequestration and storage as compared to a greater diversity of native species.

In all, the paper demonstrates that even if ecosystem restoration options are undertaken that do result in carbon removals, it will not be nearly enough on its own to combat climate change without contribution from certain low carbon technologies and a transition away from fossil fuels to limit warming around 1.5°C, the climate goal.

The paper concludes that **land-based removals are no substitute for avoiding emissions or reducing fossil fuel emissions.**

Primary forests and other intact ecosystems are irreplaceable for sustaining biodiversity. Without ending forest loss, the ongoing emissions from deforestation will counteract any benefits from increased sequestration. In all, ending loss and degradation of primary forests is more important and crucial to climate mitigation strategies than increasing carbon removals by planting natural regrowth forests.

5. Higher rates of sequestration are seen in Asia, Latin America, and Africa, where tropical biomes see higher net primary productivity.

WE NEED STEEPER AND MORE REDUCTIONS IN FOSSIL FUEL BASED EMISSIONS

While nature restoration projects are an important tool in the climate mitigation toolkit, big fossil fuel companies have placed significant attention on nature-based greenhouse gas emissions removals in an effort to justify continued fossil fuel production. It may appear to be an escape route for the industry that is driving most of the emissions that are entering the atmosphere. Other research has also suggested that 90% of rainforest carbon offsets do not represent genuine carbon reductions.

The latest science makes clear the need for strong emission reductions to begin as quickly as possible in order to pursue emission trajectories without large additional mitigation costs, e.g., due to the near-term decommissioning of recently built fossil fuel infrastructure. In this context, the paper demonstrates that the scale of carbon dioxide removals achieved via ecosystem restoration is sufficient to be compatible with the 1.5°C pathway but only when coupled with the most ambitious deep-decarbonization scenarios.

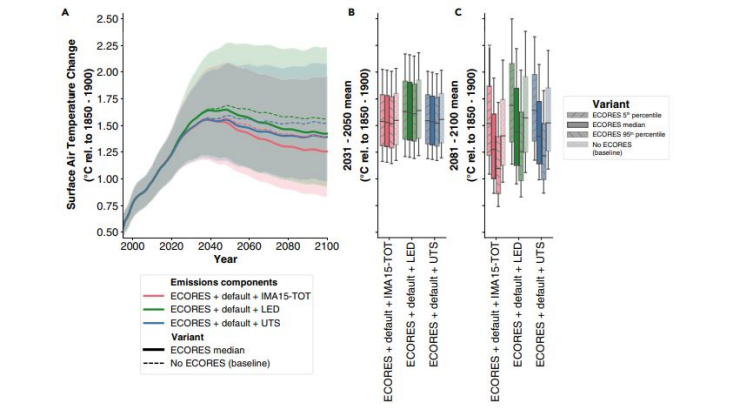

Figure 3. Temperature pathway for RESTORE scenario

(A) Removals from ECORES are combined with emissions from default land-use baseline and three different decarbonization scenarios. In all cases, median temperature briefly exceeds 1.5°C before declining to between 1.25°C and 1.5°C by 2100. The solid line depicts the median, while the shaded areas show the 5th–95th percentile range. The dashed lines depict the projections when no ECORES solutions are included in the scenario (no shaded area, only median output shown). (B and C) There is little difference in temperature impacts for the 2031–2050 mean (approximately the time of peak global temperature) over the range of removal estimates (B). Also shown are 2081–2100, i.e., end-of-century temperatures, highlighting that the uncertainty from our removals translates into an ~0.5°C difference in end-of-century temperatures (C). The solid black line shows the median, the boxes show the 17th–83rd percentiles, and the whiskers show the 5th–95th percentiles.

In order to meet our emissions target and ultimately stay within the 1.5C goal prescribed by the Paris Agreement, the study calls for coupling deep decarbonization scenarios of prompt reductions in fossil fuel emissions by 85%–98% with nature restoration. This would bring peak temperatures to 1.5°C before declining to between 1.25°C and 1.5°C by 2100. This would manifest as a steep and rapid reduction in fossil fuel emissions before 2030 and global net-zero emissions by 2050.

HALTING DEFORESTATION IS AN IMPORTANT SOLUTION TO GLOBAL WARMING

Reducing land use emissions by halting deforestation also contributes to reducing temperatures, but only slightly. Halting deforestation by 2030 in comparison to ongoing land-use and land-use-change emissions over the century (the default baseline used in the study) has little impact on peak temperature (mid-century) but reduces warming over the century by approximately 0.08℃. Together, halting deforestation emissions and increasing carbon storage through ecosystem restoration makes a relatively small contribution to reducing warming over the century compared to halting fossil fuel use, but brings significant ecological benefits.

Socio-ecological costs of ecosystem restoration pathways

The decisions on ecosystem restoration are also hindered by certain socio-ecological costs. Any proposal to halt deforestation relies on minimal to no future expansion in agricultural land, the leading driver of forest loss. It should be noted that restoration efforts do not conflict with growing demands for food production. Also, the collective tenure systems and land rights should also be respected while conserving intact forests and ecosystems.

CONCLUSION

While nature restoration is an important climate solution, it is not an alternative to steep decarbonization which would ultimately require the phasing out of fossil fuels. Both need to be implemented swiftly and tactfully. The research from the University of Melbourne makes clear that ecosystem restoration options, when done socially and ecologically responsibly, can make a long-term contribution to reducing warming over the century by approx. 0.1℃, but makes little difference to peak temperature given that realizing any form of land-based carbon removals takes decades.

Overall, to limit warming to 1.5℃, land management is cannot be a solution in isolation. For scale and impact, there must be steep emissions reductions and a phase out of fossil fuels.

Find out more at

FossilFuelTreaty.org

This policy briefing is based on the following paper: Dooley, K., Nicholls, Z., & Meinshausen, M (2022). ***Carbon removals from nature restoration are no substitute for steep emission reductions****. One Earth, 14. https://doi.org/10.1016/j.oneear.2022.06.002*