LETTERS

Dense tree plantations are vulnerable to wildfires, as shown by this pine and spruce forest in Sweden, which burned in a 2014 megafire.

Edited by **Jennifer Sills**

Tree planting goals must account for wildfires

Grassroots movements such as the Trillion Tree Campaign (*1*) and international policies such as the EU Biodiversity Strategy for 2030 (*2*) aim to mitigate climate change through ambitious tree planting objectives. However, tree planting targets could produce counterproductive side effects (*3*), including an increase in the amount and continuity of fuels, a key driver of large fires in a warming world (*4*, *5*). Drier weather, coupled with afforestation dominated by extensive, dense, even-aged, monospecific conifer or eucalypt plantations, has already promoted megafires in places like Chile and Portugal (*6*), and burnt areas are more likely to reburn when postfire management includes extensive reforestation instead of natural regrowth (*7*). Reforestation programs should prioritize the mitigation of fire risks.

Strategies to combat climate change through tree planting—whether through plantations or through restoring native vegetation—should address how the changes in composition and configuration of landscapes can affect fire propagation. Plans should favor landscape mosaics, heterogeneous and fragmented stands rather than large and homogeneous ones, vertical vegetation discontinuities that prevent surface fires from spreading to crowns, high species diversity, low-flammability species, and low plant densities throughout the life span of planted trees (*8*). In addition, decisions about which tree species to plant should prioritize natural resilience to future fires, which are likely to occur at large spatial and temporal scales under warming conditions (*9*). In many places, native resprouting species would meet these criteria.

Many ongoing land management efforts aim to help adapt ecosystems to climate change by selecting species adapted to projected future climate (*10*). Preparing for the likely increases in frequency, severity, and extent of future wildfires is at least as important. Rather than targeting a specific number of trees, reforestation programs should account for factors like the potential for the planted trees to capture carbon in the long term, considering the influence of feedbacks between planting and altered fire patterns (*5*). Revegetation that does not consider these processes may accentuate the risk of megafires and thereby abruptly release large amounts of carbon, reduce vegetation cover, and increase the risk of ecosystem collapse.

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Adapt biodiversity targets to climate change

Although the climate crisis is interrelated with biodiversity loss, the decade-old targets of the Convention on Biological Diversity (CBD) have barely addressed climate change impacts (*1*). So far, the post-2020 global biodiversity framework continues to miss opportunities: The first draft, released in July 2021 (*2*), overlooks climate-biodiversity interactions and provides no explicit solutions to anticipate climate change–related risks. These issues persist after the latest input of scientific experts (*3*, *4*). A post-2020 global biodiversity framework needs to include adaptation, not just mitigation, to achieve biodiversity goals by 2050.

Climate impacts (such as habitat fragmentation and ecological disruption) will escalate and interact with other destruction drivers (such as land degradation and overexploitation) to constrain ecosystems' integrity and functioning, which will threaten species survival globally (*5*). Disregarding these scenarios [as in table 1 and figure 1.1 in (*3*)] will likely compromise the CBD's efforts to pursue ambitious targets (e.g., protecting 30% of Earth's surface by 2030) and to expand conservation dimensions by finally safeguarding genetic diversity. To make targets climate-resilient, forward-looking strategies need to be developed. Primarily, the expansion of protected areas (target 3) should prioritize sites that can act as climate buffers, where pressures on species and ecosystems will be slowed down (*6*), and account for the adaptive genetic variation that can help species to cope with ongoing climatic and landscape alterations (*7*). Likewise, the functional

OUTSIDE THE TOWER

Air quality education in public schools

We began our first lesson on clean air as a virtual meeting in May 2021, with more than 350 fifth to eighth graders and six public school teachers on the screen. Most of the students appeared as black boxes, but as we proceeded, they began to turn on their cameras to ask questions. "If I use scented candles or air fresheners, does that increase air pollution?" one asked. We explained that these examples are indeed sources of particulate matter, which can be harmful if inhaled. Later, we discussed possible pollution mitigation strategies. Although systemic solutions are needed to curb the pollution produced by industry and traffic, carpooling, walking to school, and creating "no idling zones" can all make a difference at the local level. The students were inspired to help and debated the merits of various ways to improve air quality in their schools and homes.

The Clean Air Outreach Project's goal is to increase scientific understanding and promote long-term behavioral changes related to environmental sustainability. We worked with teachers to align our presentation to the curriculum, encouraged them to enhance the atmospheric chemistry content in their science lesson plans, and developed hands-on lab experiments. In the fall of 2021, we brought the program to schools, some of which were located near low-cost air quality multisensor pods installed by our group. To take advantage of the community-specific data, one teacher suggested displaying the air quality dashboard on the televisions in the school hallways. The school hoped to use the information to inform decisions about air quality goals and interventions.

Call for submissions
Outside the Tower is an occasional feature highlighting scientists' advocacy experiences. Submit your advocacy story at http://cts.sciencemag.org.

We were inspired to share our knowledge about air pollution after seeing the global improvement in air quality during the COVID-19 lockdowns. Even though the Waterloo area is ranked the third-fastest-growing region in Canada, it has only one air quality monitoring station. Increased traffic and other sources of pollution disproportionately affect sites that are not well monitored. Because children are vulnerable to the impacts of poor air quality, we wanted to target our outreach to them. We hope that our all-female university-level air quality team of first-generation Canadians will empower these students not only to do what they can to limit air pollution but also to consider following in our footsteps by pursuing careers in science.

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An air quality multisensor pod installed by the authors can provide data to local schools.

PHOTO: HIND A. AL-ABADLEH

connectivity of protected networks (milestone A.1) should establish climatic corridors that can ensure species' access to analogous future habitats (*8*). These strategies should incorporate measurable indicators to support their effective implementation and monitoring.

Policy-makers face a crucial year to make a meaningful and lasting impact on biodiversity conservation (*9*). The CBD's experts will meet again in June to provide their final recommendations to the post-2020 global biodiversity framework. We call on the experts to advocate for a preventive biodiversity agenda that for once gets ahead of the climate crisis.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Discovery of davemaoite, $CaSiO_3$-perovskite, as a mineral from the lower mantle"

Michael J. Walter, Simon C. Kohn, D. Graham Pearson, Steven B. Shirey, Laura Speich, Thomas Stachel, Andrew R. Thomson, Jing Yang

Tschauner *et al*. (Report, 12 November 2021, p. 891) present evidence that diamond GRR-1507 formed in the lower mantle. Instead, the data support a much shallower origin in cold, subcratonic lithospheric mantle. X-ray diffraction data are well matched to phases common in microinclusion-bearing lithospheric diamonds. The calculated bulk inclusion composition is too imprecise to uniquely confirm $CaSiO_3$ stoichiometry and is equally consistent with inclusions observed in other lithospheric diamonds.

Full text: dx.doi.org/10.1126/science.abo0882

Response to Comment on "Discovery of davemaoite, $CaSiO_3$-perovskite, as a mineral from the lower mantle"

Oliver Tschauner, Shichun Huang, Munir Humayun, Wenjun Liu, George R. Rossman

Walter *et al*. issue a number of critical comments on our Report about the discovery of davemaoite to the end that they believe to show that our results do not provide compelling evidence for the presence of davemaoite in the type specimen and that the hosting diamond had formed in the lithosphere. Their claim is based on a misinterpretation of the diffraction data contained in the paper, an insufficient analysis of the compositional data that disregards the three-dimensional distribution of inclusions, and the arbitrary assumption that Earth's mantle shows no lateral variations in temperature, inconsistent with state-of-the-art assessments of mantle temperature variations and with their own published results.

Full text: dx.doi.org/10.1126/science.abo2029

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Air quality education in public schools

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