

The Land Gap Report

The total area of land needed to meet projected biological carbon removal in national climate pledges is almost 1.2 billion hectares – equivalent to current global cropland. Countries' climate pledges rely on unrealistic amounts of land-based carbon removal.

More than half of the total land area pledged for carbon removal – 633 million hectares – involves reforestation, putting potential pressure on ecosystems, food security and indigenous peoples' rights. Restoring degraded lands and ecosystems account for 551 million hectares pledged.

Current 'net accounting' methods assume that planting new trees offsets fossil fuel emissions or the destruction of primary forest, but this ignores scientific and ecological principles.

Evidence shows that indigenous peoples and local communities with secure land rights vastly outperform both governments and private landholders in preventing deforestation, conserving biodiversity, and producing food sustainably.

Agroecology promotes socioecological resilience by restoring ecosystem functions and services through biologically diverse agricultural and food systems, also a key approach to the realization of human rights in the context of climate change.

This report examines the area of land required to meet projected biological carbon removal in national climate pledges and commitments. We find that almost 1.2 billion hectares (ha) of land – close to the extent of current global cropland – are required to meet these pledges.

This finding shows that countries' climate pledges rely on unrealistic amounts of land-based carbon removal, which cannot be achieved without significant negative impacts on livelihoods, land rights, food production and ecosystems. For example, over half of this area (633 million ha) requires a land-use change to achieve the projected carbon removal, with the potential to displace food production including sustainable livelihoods for many smallholder farmers. Slightly less than half (551 million ha) would restore degraded ecosystems.

These findings suggest that countries need to reduce their reliance on land-based carbon removal in favour of stepping up emissions reductions from all sectors and prioritizing ecosystem-based approaches to restoration. We recommend that countries address four interlinked issues related to the use of land in their national climate pledges: (i) greater clarity over assumptions made about the extent, use and ownership of land in national climate pledges; (ii) prioritizing the protection of primary ecosystems over tree planting efforts, since the latter's mitigation benefits are negligible in the current critical response decade; (iii) ensuring that land-based climate mitigation measures build on and strengthen the rights of indigenous peoples,

other human rights, livelihoods, and food sovereignty, and (iv) promote multifunctional strategies, such as agroecology, that contribute to socioecological resilience while supporting the realization of various human rights.

The land gap

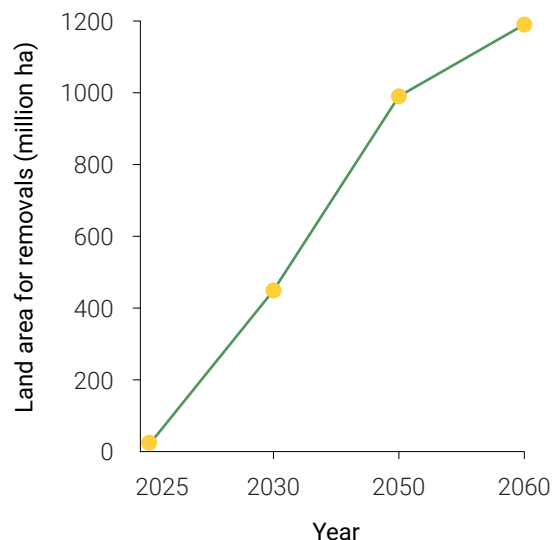
The growing momentum for climate mitigation has given rise to a new urgency around safeguarding the sustainability of ecosystems, land use and social justice. Net zero pledges by country Parties to the United Nations Framework Convention on Climate Change (UNFCCC) already cover 83 percent of global greenhouse gas (GHG) emissions, and additional pledges are coming from non-state actors, including the private sector. This climate mitigation momentum is crucial to keep global warming within the temperature goal of the Paris Agreement.

However, these pledges, collectively geared towards net zero, often rely on land-based carbon dioxide removals (CDR), which are then used to offset a theoretically equivalent amount of fossil fuel emissions in national greenhouse gas inventories. The much-needed momentum on climate action also raises serious concerns if the mitigation burden is shifted away from reducing fossil fuel emissions and onto land, local communities and ecosystems.

While other 'Gap' reports describe a gap between mitigation ambition and the emissions reductions needed to meet Paris

Carbon dioxide removal in national climate pledges

Countries' climate pledges rely on 451 million ha of land for carbon removals by 2030, another 533 million hectares by 2050, and another 200 million ha is pledged from one country for 2060. This reliance on land can be expected to increase as more countries make longer-term pledges.



Agreement goals, this report demonstrates the gap between governments' over-reliance on land for carbon mitigation purposes and the more limited role that land can play to meet competing needs, including CDR.

The Land Gap Report shows how countries' climate pledges, if implemented, will increase these competing demands made on land. The report quantifies the aggregate demand for land-based mitigation in the climate pledges submitted by Parties to the UNFCCC. A key finding is that countries' climate pledges would require almost 1.2 billion hectares of land to be prioritized for carbon dioxide removal. This land area is larger than the United States of America (983 million ha), and almost four times the area of India (329 million ha). Even more concerning is that over half of the land needed to fulfill climate mitigation pledges – 633 million ha – requires a land-use change through plantations and establishing new areas devoted exclusively to forests, which will compromise the rights of indigenous peoples, other human rights, livelihoods and food sovereignty (including the ability of local communities and smallholder farmers to feed themselves). Furthermore, the carbon removals achieved through plantations, afforestation and reforestation, will take a long time and hence

not be sufficient in the next critical decade to contribute very much to limit peak global warming.

The other half of the 1.2 billion ha for carbon removal – 551 million ha – includes activities to restore degraded lands, including agroforestry, reduced harvest and regenerating degraded forests. This approach of seeking to maintain and augment carbon stocks in existing ecosystems holds more promise for climate and biodiversity and poses fewer threats to other dimensions of sustainability. However, the potential area available for expanding forest cover is uncertain and depends on restoration approaches which respect human rights and focus on the restoration of ecosystem function. Improved governance and stewardship of land and territories focused on these goals is sorely needed to achieve multiple inter-related objectives.

These findings have implications for governments' approach to land-based climate mitigation objectives, including carbon accounting, biodiversity conservation, and the rights and livelihoods of indigenous peoples and local communities (IPs and LCs).

Conserving primary ecosystems while respecting rights

Conserving all carbon-dense primary ecosystems, and in particular all remaining primary forest – boreal, temperate, and tropical – is critical to climate mitigation efforts, as they store far more carbon compared with harvested forests or plantations. Primary forests provide the reference condition for assessing change in ecosystem function in the past, as well as potential gains in the future. Patterns of biodiversity that evolve naturally or under indigenous stewardship comprise the most stable and resilient ecosystems and, within system limits, provide resistance to threats that are increasing with climate change such as pests, disease, drought, floods and fire. Thus, the carbon stored in ecosystems with higher levels of integrity is more stable and resilient.

A better understanding of the essential role of primary forests in regulating the global climate is needed. So too is better quantification of the size of the mitigation opportunity associated with ecosystem-based removals. Both factors could help accelerate transformative change. So too would an understanding of the importance of the stability, resilience and adaptive capacity of ecosystems for their persistence in a warming climate. Protecting the remaining primary forests and engaging in large-scale ecological restoration of degraded forests is essential to solving the overlapping biodiversity, climate change, social justice, and zoonotic disease crises.

Key factors to achieve transformation include: reforming the rules for carbon accounting; prioritizing forest mitigation actions; identifying and appropriately recognizing multiple ecosys-

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tem functions and services; reducing the risk of loss of carbon stocks due to disturbance events by improving the integrity of forest ecosystems; and reforming policies and practices of governments, businesses and communities to promote synergistic and holistic solutions that foster socioecological resilience.

Secure land rights

Evidence to date shows that IPs and LCs with secure land rights vastly outperform both governments and private landholders with respect to the multiple goals of preventing deforestation, conserving and restoring biodiversity, and producing food sustainably. Moreover, there is impressive overlap between primary ecosystems and the collective landholdings of IPs and LCs. However, recognition of rights to land, resources and/or territory has been partial, limited and fraught, while subject to opposition, violence and elite capture. Despite this, IPs and LCs have proven to be effective stewards of the world's biodiversity and natural resources, reflecting essential contributions that have thus far been inadequately recognized by states, and poorly supported by the broader international community. We draw attention to the ways in which addressing current gaps in capacity and funding lead to important gains in forest conservation and sustainable use with positive benefits for livelihoods.

We argue that the most effective and just way forward for using land-based carbon removals is to ensure that IPs and LCs have legitimate and effective ownership and control of their land and adequate opportunities to represent their own interests and engage on equal terms – ultimately exercising self-determination – in the pursuit of actions that directly or indirectly affect their lands, territories, livelihoods and collective rights.

Food system transformation towards agroecology

The world's industrial food system represents more than a third of global anthropogenic GHG emissions, by far the largest sector contributor. Industrial cropping, ranching, and land-use changes contribute a quarter of those food-sector emissions. Cropland managed unsustainably is the main anthropogenic source of nitrous oxide, with synthetic nitrogen fertilizers accounting for most of the global increases in emissions of this potent GHG. Likewise, large-scale conventional agriculture (mainly livestock and rice production) contributes 36 percent of global anthropogenic methane emissions. Land conversion for industrial agriculture and agricultural intensification are the two prime causes of global biodiversity loss through land use change.

The GHG intensity of industrial food production needs to be cut drastically and negative impacts on biodiversity and climate reduced. We argue for agroecological approaches, which restore

and conserve ecosystem functions and services based on biologically diverse systems, while strengthening local livelihoods, respecting cultural values and local knowledge systems and promoting site-specific technical and social innovations. Agroecological management that replaces monocrops with crop diversification (such as intercropping, crop rotation, cover crops, prairie strips, and others) has positive effects on reducing GHG emissions and other pollutants. It also has positive effects on productivity, decreasing the so-called 'yield gap' compared to conventional agriculture. Agroecological approaches that build organic matter in soils contribute to carbon sequestration and greater resilience to extreme climate events. The contributions of agroecology to equity, justice, inclusion, and dignifying working and living conditions – expressed in improved social well-being, sustainable livelihoods, food sovereignty, and health – make agroecology relevant to the promotion and implementation of a myriad of human rights.

Mitigation and carbon accounting

Current approaches to carbon accounting fail to recognize how the risk of carbon stock loss varies widely depending on ecosystem integrity. They instead consider carbon fungible, and all carbon stocks are in effect assumed to have the same stability, longevity and resilience.

Most problematic, particularly given the use of 'net accounting' to justify achieving 'net zero emissions', is the presumed fungibility of fossil fuel carbon and ecosystem carbon. This assumption has mistakenly allowed removals from forest re-growth to offset an equivalent amount of the emissions from fossil fuel use, industrial agriculture and forest harvesting in national GHG inventories. Similarly, current carbon accounting practices fail to recognize that carbon lost from primary forests is not offset by planting trees. With lower ecosystem integrity in monoculture systems, susceptibility to extreme events, and the risk of carbon loss, are higher. Harvesting mature trees with the expectation of re-growth creates a decades-long carbon debt by permanently reducing the carbon stored in the landscape and increasing the stock in the atmosphere. Similarly, the role of wood products for mitigation has been misrepresented, creating the false impression that carbon stored in products has a greater benefit than in forest and other ecosystems.

These deficiencies would be addressed if governments were to adopt a more comprehensive approach to carbon accounting based on stocks and flows that allows the true change in the carbon stock of the atmosphere to be defined and the mitigation benefits of forests and other ecosystems to be recognized. The rules for carbon accounting need to make provision for reporting information about the carbon stocks and flows in all biologic carbon pools, which is related to the condition of the ecosys-

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tem and the impacts of human activities on each pool. This comprehensive carbon accounting system is incorporated in the UN System of Environmental Economic Accounting Ecosystem Accounting (SEEA_EA). The SEEA_EA system provides an important opportunity to bridge the silos of the Rio Conventions (UNFCCC, UNCCD and CBD) and inform the Sustainable Development Goals by revealing synergies among these international commitments and demonstrating the benefits from integrating climate and biodiversity actions.

Conclusion

Governments' reliance on land-based carbon removal in current climate pledges is unrealistic in terms of available land and unfeasible in terms of the human rights tensions that devoting land primarily to carbon removal implies. Land-based carbon removals make an important contribution to mitigation efforts only if they are accompanied by rapid and deep cuts in fossil fuel emissions from all sources. Land-based carbon removals must complement and not offset fossil fuel and other emission reductions. Carbon accounting practices need to provide clearer and more accurate information on the true impacts of different mitigation actions. Information is needed that shows the mitigation benefits of protecting primary forests while restoring ecosystems for more integral, stable and resilient carbon removals. Restoration improves ecosystem functions and services that are relevant for broader ecological and social benefits. Food system transformation based on agroecological principles is critical for achieving socioecological resilience to climate change, as well as the promotion and realization of human rights, and in particular the right to food.

Key messages for decision makers

- **The 'net' in net zero must not distract from emissions reductions now.** Framing climate targets as 'net zero' risks undermining mitigation action by allowing a trade-off between emissions reductions and removals. Targets based on net accounting obscure the extent to which countries are relying on land removals for meeting climate mitigation commitments.
- **Ecosystem restoration as a removal could help get us closer to 1.5 °C if emissions reductions in all sectors happen now.** The scale of CDR that can be achieved sustainably via ecosystem restoration is sufficient to be compatible with a 1.5 °C temperature limit only when coupled with the most ambitious reductions in emissions from all sectors – such as fossil fuel use, industrial agriculture, deforestation and forest degradation related activities.
- **We don't have the land availability for unrealistic removals claims.** Countries current pledges implicate a land area equal to the total global food growing base; changes in land use proposed in those pledges are equivalent to half of global crop land. This reliance on land use change is deeply unrealistic and if implemented will exacerbate existing social and ecological challenges caused by demand for land. There is no available land for expanding energy crop or monoculture plantations.
- **Focusing on tree planting deflects attention from the urgency, immediate and multiple benefits of protecting and restoring forest ecosystems.** Keeping existing forest ecosystems healthy and functional is the most important contribution of land towards meeting a 1.5 °C temperature limit by avoiding emissions and maintaining stable carbon stocks.
- **Agroecology contributes to socioecological resilience and requires higher institutional support.** Agroecological principles contribute to climate change adaptation and mitigation by restoring and enhancing ecosystem functions and services, while respecting and strengthening livelihoods (particularly of IPs and LCs), providing enough healthy and diverse food, and fostering human rights promotion and realization.

November 2022

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