
CSE
SCHOOL OF ENVIRONMENTAL COMMUNICATION
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ANIL AGARWAL DIALOGUE 2022
The Politics of Using Forest Sinks for Climate Change Mitigation
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Key Questions

Question #1: Why are forests important for combatting climate change?

Question #2: Where are the major sinks?

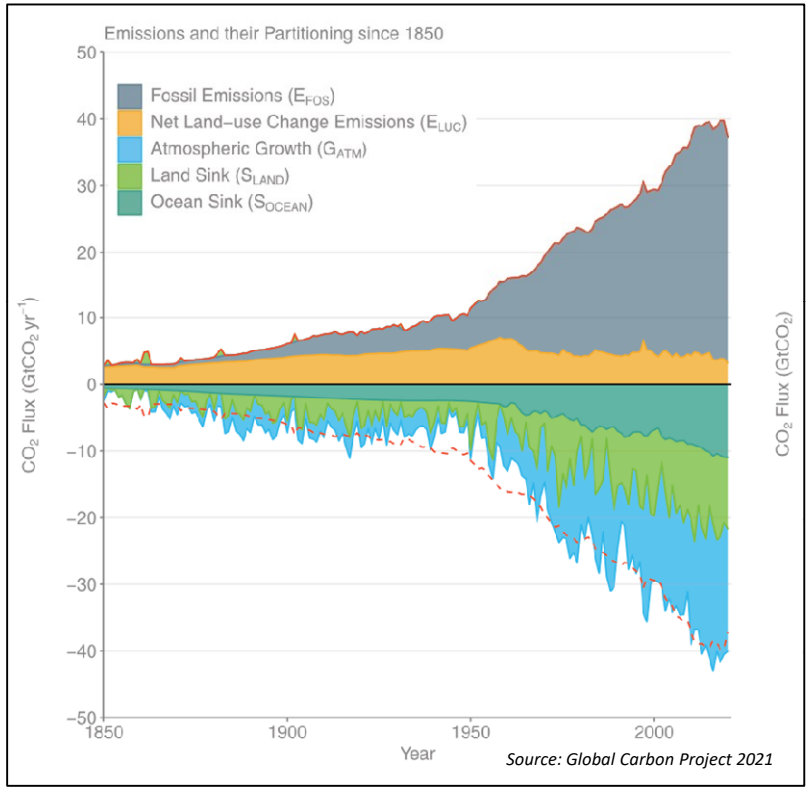
Question #3: Where is the renewed interest in forest sinks coming from?

Question #4: Can forests really soak up all our excess CO2 emissions?

Question #5: What about the existing owners and users of forests? And how can we use forests to their maximum potential without displacing them and destroying their livelihoods?

Question #1: Why are forests important for combatting climate change?

Land is Both a ‘Source’ and ‘Sink’ for Carbon Dioxide



Source: Global Carbon Project 2021

Major sources of CO2 emissions – fossil fuel burning and deforestation

Land sinks absorb about 30% of anthropogenic CO2 emissions

Among land sinks, forests absorbed a net 7.6 GtCO2/year (15.6 Gt in removals, and 8.1 Gt in emissions) – they are the largest component of the land sink

Land – forests, wetlands, grasslands, etc. – absorbs 29% or 11.2 GtCO2/yr

Oceans absorb 26% or 10.2 GtCO2/yr

Source: Global Carbon Project 2021

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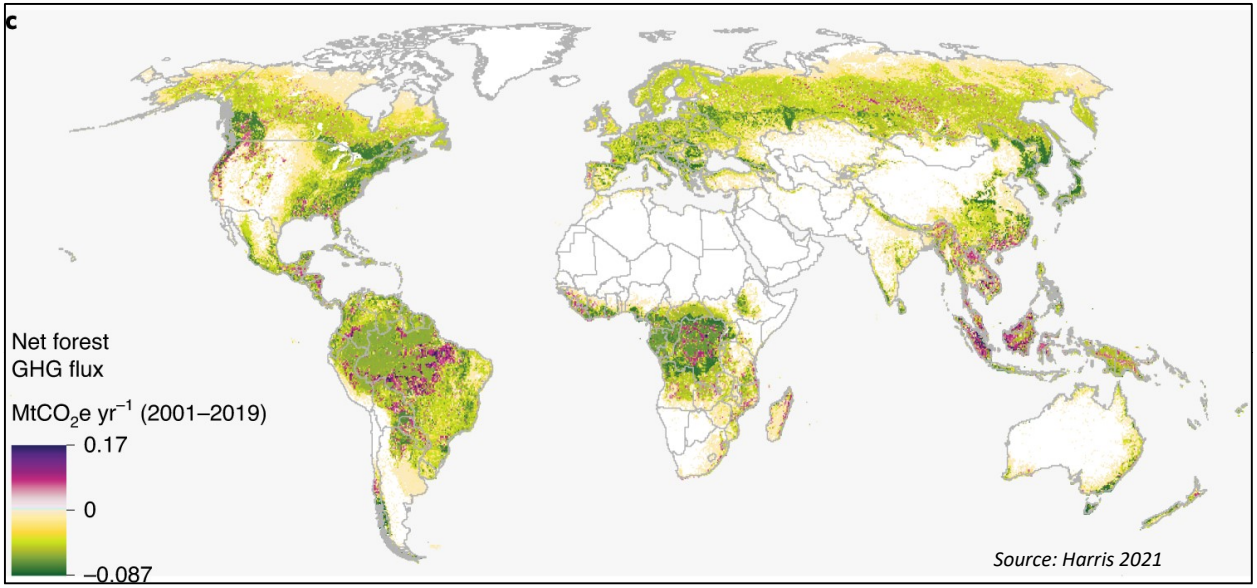
Question #2: Where are the major sinks?

Where are the major sinks?



Tropical forests store the most carbon, for now

Tropical forests in Latin America (mainly Brazil), Africa (mainly the Congo Basin) and Southeast Asia (mainly Indonesia) are the biggest carbon sinks, followed by temperate and boreal forests

But tropical forests are also being deforested the most rapidly. They are being cleared for commodities such as beef and oilseeds. As a result, forest carbon stock is decreasing, it went from 668 Gt to 662 Gt between 1990-2020, due to an overall decrease in forest area

Tropical forests are thus turning into CO2 sources – the Amazon is a net carbon source now, according to recent research

Region	% Change in forest carbon stock (1990-2020)
Africa	-14%
South America	-10%
South and Southeast Asia	-9%
North America	+2%
Europe (excl. Russia)	+24%

Source: FAO 2020

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Question #3: Where is the renewed interest in forest sinks coming from?

Race to Net Zero is Leaning on Carbon Sinks

BONN CHALLENGE

- UNFCCC 1992
- Kyoto Protocol 1997
- IUCN Position Paper 2009
- Bonn Challenge 2011
- New York Declaration on Forests 2014
- UN Decade on Ecosystem Restoration 2019
- 1 Trillion Tree Initiative 2020
- G7 Pledge 2021
- Glasgow Leaders' Declaration on Forests and Land Use 2021

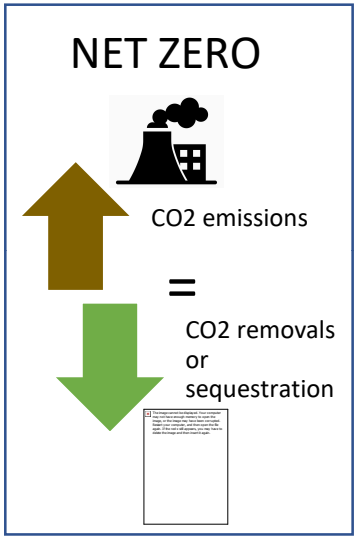
Policy interest in using forests sinks to absorb CO2 goes back to the early 1990s. Many initiatives have been announced since then, most recently the ***Glasgow Declaration on Forests*** signed at COP 26 in November 2021 by 141 countries

Following the IPCC's 2018 Report on 1.5C, countries and companies started setting "net zero" emissions goals

Net zero means: CO2 emitted is balanced out by CO2 removed or sequestered. This can be done by technologies like direct air capture (DAC) or through natural sinks like forests

Since then, most net zero plans have banked on forest sinks to some degree, mostly in the form of tree planting projects, since they are cheaper than using technologies like DAC

Using forests to absorb CO2 is now covered under many new umbrella terms, each with varying nuances: **nature-based solutions, natural climate solutions, forest restoration, tree planting, afforestation/reforestation, land-based mitigation, land use land use change and forestry (LULUCF) solutions**



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Overoptimistic Scientific Estimates

Sl. No.	Study	Elements of land sink / pathways covered	Target Year	Maximum mitigation potential
1	Griscom et al., 2017	Forests, wetlands, grasslands, agricultural lands	2030	23.8 GtCO2e / year
2	Grassi et al., 2017	Forests	2030	1.1 ± 0.5 GtCO2e / year
3	Hansen, 2017	Soil and biosphere	-	100 Gt C or 367 GtCO2
4	Dooley et al., 2018	Forests, grasslands, savannahs, agricultural lands	2050	6.1 GtCO2e / year in avoided emissions 8.7 GtCO2e / year sequestered 7.5 GtCO2e / year avoided through agricultural practices
5	IPCC SRCCL, 2019	Reduced deforestation and forest degradation Afforestation	-	0.4–5.8 GtCO2e / year 0.5-8.9 GtCO2e / year
6	Bastin et al., 2019	Restoration of forested land and additional 0.9 billion hectares of forest canopy cover	-	752 GtCO2
7	Busch et al., 2019	Tropical forests in 90 countries	2020-2050	Additional 5.7 GtCO2 at carbon price of USD 20, or 15.1 GtCO2 at USD 50
8	Austin et al., 2020	Avoided deforestation, forest management activities, increasing harvest rotations, and afforestation/reforestation	By 2055	0.6–6.0 GtCO2 / year at a total annual cost of 2 – 393 billion USD / year
9	Griscom et al., 2020	Forest/savannah, agriculture, wetland in 79 tropical countries and territories	2030-2050	6.56 GtCO2e /year across 79 tropical countries and territories
10	Teske et al., 2021	Reforestation, forest ecosystem restoration, sustainable use of forests, and agroforestry	2050	117 GtCO2 (3.9 / year 2020-2050)
11	Li et al., 2021	Land sink	2100	2.75 GtCO2 / year
12	World Economic Forum, McKinsey & Company, 2021	Avoided deforestation and peatland impact, peatland restoration, reforestation, and cover crops	2030	7 GtCO2 / year
13	Koch et al., 2021	Tropical forests and farmland	2100	Additional 124 Gt C or 455 GtCO2

We reviewed 13 studies that provide estimates of the CO2 mitigation potential of land/forests

The studies vary widely* in their findings – thus their results are difficult to use to design a mitigation policy

But most agree that forests offer a low-cost solution to sequester CO2. And many of them offer overtly optimistic estimates of how much additional CO2 forests can capture

**in terms of:*

1) *the pathways analyzed (reforestation, agroforestry, etc.)*
2) *the biomes selected (forests, wetlands, etc.)*
3) *time horizons that determine the resultant mitigation potential*

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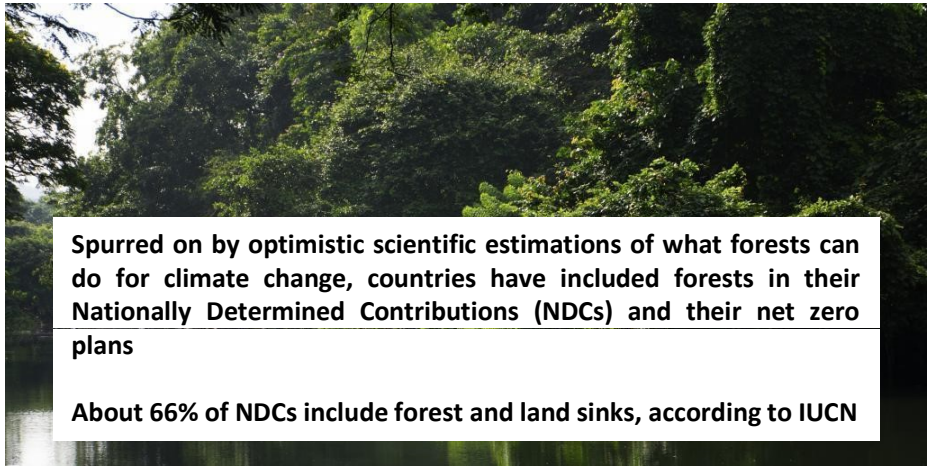
NDCs and Net Zero Plans



Spurred on by optimistic scientific estimations of what forests can do for climate change, countries have included forests in their Nationally Determined Contributions (NDCs) and their net zero plans

About 66% of NDCs include forest and land sinks, according to IUCN

India has set a carbon sink goal in its NDC:

to "**create an additional (cumulative) carbon sink of 2.5–3 gigatonnes of carbon dioxide equivalent (GtCO2e) through additional forest and tree cover by 2030**" and "**to bring 33% of its geographical area under forest cover eventually"**

Forests in net zero plans of countries

UK - Net zero by 2050	• Afforestation of 30,000 ha per year by 2025, and 50,000 ha by 2035 • Restore approximately 280,000 hectares of peat in England by 2050
China - Carbon neutral by 2060	• 36,000 km^2 of new forest a year till 2025
EU - Climate-neutral by 2050	• According to the EU Climate Law, an estimated 2.2% of emissions reduction, which amounts to 225 Mt CO_2e, will be achieved through forests and other natural sinks
India - Net zero by 2070	• ***NDC goal not reiterated under net zero announcement***
UAE - Net zero by 2050	• Planting 100 million mangroves by 2030
US - Net zero by 2050	• Up to 133 million ha of potential reforestation. Plus, "avoided forest land conversion, s longer harvest rotations or increased carbon storage in harvested wood products and substitution of more fossil-intensive construction materials with wood products"
Russia - Carbon neutrality / net zero by 2060	• "By aiming to build a carbon-neutral economy by no later than 2060, Russia is relying, among other things, on the unique resource of forest ecosystems available to us, and their significant capacity to absorb carbon dioxide and produce oxygen"
Colombia - Climate-neutral by 2050	• "To reforest 1m ha of land by 2030, which could sequester 10.5 Mt CO_2e, or roughly 6% of its total emissions reduction"
Ethiopia - Carbon neutral (without target date)	• 220 MtCO_2e GHG reduction from land and forestry, 20 billion trees to be planted 2020-2024

Confidence in forest sinks has bolstered carbon offset markets, with a focus on forest-based offsets…

The process of carbon offsetting aims to ‘neutralize’ CO2 emissions

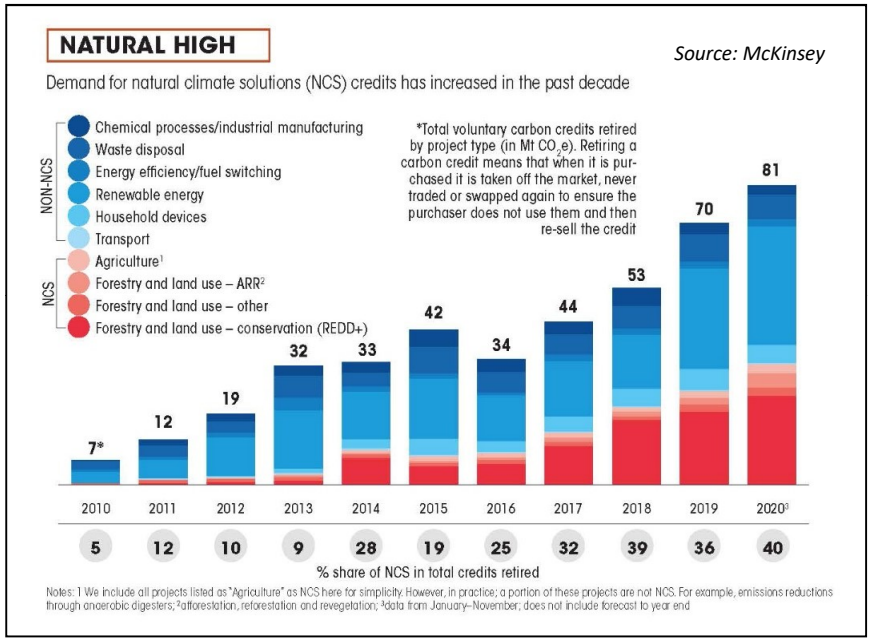
CO2 emitted by a particular activity such as taking a trip on an airplane, is theoretically nullified by an equivalent volume of CO2 absorbed by an activity such as planting a few trees elsewhere

Purchasing offsets has become a key strategy for companies who have set net zero goals. For example, Google says it has eliminated its "entire carbon legacy" through the purchase of high-quality offsets. Oil giant Shell plans to plant forests to offset 120 million tonnes of CO2 per year and achieve its net zero goal

Offsets are traded as carbon credits, and credits focused on forests and land are the cheapest ($4-50 / tonne CO2e; IHS Markit)

These credits rose from 5% of all credits in 2010 to 40% in 2021 – 80% of forestry offsets are from the REDD+ programme. By 2030, McKinsey estimates that more than half of carbon offsets will come from forest and other nature-based projects

These projects are disproportionately located in the Global South - Asia, Latin America, and Africa – the regions with the densest tropical forests and the poorest people



Question #4: Can forests really soak up all our excess CO2 emissions?

Question #5: What about the existing owners and users of forests? How can we use forests to their maximum potential without displacing them and destroying their livelihoods?

There are multiple challenges with banking on land and forest sinks

Permanence	Forests can be destroyed by fire, deforestation etc. Thus, carbon pulled out from permanent reserves like coal, is not permanently locked away when it is absorbed by forests – forests are in the unstable part of the carbon cycle
Limits of sink capacity	Annually forests sequester only 7.6 $GtCO_2$ today, CO_2 emissions from coal, oil and gas alone were 33 $GtCO_2$ in 2020; overall, land can at most sequester an additional 100 Gt of carbon (367 $GtCO_2$)
Complexity in estimation	The land sink is extremely uncertain, and models differ widely from on-ground observations. So how do we frame a coherent policy on something we cannot easily measure?
Competes with food production	Excess dependence on afforestation for climate change mitigation can put 41.9 million people at risk of hunger globally in 2050, mainly through rising food prices, since afforestation competes with agricultural land (Fujimori et al., 2022)
Impact of climate change and deforestation	Land sinks are already weakening due to climate change. If business-as-usual emissions continue, the strength of the global land sink could be cut by nearly 50% by 2040 (Duffy et al., 2021). The tropical sink has already saturated
Reporting discrepancies and lack of clarity from countries	Country reports of land emissions/removals differ from global models by 5.5 $GtCO_2$ / year (Grassi, 2021) due to difference in methods. This adds to the confusion.
Creative accounting	Overestimating the role of forests as sinks could lead to inadequate steps to reduce GHG emissions in countries which are major emitters, and also have large forested areas like Russia, Canada, Brazil, the US, and China
Ownership of land and forests	Existing users and dwellers of lands are frequently disregarded when planning afforestation, especially Indigenous Peoples and local communities, even though at least 293 Gt C is stored in their collective forestlands
Exploding offsets market for private sector will intensify these issues	It is speculated that the demand for carbon offsets could increase 15-fold by 2030. This will exacerbate all the above issues – human rights, competition for land, proliferation of monoculture plantations

India's NDC Goal to Enhance Its Carbon Sink is Unclear, and Progress Is Difficult to Measure…

India's NDC goal is to "create an additional (cumulative) carbon sink of 2.5–3 gigatonnes of carbon dioxide equivalent (GtCO2e) through additional forest and tree cover by 2030"

This has multiple unknowns, and progress has not been measured

Publicly, a **baseline year** has not been communicated (off-record it is said to be 2005). And should the additional sink be **above BAU in the baseline year (e.g., 2005)**, or **above the BAU level in 2030**?

Questioned by FSI

And, to truly help reduce emissions, should the additional sink simply be counted as **additional carbon stock in forest and tree cover**, or the **additional net sink of CO2 emissions?** *(SEE FIGURES ON THE RIGHT)*

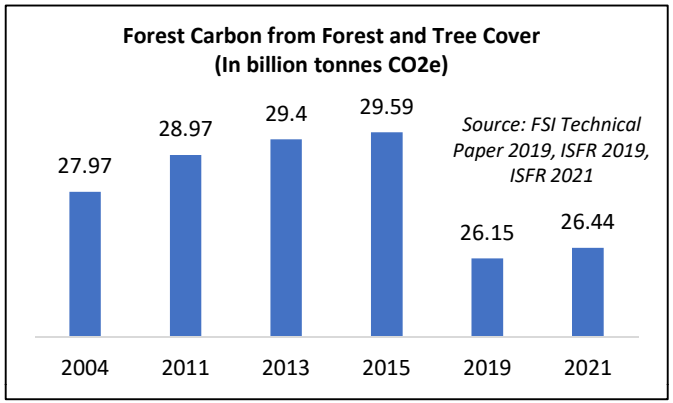
Questioned by CSE

FSI projects that carbon stock will rise to 31.87 GtCO2e by 2030 – up from 28.12 GtCO2e in 2005 – which means the sink goal could be met by current programmes. But is this realistic?

Between 2010 and 2020, India ranked third in average annual net gain in forest area (0.38% annual net change) – forest and tree cover comprises 24.62% of geographical area

But although our forest cover is noted to be increasing – it is due to increase in plantations, and not natural forests. 257,950 ha of natural forests were deforested between 2008 to 2020 Thus, carbon stock projections may have been overestimated, as asserted by several independent studies – in fact, even official numbers show that in many States it is decreasing

Additional carbon stock in forest and tree cover?



Or additional net sink of CO2 emissions?

Report	Based on	Share of Emissions Offset by Land Sector
June 2004, Initial National Communication	National Inventory 1984-1994	**3%**
May 2012, Second National Communication	National Inventory 1994-2004	**23%**
Dec 2015, BUR 1	National Inventory 2010	**12%**
Dec 2018, BUR 2	National Inventory 2014	**12%**
Feb 2021, BUR 3	National Inventory 2016	**15%**

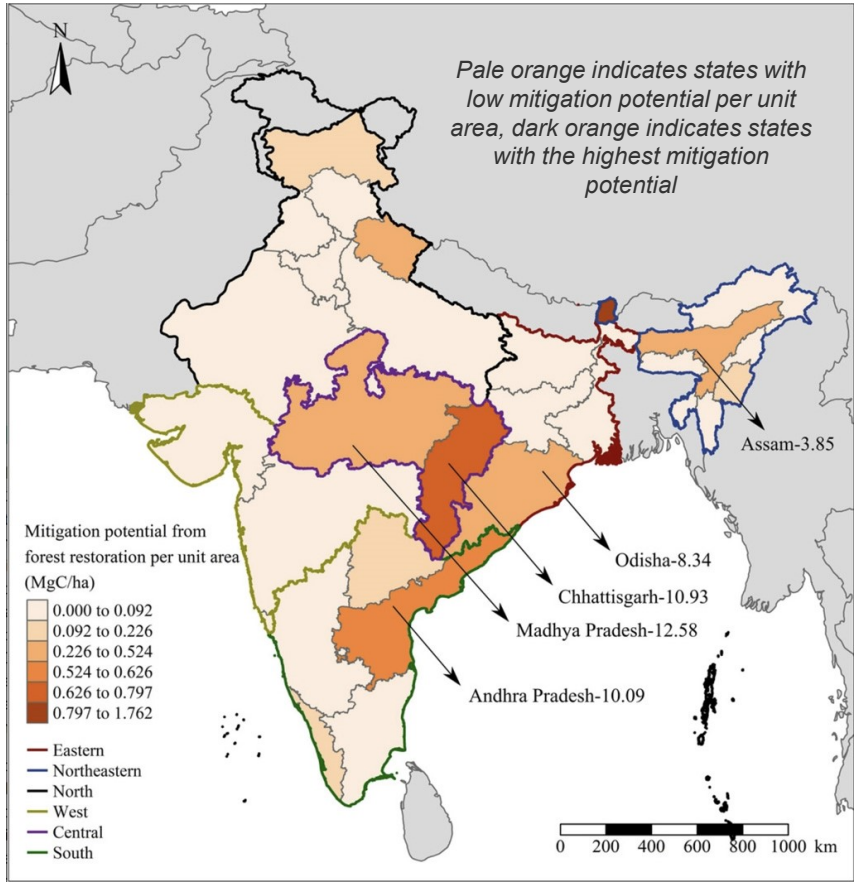
India’s NDC Goal May be Difficult to Meet Without Competing for Land…

More than 300 million people in India depend on forests for their livelihoods. A new estimate suggests that restoring forests on ‘available land’ – that is not used for food or livelihoods – will achieve only 7% of India’s carbon sink pledge through forest restoration (Gopalakrishna et al., 2022)

The highest potential is in the central Indian states of Madhya Pradesh and Chhattisgarh

But is not only land area available for forest restoration that must be considered, but also “forest governance, land tenure issues, historical land use legacies and approaches that can reconcile environmental goals with the needs of existing land users”

Climate change mitigation potential from natural restoration of forests varies across the Indian states



Source: Gopalakrishna et al., 2022

Way forward

The questions we have raised are addressed for the most part by the scientific community and observations on the ground

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But some questions remain…

In whose lands will these forests be grown, and who will benefit and at what cost? What will this mean for the habitats and future of poor communities?

And how do we prevent disincentivizing of emissions reduction by both countries and companies – i.e., 1) the issue of creative accounting of GHG emissions where countries take credit for the CO2 that the forests in their territory have naturally absorbed, and 2) the issue of private sector offsets?

Image: Sharbendu De/UNDP India, 201

Way forward

For India, clarity is needed on the carbon sink goal.

And India's afforestation strategy will have to account for the needs of the poorest who live on these lands.

The State of Forest Report shows clearly that the bulk of the forests in the country are 'tribal' districts.

Therefore, the issue is not just about accounting for sources and sinks, but to build a forest future for these communities.

This will be the big question in India's nature-based solution strategy.

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