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India: Markets and Supply Chains for Climate, Forests, and Land Use

Climate and Forests 2030

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Background

The Climate and Land Use Alliance (CLUA), with the support of Meridian Institute, is exploring the integration of climate and land use with justice, equity, health, and economic recovery through Climate and Forests 2030: Resources for Funders. This focus is intended to inspire innovation and investment in integrated work on forests, rights, and sustainable land use and will inform a new strategic plan for CLUA for the period 2021 to 2030.

To inform the thinking, CLUA commissioned a series of "thought pieces" to provide diverse inputs into developing a more integrated approach for forests and land use. These are meant to stimulate discussion and debate and are not intended to reflect the views of CLUA, its member foundations, or Meridian Institute. The views expressed in this paper are those of the author, Dr. Rohini Chaturvedi. They have been informed by commentary and input by a range of other experts, including Dr. Ashwini Chhatre, Anirban Ghosh, Dr. Arshiya Bose, Dr. Dennis Garrity, Edel Monterio, Dr. KM Jayahari, Dr. Nitin Pandit, Satya Tripathi, Dr. Sushil Saigal, and Vijay Pratap Singh Aditya. The author would like to thank the reviewers of this paper: Hisham Mundol, BMS Rathore, Benugopal Mukhopadhyay, and Krishna Kumar Singh.

List of Acronyms

CAF	Compensatory Afforestation Fund
CMNF	Community Managed Natural Farming
CSR	Corporate Social Responsibility
DMF	District Mineral Foundation
EFT	Ecological Fiscal Transfers
FRA	Colloquially, Forest Rights Act 2006
FSI	Forest Survey of India
JFM	Joint Forest Management
NAPCC	National Action Plan on Climate Change
NBS	Nature Based Solutions
NDC	Nationally Determined Contribution as part of the Paris Climate Agreement
NTFP	Non-timber Forest Product
MoEFFCC	Ministry of Environment, Forest and Climate Change

Summary

India holds tremendous opportunity for land use based climate action, predominantly in the agriculture and forest sectors which together account for nearly three quarters of India's land area and over one quarter of India's emissions. India's political leadership is attuned to the imperatives of global climate action and has made multiple international commitments that draw on land use strategies for mitigation and adaption. Notwithstanding its international commitments, India's domestic policy and regulatory framework, including the National Action Plan on Climate Change, prioritizes development outcomes. Development priorities are further accentuated as one moves to the state and local levels. From an implementation perspective, therefore, all climate actions must lead to development outcomes, particularly jobs and economic growth.

Nature Based Solutions (NBS) provide an appropriate fulcrum of a 2030 climate, forest, and land use vision for India:

By 2030 India will firmly be on the path of achieving resilience for its forests and grasslands, cropped lands and for its rural communities. A strong momentum has built for protecting and restoring of India's forests and grasslands into healthy ecosystems. Communities living in and around these areas will be well on the way to having secure, recognized, and respected tenure. They will actively shape and participate in forest-linked markets and supply chains. At the same time, a vibrant grassroots movement will be underway for a shift to more regenerative systems of cropping that restore soils, support agri-biodiversity, and strengthen household nutritional security, thus leading to overall well-being of India's large agriculture workforce.

Three trends create a context for markets and supply chains to promote actions towards achieving the above vision:

1. Declining forest quality and replacement of forests and grasslands with monoculture plantations. Unless arrested and reversed, declining forest quality can exacerbate vulnerability of hundreds of thousands tribal and forest dwelling communities.
2. Increasing agrarian distress resulting from a complex set of variables including but not limited to aggravated soil degradation, increased production costs, decline in prices of agricultural commodities, high levels of indebtedness, and growing unemployment in the sector.
3. Urbanization in India is increasing; estimates suggest that more than 70% of buildings in India are yet to be built. In a business-as-usual scenario, this will result in massive growth in the construction sector, resulting in a significant climate impact.

Approaches that can counter these trends at large scales to deliver both mitigation

and resilience benefits include strengthening community forest governance and establishing community-business linkages; a transition to regenerative agriculture at scale; and shifts from concrete to biomass in the built environment, which also has the potential to create a market for biomass produced in the agriculture and forest sectors.

In each of the priority areas, investments are needed to strengthen production systems, build supply chains, and generate demand. At present, public sector investments are driving land use and climate action. Philanthropic funders can support progress at scale in three ways: 1) by unlocking available public funding and improving the effectiveness of public spending; 2) by catalyzing enlarged public and corporate sector investments in land use and climate action; and, 3) by enhancing on -the-ground absorptive capacity (readiness) for enlarged funding (demand creation for change on the ground).

Introduction

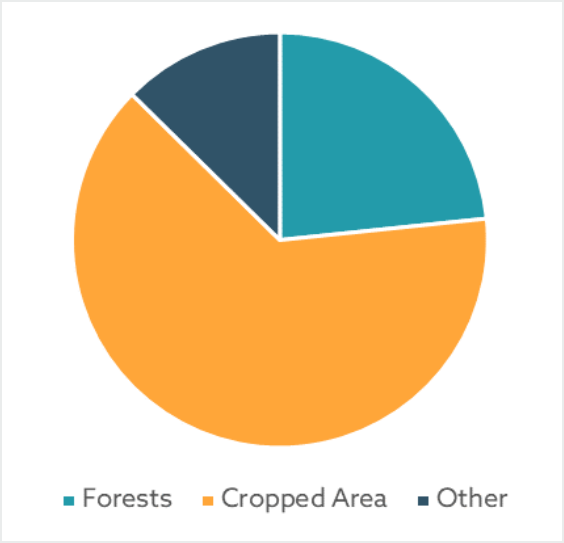
This analytical paper identifies spaces where markets and supply chains can strengthen and accelerate climate action for forests and land use in India. In addition to published literature and policy documents, this paper draws upon 10 expert interviews, covering diverse fields including forest, agriculture and natural farming, commodities, and business.[1] With permission, the paper incorporates their thinking into a suggested climate and land use vision as well as sectoral approaches. All experts have been listed as contributors. The ideas and views expressed in this paper, however, do not reflect any kind of consensus on the way forward. The paper is organized into three sections. The next section lays out a climate and land use vision for India for 2030. This vision is embedded in the growing salience of Nature Based Solutions for addressing the global climate crisis. Section 3 identifies three priority areas where markets and supply chains can support transformation of land uses. The paper concludes with suggestions on the role that philanthropic donors can play in supporting India's progress towards achieving its climate and land use vision.

The paper has been written in an atmosphere of uncertainty, against the backdrop of large-scale farmer protests that started in India in August 2020 and gained momentum in November 2020. The focus of these protests is a set of farm sector legislation which, farmers allege, will result in large scale corporatization of agricultural lands and supply chains and leave them at the mercy of big agri-business. Farmers are therefore demanding that the laws be repealed. The national government, on the other hand, maintains that the laws will modernize the farm sector and attract much-needed private investment. Hard negotiations with the national government have resulted in a stalemate; and for the moment, implementation of the laws has been suspended. The resolution of this conflict between the national government and the farmers remains unclear, and the outcomes may influence the shape and direction of any future land use approaches.

2030 Vision

India is a predominantly rural and agrarian country. More than half of India is comprised of arable land and another 23% is designated as forest (See Figure 1). These forests hold a carbon stock of 7.124 billion tons (FSI 2019). An estimated 146 million families have operational landholdings for agriculture; about 85% of these are small and marginal landholders with 2 hectares of land or less. Agriculture and forestry are the largest source of employment in India and absorb 54.6% of the country's workforce (Lok Sabha Standing Committee 2020). Women constitute more than 42% of the workforce (Mehta 2018). More than half of Indian agriculture is rainfed and is highly dependent on the Indian monsoon. These areas, however, contribute significantly to food security by producing 89% of the country's millets, 88% of pulses, 73% of cotton, and 69% of oilseeds (Mishra n.d).

FIGURE 1: Land use in India



Source: FSI 2019

[1] *"A direct fallout of the farmer protests described here was the reluctance of big agribusiness to participate in a discussion on land use particularly from a markets and supply chains perspective. Requests were politely declined with advice to wait for improved clarity.*

A severe agrarian crisis is unfolding in the Indian countryside — creating urgency for transformative action. More than 100 million hectares of land in India is degraded (ICAR & NAAS 2010). Although official estimates show forest cover increases at a national level, this cover is declining in two critical areas: namely, the biodiverse rich northeast region of the country which has lost more than 3000 square kilometers of forest since 2009, and in tribal districts where there is high dependence on these resources (FSI 2019). Agricultural productivity is declining even as the cost of cultivation has risen much faster than prices of farm produce. There are high levels of indebtedness and farm-related suicides (one every hour), and the disparities in income vis-a-vis households that have given up on agriculture are growing wider (Khurana and Kumar 2020). The already high levels of economic dependence on agriculture and forests are likely to have increased even further resultant of the Covid-19 pandemic, which has caused job and wage losses, and a return of migrant laborers to their rural homes, although this migration may be temporary.

Growing attention to the climate crisis in recent years alongside the high contribution (nearly 25%) of agriculture, forestry, and other land uses to global GHG emissions has turned the spotlight on Nature Based Solutions (NBS). NBS include a suite of interventions that protect, sustainably manage, and restore natural or modified ecosystems in ways that address societal challenges effectively and adaptively, while simultaneously providing human and biodiversity benefits (Cohen-Shacham *et al.* 2016). Accordingly, NBS are seen as a viable strategy for not only mitigating the carbon crisis but also supporting adaptation pathways. NBS provide an appropriate foundation for a 2030 climate, forest, and land use vision for India for three reasons:

1. **High potential for application of NBS:** India has immense potential for NBS, particularly those that involve improvements in management of forests and croplands (Griscom 2020). It is estimated that more than 18 million hectares of dense forests outside the protected areas network have tree cover that can be protected and sustainably utilized, while 34 million hectares of near contiguous forest and tree cover can be established through wide-scale forest restoration. In more than 87 million hectares of rainfed croplands, trees can be introduced in ways that are consistent with agroecological approaches (Chaturvedi *et al.* 2018). Through protection, improved management, and restoration, India can sequester between 3 and 4.5 billion tons of above-ground carbon by 2040. And while the science remains inexact, conservative estimates suggest that India can sequester at least twice as much carbon in soils (*Ibid.*).

2. **Climate and land use commitments:** Land use action is embedded in India's international commitments to climate change. For instance, as part of the Paris Agreement, the Government of India has committed to creating an additional carbon sink of 2.5-3 billion tons of CO_2-equivalent through additional forest and tree cover (GoI 2015). As part of the Bonn Challenge, the Paris Agreement, and Land Degradation Neutrality, the country has committed to restoring 26 million hectares by 2030. Notably, the national government has always maintained that all climate action must support development, particularly of people directly dependent on land and forest resources. Accordingly, India's policy and regulatory framework on land use and climate change responds determinedly to domestic developmental priorities. For instance, the principles underpinning the country's National Action Plan on Climate Change emphasize continued economic growth and development (See Box 1). The shrinking of the Indian economy resulting from the global pandemic could lead to even more emphasis on growth, and through it, jobs and wage opportunities — even if these are at the cost of environmental actions. At the state/provincial level, these development priorities become even more prominent. Thus, from an operational perspective, all climate policy commitments need to be translated into jobs, enhanced land productivity, and economic growth.

3. **Existing policy framework containing elements of NBS:** A robust policy framework is already in place that creates the necessary enabling context for NBS. Developed over the last five decades, India's land use policy framework enables NBS elements that include but are not limited to protecting forests for a wide array of ecosystem services such as carbon sequestration, regulating conversion of forest for non-forest uses, scaling

BOX 1: Development principles underpinning India's NAPCC

India's National Action Plan on Climate Change (NAPCC) is guided by the following principles: (i) protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change; (ii) achieving national growth through ecological sustainability; (iii) devising efficient and cost-effective strategies for end use Demand Side Management; (iv) deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions; (v) engineering new and innovative forms of market, regulatory, and voluntary mechanisms to promote sustainable development; (vi) effecting implementation of programs by including civil society and local government institutions and through public-private partnership; and, (vii) welcoming international cooperation for research, development, and sharing and transfer of technologies.

Source: Government of India, 2008

up of agroforestry, as well as securing land, forest, and tree rights. The National Forest Policy of 1988, for instance, recognizes the need to protect and manage forests for generating multiple ecosystem services that are essential for human well-being. From a climate and land use perspective, at least half of the missions launched under the National Action Plan on Climate Change comprise land use targets. Regenerative agriculture systems, particularly organic farming and natural farming, are gradually gaining policy attention with programs and schemes for their promotion. It is estimated that about 2.5 million farmers are already practicing regenerative farming and by 2025, such farming will cover about 2 million hectares.[2]

In this context, an NBS vision for India looking into 2030 could be:

By 2030 India will firmly be on the path of achieving resilience for its forests and grasslands, cropped lands, and for its rural communities. Strong momentum has built for protecting and restoring India's forests and grasslands into healthy ecosystems. Communities living in and around these areas will be well on the way to having secure, recognized, and respected tenure. They will actively shape and participate in forest linked markets and supply chains. At the same time, a vibrant grassroots movement will be underway for a shift to more regenerative systems of cropping that restore soils, support agri-biodiversity, and strengthen household nutritional security — thus leading to overall well-being of India's large agriculture workforce.[3]

This 2030 vision is nested within and responds to a variety of contextual factors that can enable (Enablers) or constrain (Stressors) progress (See Figure 2).

NBS Priority Areas for Achieving the 2030 Vision

India is the third largest emitter of carbon in the world. Agriculture and forests account for 28% of the country's emissions. But, as already mentioned, these sectors also offer tremendous opportunity for land use approaches to climate mitigation and adaptation. Designing these land use approaches requires attention to the distribution of powers within India's federal system, as governed by the Constitution of India and mediated by the political economy of center-states' relations (Chaturvedi 2016). Climate is not a specific subject of either national or state jurisdiction. However, since international relations are the purview of the national government alone, the Government of India takes the lead in all climate negotiations and commitments. Control over land and agriculture rests with state

[2] niti.gov.in/natural-farming-niti-initiative

[3] *At this juncture, it is extremely challenging to quantitatively ascertain the hectarage, households, or carbon values embodied in this vision. For example, on regenerative farming alone, estimates from experts ranged from 10% to 100% of arable land.*

FIGURE 2: Contextual enablers and stressors for climate and land use

ENABLERS	STRESSORS
A stable government with a clear majority is in place at the national level and in most states. The national government in particular appears unafraid to take tough decisions even if such decisions are unpopular. Hence, if convinced of the feasibility and returns (economic as well as political) for NBS action, it is likely to implement actions towards this end.	The space for environmental action is steadily decreasing. Environmental narratives are often perceived to be anti-development and therefore, "anti-national." Since 2017, the licenses of more than 6,600 NGOs have been revoked, citing procedural violations of the 2010 Foreign Contribution (Regulation) Act.
Incentives for environmental action that were introduced through intergovernmental ecological fiscal transfers (ETF) in 2005 have grown substantially. In 2021-22, states are expected to receive upwards of 130 billion USD through ETF.	There is an increasing perception that the space for questioning the government, criticizing it, or dissenting with it are rapidly declining in India.[4] This has wider implications for overall governance.
Declining population growth rates coupled with surplus food generation allow for a macro-policy shift in focus from yield improvements to nutrition (including more diverse, less chemical-intensive cropping).	Although India has an enabling policy and regulatory framework for NBS, implementation and enforcement continue to be very weak, particularly where environment action is pitted against big development, and where community rights are concerned.
Business is slowly but surely waking up to the imperatives of climate action. Their receptiveness to and demand for ideas and technologies that support transitions to more climate positive outcomes is steadily increasing.	While numerous institutions for decentralized and participatory governance, extension and training, and strengthening agriculture supply chains have been created, many of these are defunct. Therefore, the institutional basis for land use transformation is very weak.

governments. Jurisdiction over forests, however, is shared between the national and state governments, with the latter exuding greater control over forest land, financial flows, and the forest bureaucracy. Hence, while the national government negotiates commitments in the international climate context, it relies heavily on the states for designing and executing land use-based climate strategies necessary to meet these commitments. But for the most part, states have not really bought into the climate agenda and remain more focused on development priorities.

The starting emphasis of this paper was on understanding the potential for markets and supply chains for strengthening land use related climate action. This section *does not* map markets and supply chains related to agriculture and forest commodities nor does it suggest ways to make these more friendly to climate or sustainable land use. This is because existing forests and agriculture markets and supply chains in India are fragmented, complex, and messy. They vary tremendously, depending on a wide range of factors including region, state legislation, type of commodity, agriculture practice, size of landholding, farmers' and collectors' capacities to engage with market processes, and location of

[4] www.thewire.in/rights/justice-chandrachud-dissent-anti-national-democracy-caa

markets. Furthermore, many agriculture and forest products are consumed at the household level or traded in informal markets. And overall, information on markets and supply chains is neither readily-available nor accessible. Additionally, a focus on existing markets and supply chains risks excluding at present non-existent markets which could potentially influence the achievement of the climate, forest, and land use vision described in the previous section.

This section provides an overview of three emergent priority areas where markets and supply chains can support progress towards the above 2030 vision for India. A set of loosely defined criteria were used for identifying these priorities:

1. Potential for impacts at scale as reflected in the opportunity for action.
2. Public sector openness to the idea as reflected in an existing enabling policy context even if this is nascent and/or inadequate.
3. The presence of some existing knowledge, technologies, or pilot initiatives that can provide the basis for learning and designing strategies for impacts at scale.

Priority Area 1: Forest communities, climate, and business

While officially India is not a deforesting country and has witnessed year on year increases in forest cover as well as carbon stocks (FSI 2019), non-government experts (and the UNFCCC) argue that the definition of forests and monitoring methodologies deployed by state agencies result in considerable overestimation of forest cover.[5] By not differentiating between native forests (that are declining) and plantations (which are increasing), government estimates obfuscate ongoing degradation and deforestation in the country (Shrivastava 2018; Nandi 2019). Even with its overestimation, official data suggests that in a business-as-usual scenario, India may well fall short of achieving the targets set out in the Paris Agreement unless more areas are brought under tree cover through afforestation, agroforestry, and linear plantations (See Figure 3). The trend of declining forest quality and extent, and increase in areas under plantation, also has adverse social impacts since it is intertwined with forest conflicts, primarily between forest-dependent communities and state forest bureaucracy.

There is growing recognition worldwide that clear and secure tenure is a critical enabling condition for

FIGURE 3: India's progress towards achieving its forest and land use NDC

	Projection of carbon in forest & tree cover in BAU scenario (billion tonnes CO_2-eq)	Plus 2.5 billion tonnes	Plus 3.0 billion tonnes	Difference from the projected value in 2030	
				2.5 billion tonnes	3.0 billion tonnes
2005	28.12	30.62	31.12	-1.25	-0.75
2015	29.62	32.12	32.62	0.25	0.75
2020	30.53	33.03	33.53	1.16	1.66
2030	31.87				

[5] The Forest Survey of India conducts a biennial assessment of forest cover through remote sensed images. For the purposes of this assessment, "forest cover" includes all tree patches which have canopy density more than 10% and area of one hectare or more in size, irrespective of their legal status and species composition. The term "Recorded Forest Area" (RFA) is used for lands which have been notified as "forest" under any government Act or rules or recorded as "forest" in the government records.

climate mitigation and adaptation as well as for achieving Land Degradation Neutrality (IPCC 2019). India's policy framework recognizes local communities as key stakeholders in forest and tree management. In many parts of the country, communities have traditionally managed resources upon which they depend, through diverse institutional arrangements. Since 1990, the Joint Forest Management (JFM) policy has facilitated participatory protection and restoration of forests. Through JFM, agreements are made between local communities and state forest departments to jointly protect adjacent forest lands. More than 100,000 Joint Forest Management Committees have been created covering nearly 23 million hectares of recorded forest area (MoEFC 2011). Unfortunately, most of these committees are merely paper committees, and even when they do work, their institutional structure allows for excessive control by the forest bureaucracy.

Since 2006, a much stronger legislation has been in place that decentralizes and democratizes forest governance.[6] Called the 2006 Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (hereafter FRA) this legislation addresses long-standing issues of tenurial insecurity and access rights for tribal and other forest dwellers.[7] If fully implemented, FRA is expected to decentralize and democratize governance of about 35 million hectares of forest (45% of forests) through the recognition of community rights and community resource rights. This will directly benefit at least 200 million tribal and forest dwellers, living in more than 170,000 villages.

Nascent evidence from civil society organizations reports improvements in forest extent and quality from tenure secure forests, as well as substantial improvements in household incomes through the extraction and sale of non-timber forest produce (Vikalp Sangam and CFR-LA 2020). Emerging evidence also suggests that communities with secure rights were better able to tide over the economic crisis unleashed by the Covid-19 pandemic.

So far, India has realized less than 15% of the FRA potential for community forest rights — and even this rights recognition has been unevenly distributed. In fact, states with the highest forest cover and high NBS potential have been among the slowest to recognize rights (Agarwal and Saxena 2018; Chaturvedi *et al.* 2018. See Annex 1). Foot dragging by the forest bureaucracy — which is resisting decentralization of power and loss of forest revenues[8] — and low political will in support of community rights have often been cited as reasons for incomplete and uneven rights recognition. Also critical is the weak capacity of communities to demand their rights and engage in the long, drawn-out process for rights' recognition.

The market and supply chain relevance of community tenure can be broadly placed into two categories. The first relates to marketable services that can accelerate rights recognition processes by facilitating efficient and effective replication. To a large extent, communities have been successful in filing forest rights claims when civil society organizations have created awareness, facilitated social mobilization, and provided handholding support for fulfilling requirements of the FRA. While some elements of this support cannot be blueprinted (e.g., community mobilization), others like form filling or resource mapping and inventory development can be readily replicated with the use of technology, especially as digital penetration in India is growing manifold (McKinsey Global Institute 2019). A market for these services, along with low-cost, effective outreach techniques, can create entrepreneurial opportunities that contribute to increasing the proportion of land under secure tenure. The second category is relevant after rights have been recognized and communities have management control over forest resources. This category involves the production and sale of non-timber forest produce (NTFP) like bamboo, *kendu*

[6] Community tenure in forests is also recognized in other legal provisions, most notably the 1996 Panchayat (Extension to Scheduled Areas) Act. There are also legally-recognized systems of customary community tenure in place in northeastern parts of the country. While acknowledging the existence of these systems, this paper emphasizes FRA since it is most expansive in its reach, covering nearly all forest areas of the country.

[7] FRA recognizes three categories of rights. First are individual forest rights to legally hold forestlands that the forest dwelling communities have been residing on and cultivating prior to 13 December 2005. Second are community rights of ownership, use, and disposal of "minor forest produce," also known as non-timber forest produce (NTFP); CRs include rights of grazing, collection of firewood, fish, and other such products from water bodies, as well as rights to biodiversity and intellectual property, including those related to traditional knowledge. Third are community forest resource rights to protect, regenerate, conserve, or manage forest resources for sustainable use, providing for community governance of forests.

[8] Many states have nationalized some high value NTFP items. Almost 50% of forest revenues are generated from the sale of these NTFP.

leaves, lac, gum, resins, and a wide variety of medicinal and aromatic plants. For one third of India's rural population, employment in the NTFP sector as well as the sale of NTFPs provide more than half of household income (Pandey *et al.* 2018). With community forest governance, sustainable harvesting of NTFPs combined with stronger linkages to commercial markets can generate further income for households. These returns would flow directly to communities and individuals (as opposed to forest departments).

Priority Area 2: Regenerative agriculture

India's agriculture sector sits at the nexus of multiple tensions. The first is the pressure to intensify production. Although India is sufficient in food production at present, this production needs to increase substantially in the coming decades to ensure the food security of a growing population that is estimated to reach more than 1.6 billion in 2050 (UN Pop 2017). An associated trend is that of very high post-harvest losses — estimated to be over 15 billion USD in 2014, more than twice as much as the national agriculture budget for the same year (Jha *et al.* 2015). These losses exert further pressure on food production. The second is the adverse impact of climate change which is expected to decline agricultural productivity and erode up to 25% of annual agricultural incomes, with disproportionate impacts in rainfed lands (Government of India 2018). Third, development activity and urban expansion are leading to conversion of agricultural land, although the rate of this conversion is low as compared to other countries (e.g., China and Brazil). Finally, as already mentioned, India's agrarian sector is in distress due to a complex combination of factors including declining soil quality, increased production costs, and declining returns from agricultural investment that have resulted in high levels of rural indebtedness.

An emergent solution to addressing these problems concurrently is regenerative agriculture: a sustainable land management practice focused on ecological functions that can be effective in building resilience of agro-ecosystems (IPCC 2019). Simply put, regenerative farming approaches restore soils that have been degraded by industrial agriculture. They involve rebuilding soil organic matter through holistic farming and grazing techniques that allow nature to work. Advocates claim that over time, regenerative agriculture can generate net positive environmental and social impacts. In India, regenerative agriculture of different types is practiced in many parts the country. To a large extent, these solutions have been promoted by farmers and by civil society organizations, although there is increasing interest from state and national government actors, particularly for organic and natural farming (Khurana and Kumar 2020). Thus, the Government of India is promoting organic and natural farming through various schemes. Sikkim is committed to being India's first organic state while Andhra Pradesh and Himachal Pradesh are aspiring to be 100% natural farming states by 2022 and 2027, respectively.

Emerging evidence suggests that transitioning to regenerative systems is an environmentally more beneficial and economically more viable option. Initial, albeit contested, evidence from the iconic case of Community Managed Natural Farming in Andhra Pradesh (CMNF),[9] for instance, has demonstrated the multi-fold benefits that can accrue from such a transition. A life-cycle assessment of paddy, groundnut, chili, cotton, and maize crops in CMNF and non-CMNF farms in Andhra Pradesh concluded that CMNF processes require 50–60% less water and less electricity than non-CMNF for all selected crops (CSTEP 2019). For irrigated crops, CMNF utilizes 45–70% less input energy (12–50 GJ per acre) and results in 55–85% less emissions (1.4–6.6 Mt CO_2e) than non-CMNF. In the case of rainfed crops these numbers are even starker, with CMNF requiring 42–90% less input energy (1.1–16 GJ per acre) and results in 85–99% less emissions (0.5–11 Mt CO_2e). CMNF was also found to considerably reduce methane emissions; and the centrality of the practice of mulching reduced the incentive to burn crop residue, possibly leading to improvements in air quality. On the household economics side, a study by Khurana & Kumar (2020) reported farmer perceptions that: one, CMNF had improved the resilience of crops to weather events. Two, for the most part, net income for farmers — particularly small farmers — increased. For large farmers, the higher labor requirement of CMNF implied that net income remained the same. Three, since farm inputs were locally sourced, the cost of these inputs fell drastically under CMNF and most farmers no longer had to borrow money to farm.

[9] *This program was initially christened Andhra Pradesh Zero Budget Natural Farming.*

Four, CMNF impacts on yield varied across crop types. For most crops, yield increased or remained the same when compared with non-CMNF farming systems.

Presently, regenerative agriculture systems are niche. Scaling up and scaling out these practices requires overcoming multiple interconnected political, institutional, market, financial, and knowledge barriers that are adversely impacting the uptake of regenerative agriculture practices by farmers and governments (See Figure 4). As regenerative systems shift from niche to mainstream, three types of market and business opportunities may be anticipated. The first relates to provisioning of inputs for transforming the production base. These could include decision-

FIGURE 4: Barriers to mainstreaming organic and natural farming

Why governments at the Centre and states are not adequately pushing for organic or natural	Why farmers are reluctant to adopt organic or natural farming practices	Why the majority of consumers are not buying organic or natural foods
• Mindset of chemical farming • Scientific community not oriented towards organic or natural farming • Issues of low yield and food security • Influence of agro-chemical industry • Organic and/or natural produce not considered a holistic solution beyond pesticide-free food • Lack of documentation on holistic linkages • Limited attention to disadvantages of current chemical-based model • Lack of conviction about benefits • Extension machinery lacks expertise; not trained, not practiced • State-level "political will" not adequately displayed other than in a few states such as Sikkim and Andhra Pradesh	• Prevailing mindset for chemical farming • Lack of knowledge of organic and/or natural approaches • Lack of confidence in organic and/or natural practices and fear of low yield • Lack of risk-taking capacity to bear yield losses • Absence of handholding support during transition to organic and/or natural farming • Lack of support and risk coverage during transition to organic cultivation • Lack of assured market offering remunerative prices • Inadequate availability of quality organic inputs like seeds, bio-inputs, and technology • Concerns about pest management • Certification involves extensive paperwork, which is cumbersome and expensive for small farmers • Dependence on livestock • Natural and organic farming are labor-intensive and require time • Rural youth's declining interest in agriculture; reducing joint family support system	• Organic produce often priced higher than conventional — most consumers not ready or cannot afford to pay higher prices • Organic produce not easily available and accessible everywhere • Concerns about credibility of organic food in market, i.e., whether produce is fake organic • Lack of awareness or conviction about health linkages (e.g., cancer and pesticides have a more complex link than sugar and diabetes — this link is less direct, less seen, and less believed) • Limited awareness on linkages of organic and/or natural farming with sustainability, environment, etc. • Consumers may lack awareness of chemical-dependent food systems and food producers

Source: Reproduced from Khurana and Kumar 2020.

support and advisory systems. They could also include localized markets and supply chains for physical inputs such as seeds or natural fertilizers and pesticides. The second relates to markets for commodities, and to a large extent would be commodity driven. The third relates to ecosystems services. In addition to the trade of ecosystem services themselves such as carbon, markets for ecosystem services would create opportunities for low-cost monitoring, verification and tracking, and trading systems.

Priority Area 3: Promoting the use of biomass in construction

Globally, the building construction industry is regarded as one of the most carbon-intensive industrial sectors. India is poised to witness rapid growth in both urbanization as well as construction. The national government estimates that more than 40% of India's population, or 600 million Indians, will live in urban centers by 2030, necessitating construction of 600 to 800 million square meters of urban space every year between 2021 and 2030.[10] Essentially, more than 70% of Indian houses are yet to be built.

The increased adoption of biomass in construction offers a pathway to mitigating the construction industry's climate impact through lower fossil carbon emissions, long-term biogenic carbon storage, potential reduction in material waste, and increased construction efficiency. Although very nascent, this sector could be developed so that it absorbs the biomass that is produced in agroforestry systems as well as from the plantations of the forest departments. It could therefore catalyze and support market-led transitions in both the forest and agriculture sectors, while also enabling more sustainable urbanization.

An enabling environment for biomass in construction is gradually emerging in India. On the production system side, the National Agroforestry Policy and the National Bamboo Mission, for instance, are both promoting biomass production on non-forest lands. On the demand side, the Ministry of Environment, Forest, and Climate Change has become open to the increased use of wood, and in 2017 launched a "Wood is Good" campaign towards this end. Despite these encouraging beginnings, the mass timber sector has a long way to go before it becomes accepted and adopted at a scale sufficient to deliver potential impacts. Investments will be necessary for correcting perception issues about the use of wood (expensive, prone to disease, environmentally-unfriendly...), as well as creating the policy, technological, skill and capacity, financial, and institutional infrastructures for this transition.

Pathways to Change: The Role of Donors

Implementing NBS such as those described in the previous section will require large scale and coordinated public and private sector financing. As in the case of other social sectors, land use action in India is financed predominantly by the public sector with the biggest contributions coming from budgetary allocations of the national and state governments. These funds flow to the ground in schemes run by different ministries. For the most part, government finance is inadequate as well as highly fragmented. For instance, a recent estimate found that in the period 2012-2013 India spent about USD 2.6 billion annually on biodiversity-relevant expenditures, which included land use-based actions. This was less than 20% of the outlay required to implement the country's National Biodiversity Action Plan (Pandey *et al.* 2020). The study further found that such spending was distributed across more than 115 schemes run by 24 central ministries and 29 departments. With this level of fragmentation, ascertaining progress and impact is very challenging. Furthermore, the design of most government schemes typically adopts a "one size fits all" approach, with very little room for maneuver in implementation; and often the assumptions underpinning this design are untenable (e.g., in terms of availability of grassroots institutions and their capabilities, the scaling power of the demonstrated solution, or of implementing organizations willingness to collaborate). Consequently, schemes oftentimes fail to take off and to deliver intended outcomes. And while policy and programs may speak

[10] www.firstpost.com/india/40-indians-likely-to-live-in-urban-areas-by-2030-says-hardeep-singh-puri-8725381.html#:~:text=New%20Delhi%3A%20Forty%20percent%20of,Hardeep%20Singh%20Puri%20on%20Tuesday

BOX 2: Illustrative ideas for grant-making to operationalize pathways for climate, forest, and land use action

Designing strategies for achieving scale

- In selected states, identify priority landscapes based on a comprehensive set of variables including (but not limited to) biophysical potential for strengthening community forest governance and promoting regenerative agriculture; ground level political and people support; the presence of enabling conditions such as tenure, institutions, and finance; and the likelihood of market-facilitated land use transitions.
- Identify the production base and processing potential for biomass in construction and develop strategies that link production systems to urbanization hotspots.

Catalyze changes in mindsets and behavior

- Design (or extend existing) networks that promote sub-national leadership on land use and climate action by providing incentives to political and administrative leadership. This may be similar to the Governors' Climate and Forests Task Force (www.gcftf.org).
- In collaboration with agriculture universities, design and deliver training packages on regenerative farming for agriculture graduates, extension services, and the Krishi Vigyan Kendras (agriculture science centers). Recruit champions who can demonstrate these technologies at the field level and catalyze local movements.

Facilitate evidence and knowledge flows for decision-making

- Develop participatory resource monitoring systems for tenure secure forests managed by communities. This could leverage the upcoming Global Restoration Observatory. Monitoring and verification systems could also be combined with market aggregation platforms to support scaling up of responsible businesses.
- Build evidence and data that can contribute to reshaping Ecological Fiscal Transfers so that they no longer remain exclusively focused on forest density but also attend to dimensions of forest quality as well as secure tenure, and thereby provide a better policy incentive for strengthening forest governance and improving the flow of forest ecosystem services.

Promote responsible businesses and equitable supply chains

- Collaborate with mainstream financial institutions to design innovative financial packages that can support the growth of social enterprises in the forest and agriculture sectors.
- Incubate agritech and forestech start-ups to catalyze higher levels of entrepreneurial energy in the climate and land use priority areas described above.

eloquently of the desirability of "convergence" and "congruence" among the schemes of different government departments in achieving land use and climate goals, these are often very difficult to realize due to existing structural, political, and institutional barriers (Chaturvedi 2015).

In addition to budgetary allocations, cesses present a potential source of climate and land use action. Notably, the diversion of forest land for development purposes requires developers to "compensate" the loss of environmental services and cover the costs of recreating green cover through afforestation. This is done through contributions to the Compensatory Afforestation Fund, which has collected over 7 billion USD. Although this amount must be used for strengthening afforestation, large sums of this Fund have either been used for administrative expenses (building and renovating forest rest houses, purchasing IT equipment, fuel and travel) or for monoculture plantations that usually exclude communities.[11] Similarly, the District Mineral Foundations created with the express purpose of ensuring development and livelihood security of locals living in mining-affected districts has accumulated over 5 billion USD, of which less than 3% has been utilized (Banerjee et al. 2018). Although both CAF and the DMF represent "blood money" and one hopes that they will not increase substantially in future, the effective utilization of these funds could offset some of the development fallouts.

Since the early 2000s, bilateral financing into the land use and environment sector has declined. This ties in with India's gradual transition from recipient to donor, as well as its determined resistance to accepting funds with conditionalities. Notable ongoing bilateral programs in climate and land use include the Forest-PLUS 2.0, in which the U.S. Agency for International Development (USAID) is providing technical assistance to the Indian Ministry of Environment, Forests, and Climate Change to improve the management of forested landscapes in three states.[12] On the private sector side, India has seen a significant increase in philanthropic giving to the social sector from 2010 to 2018, with an almost 60% increase in individual contributions (Dasra and Bain & Company 2020). It is, however, unclear how much of this has been invested in land use and climate solutions, with climate action jostling for space in an already overcrowded development agenda that includes poverty alleviation, education, health and nutrition, and water and sanitation. It is unlikely that it attracts a significant proportion of philanthropic contributions. Private sector support for climate and land use solutions has also been channelized through Corporate Social Responsibility (CSR)-related giving, although only 12% of the 1.4 billion USD CSR outlay flowed to environment sustainability, with information on land use outlay unavailable.[13] And while growing attention to the climate crisis has galvanized several global private sector commitments to action, it is unclear the extent to which these may translate into climate and land use initiatives in India.[14]

To accelerate progress on the climate and land use actions suggested in the previous section, philanthropic funders can support the achievement of impacts at scale in three ways: one, by unlocking available public funding and improving the effectiveness of public spending; two, by catalyzing enlarged public and corporate sector investments in land use and climate action; and three, by enhancing on-the-ground absorptive capacity (readiness) for enlarged funding (demand creation for change on the ground). This may be achieved through the following broad pathways that would need to be operationalized through specific grant making ideas (See Box 2).

1. Design strategies for achieving scale. Several decades of investment in land use projects and technologies in India have led to a plethora of discrete shining star examples of success and promising pilots. However, these successes remain localized and don't get to scale. Part of the problem is one of design. Planners and funders often assume that once the power of an idea or innovation has been demonstrated, it will organically scale up (Woltering *et al.* 2019). However, this is not the case. Getting to impact at scale requires strategies that are

[11] www.thewire.in/environment/centre-conservation-forest-rights-tribals; https://economictimes.indiatimes.com/news/economy/finance/states-diverting-campa-funds-for-planting-trees-to-meet-other-expenditure/articleshow/46670180.cms?from=mdr

[12] www.usaid.gov/india/news-information/press-releases/usaid-and-moefcc-launch-forest-plus-20-improve-status-india

[13] www.india-briefing.com/news/corporate-social-responsibility-india-5511.html/

[14] *For instance, the commitments made by Shell, Total, and BP; or the estimated 2.9 billion USD private finance committed to restoration.*

embedded in and respond to wider systemic drivers such as politics, policy, institutions, and incentives, which in turn play out differently at local, regional, and national levels. Philanthropies can support the design of strategies that aim for impacts at scale, within which discrete investments can be embedded, and alignment explored through co-financing arrangements.

2. Catalyze changes in mindset and behavior. The processes of chemical input-based agricultural intensification brought in by the Green Revolution, or of exclusionary forest conservation and management inherited as part of India's colonial legacy, continue to exude a strong hold over policy, thought, and action. Each of the NBS priority areas described in the previous section are predicated upon successful changes in mindset and behavior of influential stakeholders — policymakers, business, donors, consumers, and landowners. Although customized strategies will be essential for each stakeholder and intervention area, philanthropy can support combinations of measures that may facilitate change, including demonstration of success, credible delivery of powerful narratives including strong economic arguments, new incentives, and development of communities of practice.[15]

3. Facilitate evidence and knowledge flows for decision-making. Accelerating progress in climate and land use priority areas described in the previous section requires philanthropic support in addressing three types of evidence deficits. The first involves missing information fundamental to designing scaling strategies. The second evidence deficit is low accessibility and usability of existing knowledge and evidence. This requires philanthropic support for designing, testing, and deploying evidence-based tools that can support adaptive decision-making. The third evidence deficit pertains to free flows of information including contested information, and opportunities for building shared understanding through debate and dialogue. In the regenerative agriculture space, for example, experts lament the current stalemate between believer and non-believer scientist groups, particularly policy advisory groups who have adopted diametrically-opposite positions. In the absence of minimal agreement between these positions, policymakers tend to adopt a risk averse approach in which they may merely posture support for regenerative systems.

4. Promote responsible businesses and equitable supply chains. The role of markets and supply chains in promoting environment and development outcomes has been much debated. Critics argue that market mechanisms are inherently unjust and can further reinforce structural inequalities in society. However, multiple initiatives (within the umbrella of social enterprises) demonstrate how more power-balanced and equitable supply chains can be established.[16] The success of these responsible businesses and value chains in delivering desired environmental and social outcomes is predicated on their upfront investments in social mobilization and institution-building, which are both time- and resource-intensive. These investments don't readily translate into monetary returns and are therefore seen as "sunk" investments that make social enterprises relatively less competitive and reduce their ability to raise capital. One of the ways of addressing this challenge is to direct philanthropic investments into the social capital-related costs, which has already started albeit on a very small scale through processes like the Restoration Accelerator run jointly by The Nature Conservancy and the World Resources Institute as part of a larger global program.[17] Additionally, it is critical to scale up and

[15] In the case of regenerative agriculture, for instance, a powerful case could be (and to some extent has been) made in terms of the savings that could accrue to governments if fertilizer subsidies are redirected to natural farming systems. A recent study by the CEEW (2020) estimated that if all farmers in Andhra Pradesh shifted to CBNF, the state could save 300 million USD annually in fertilizer subsidies. Yet, this economic argument alone may be insufficient for shifting policy because of the political economy of fertilizer production, as well as the possible shifts in benefit flows from politically influential large farmers to small and marginal holders. The economic argument may therefore need to be combined with other political incentives that relate to the compulsions of vote-bank politics, or perhaps appeal to political leaders' desire for a legacy. It may also need to be bolstered by credible evidence that such a shift is not risky at the farm level (and therefore unlikely to adversely impact farmer voting patterns).

[16] The Black Baza Coffee Company, for instance, is designed as an "activist company" whose mission is to "enable coffee producers to enjoy secure and stable livelihoods and strengthen coffee farming practices that conserve biodiversity." Born from a four-year research project, Black Baza embodies a movement to disrupt existing coffee markets that are structured in wats that undermine the well-being of forests as well as farmers. The Company has started a participatory coffee growers movement that firstly co-imagines a sustainable coffee future with famer communities and then connects producers with consumers through a community-supported agriculture marketplace. For further details see www.blackbazacoffee.com.

[17] For information see www.wri.org/our-work/project/land-accelerator

scale out these new market models by building bridges to larger financing opportunities — from private impact investors and well as mainstream institutional investors.

5. Strengthen key enabling conditions. Secure tenure, enabling policies, appropriate institutions and governance mechanisms, access to technology, and adequate financial flows are some of the enabling conditions essential for strengthening the land use production base and associated markets. While many of these enabling conditions exist, they are not configured well enough to form the basis for transformative actions at scale. Philanthropies can provide invaluable support in strengthening these enabling conditions. For instance, since 2018, the Tenure Facility has been supporting a consortium of organizations led by the Indian School of Business to leverage existing political will, grassroots mobilization, and civil society strength in the states of Odisha, Jharkhand, and Chhattisgarh to secure community forest rights for over 5,000 communities and 1 million hectares of forest land. These secure rights are expected to deliver a sound basis for community-corporate engagement, as well as more equal involvement of communities in forest value chains.

This paper presents a high-level vision for climate, forest, and land use in India, and provides a broad understanding of priority areas of intervention leading to the achievement of that vision. As this vision is translated into strategies and plans of action, three things will become critical. One, as the paper notes quite early on, India's attention to climate is overwhelmed by the need to secure jobs, improve productivity and stimulate economic growth — imperatives that have become even more urgent in the wake of the economic havoc wrecked by the global pandemic. It will therefore be essential for philanthropies and donors to translate climate action into development terms. Two, as the paper notes, forest and land use actions in the country are highly likely to be impacted by larger contextual enablers and stressors, some of which are beyond the sphere of philanthropic influence and may need to be managed through strategic collaborations. And finally, India is a highly diverse country with complex socio-ecological systems governing land use. Philanthropies may therefore find it useful to prioritize geographies of intervention.

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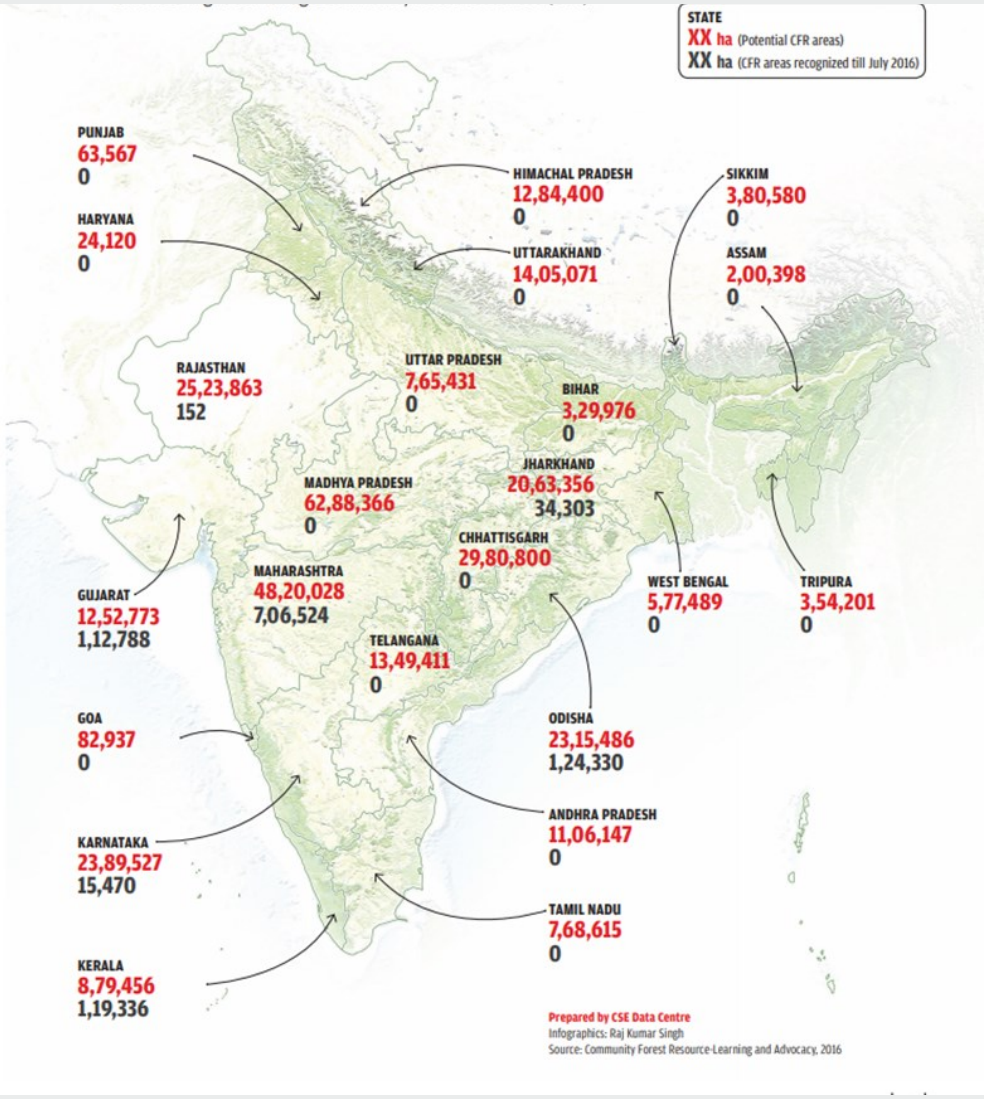
Annex 1

Potential and Recognized Community Tenure in India



Source: Agarwal and Saxena 2018

AUGUST 2021

Thought Piece: India: Markets and Supply Chains for Climate, Forests, and Land Use

Rohini Chaturvedi