

How Can We Harness Climate Change Mitigation Potential of REDD+ in India?

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Abstract

This working paper introduces the United Nations initiative on Reducing Emissions from Deforestation and forest Degradation (REDD). Reducing Emissions through avoided Deforestation in Developing countries (REDD) first discussed at the 11th Conference of Parties (COP) in 2005. During the 13th COP in Bali Action Plan, its concept was revised to include sustainable development. This enhanced concept was called REDD+. The five new elements of REDD+ were ratified at the Copenhagen COP-15 held in 2009. The Cancun Conference (2010) called for international financing and funding for implementing REDD+ projects. The Durban COP-17 held in 2011 was about setting reference emission levels and conducting monitoring, reporting, and verification relating to REDD projects. REDD+ is expected to be operational in the second commitment period of Kyoto Protocol. We present current status of REDD in India and the need for carbon accounting REDD plus readiness plan for India are discussed.

Keywords: REDD, Climate change mitigation, Forest cover, Women empowerment

1. INTRODUCTION

'Climate mitigation and adaptation strategies must be developed with women, not for them, and women must be involved alongside men in every stage of climate and development policy-making.'

--Mary Robinson Foundation in 2010

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Global warming and climate change are providing new threats to our energy security and sustainability. Energy security is of prime concern of every citizen of the globe, man or women. It is determined by energy availability for meeting the basic needs in transportation, building, industrial and agriculture activities. Fossil fuels continue to dominate the world energy scene and are currently meeting 82% of the global energy needs. They are also the reason for increasing CO₂ and other greenhouse gas pollution in the atmosphere. The average atmospheric concentration of CO₂ as a trace gas in preindustrial era was 280 ppmv. In 1958 the observed concentration was 315 ppmv, which suggested an increase of about 0.5 ppmv per year in the first half of the 20th century. In 2005 the measured concentration of CO₂ was 374 ppmv, suggesting an increase of about 1 ppmv per year in the latter part of the 20th century. As the greenhouse gas emissions are increasing, their concentrations in the atmosphere are rising, resulting in global warming. According to IPCC 2007 mean rise in global temperature from 1905 to 2006 has been recorded as 0.74°C.

Forests are important carbon sinks. More than 30 percent of the earth's surface is covered by forests. The forests take up CO₂ through photosynthesis route and store it in their woody biomass. In the event of logging and burning of forests or by deforestation and degradation of forests, there is loss of carbon storage. Can we harness their climate change mitigation potential by stopping deforestation and degradation? Burning and clearing of tropical forests can account up to 17 per cent of total global GHG emissions on earth and it is desirable to conserve forests. Mechanisms like REDD and REDD+ have been suggested in the Conference of Parties (COP) of United Nations Framework. Convention on Climate Change (UNFCCC) was enunciated in the Rio Earth Summit held in 1992. It is in this

context the above quote would become relevant to women empowerment in developing countries envisaged in implementation of REDD and REDD+.

Considering the importance of forests as carbon sinks, FSI, Forest Survey of India, has estimated carbon stocks in Very dense forest, Moderately dense forest and Open forest, for 1994 and 2004 in respect of forest land remaining forest land and land converted into forest land (Table 1). Forest cover in different States/UTs of India is depicted in Table 2.

Table 1: Forest land remaining forest land and land converted to forest land in 2004 with respect to 1994

Land Use	Forest Land Remaining Forest Land (km ²)	Land Converted to Forest Land (km ²)
Very Dense Forest	78770	4702
Moderately Dense Forest	301926	18022
Open Forest	270599	16152
Total	651295	38876

Source: India state of forest report, 2011.

Table 2: Forest cover in States/UTs in India (area in km²)

State/UT	Geographical Area	2011 Assessment				Forest Cover Reported in ISFR 2009	Interpretational Change	Forest Cover 2009 as Revised (7+8)	Real Change from SFR-09 (6-9)
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest				
1	2	3	4	5	6	7	8	9	10
Andhra Pradesh	275069	850	26242	19297	46389	45102	1568	46670	-281
Arunachal Pradesh	83743	20868	31519	15023	67410	67353	131	67484	-74
Assam	78438	1444	11404	14825	27673	27692	0	27692	-19
Bihar	94163	231	3280	3334	6845	6804	0	6804	41
Chhattisgarh	135191	4163	34911	16600	55674	55870	-192	55678	-4
Delhi	1483	7	49	120	176	177	0	177	0
Goa	3702	543	585	1091	2219	2151	61	2212	7
Gujarat	196022	376	5231	9012	14619	14620	0	14620	-1
Haryana	44212	27	457	1124	1608	1594	0	1594	14
Himachal Pradesh	55673	3224	6381	5074	14679	14668	0	14668	11
Jammu & Kashmir	222236	4140	8760	9639	22539	22686	-149	22537	2
Jharkhand	79714	2590	9917	10470	22977	22894	0	2894	83

Karnataka	191791	1777	20179	14238	36194	36190	0	36190	4
Kerala	38863	1442	9394	6464	17300	17324	0	17324	-24
Madhya Pradesh	308245	6640	34986	36074	77700	77700	0	77700	0
Maharashtra	307713	8736	20815	21095	50646	50650	0	50650	-4
Manipur	22327	730	6151	10209	17090	17280	0	17280	-190
Meghalaya	22429	433	9775	7067	17275	17321	0	17321	-46
Mizoram	21081	134	6086	12897	19117	19240	-57	19183	-66
Nagaland	16579	1293	4931	7094	13318	13464	0	13464	-146
Orissa	155707	7060	21366	20477	48903	48855	0	48855	48
Punjab	50362	0	736	1028	1764	1664	0	1664	100
Rajasthan	342239	72	4448	11567	16087	16036	0	16036	51
Sikkim	7096	500	2161	698	3359	3357	2	3359	0
Tamil Nadu	130058	2948	10321	10356	23625	23338	213	23551	74
Tripura	10486	109	4686	3182	7977	8073	-88	7985	-8
Uttar Pradesh	240928	1626	4559	8153	14338	14341	0	14341	-3
Uttarakhand	53483	4762	14167	5567	24496	24495	0	24495	1
West Bengal	88752	2984	4646	5365	12995	12994	0	12994	1
A & N Islands	8249	3761	2416	547	6724	6662	0	6662	62
Chandigarh	114	1	10	6	17	17	0	17	0
Dadra & Nagar Haveli	491	0	114	97	211	211	0	211	0
Daman & Diu	112	0	0.62	5.53	6	6	0	6	0
Lakshadweep	32	0	17.18	9.88	27	26	0	26	1
Puducherry	480	0	35.37	14.69	50	44	6	50	0
	3287263	83471	320736	287820	692027	690899	1495	692394	-367

Source: India state of forest report, 2011.

The State of Madhya Pradesh has the highest forest cover (77,700 km²), followed by Arunachal Pradesh, Chhattisgarh, Maharashtra and Orissa. Mizoram has the highest percentage of forest cover with respect to total geographical area as 90.68%, followed by Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya and Tripura. Total forest cover in India based on 2011 assessment is 6,92,027 sq. km. The role of forests, evolution of REDD in the light of carbon credit mechanism under Kyoto Protocol are discussed here. The current status of REDD in India, anticipated benefits and need for a robust carbon accounting system are presented.

2. EVOLUTION OF REDD AND REDD +

Since 1850, it is estimated that land-use changes have released about 136 GtC (giga tonnes of carbon) while fossil fuel combustion about 270 GtC (Sathaye et al, 2006). Of this, 180 GtC remains in the atmosphere, while 110 GtC has been taken up by growing vegetation and the remainder is absorbed by the oceans. ‘Reducing Emissions from Deforestation in Developing countries’ (REDD) was proposed by Papua New Guinea and Costa Rica at the Conference of Parties 11th meeting (COP 11) held in Montreal in 2005. The REDD concept was to discourage the developing countries from cutting the forests by paying compensation through carbon credits in order to prevent release of waste of the carbon emissions stored in the forests. At the current rate of growth rising concentrations of CO₂ are expected to become 550 ppm in 2050 from 396 ppm at present. Advocating the role of forests as global carbon sinks it is predicted that reducing global deforestation by 50 percent by 2050 offers nearly one-third of the cost-effective, technologically available option to meet 450 ppm stabilization targets. The major contribution will come from tropical forest –rich countries (Tavoni et al, 2007).

REDD has shifted the focus from the role of industries as GHG emissions mitigation to role of forests. It was pointed out that in climate change mitigation, forestry sector could be given the same status and responsibility, as energy sectors like industry and transport. India introduced the concept of ‘compensated conservation’ and demanded a mechanism for incentivizing efforts towards restoration and conservation of forest carbon stocks, as part of the REDD strategy. REDD was elaborated as Reducing Emissions from Deforestation in Developing countries. This was supported by China and other developing countries practicing forest management focusing on conservation. The Subsidiary Body for Scientific

and Technological Advice (SBSTA) of UNFCCC worked on REDD strategy. Since then guidelines for REDD implementation are being worked out.

Subsequent international debates and agreements under the United Nations Framework Convention on Climate Change (UNFCCC) have led to the conceptualization of REDD+ from REDD to include Sustainable Forest Management (SFM) and Afforestation and Reforestation (A&R). conservation, and enhancement of forest carbon stocks in developing countries. The consensus on REDD+ was launched during the Bali Action Plan (COP13- 2007). The five elements that distinguish REDD+ from REDD included (i) Afforestation/ Reforestation, (ii) Increasing carbon stock of existing forests, (iii) Conservation of carbon stock through sustainable forest management, (iv) Reducing emissions from deforestation and (v) Reducing emissions from forest degradation. There were endorsed at the Copenhagen Climate Conference (COP-15) in 2009. The COP-15 adopted decision on methodological guidance for activities relating to reducing emissions from deforestation and forest degradation. General guidance for the establishment of forest refers emission levels and forest reference levels were proposed. REDD+ as sustainable forest management became a tool to increase sequestration of carbon in terrestrial ecosystems, and hence has been identified as one of the most effective tool in combating climate change.

The Cancun Climate Conference COP-16 in 2010 stressed on the need for inclusion of social and environmental safeguards as well. The implementation was expected to be carried out in accordance with guidance in Annex I. Developing countries were expected to create a national forest reference emission level, a transparent monitoring & reporting of REDD+ activities and providing information on how to safeguards in Annex I should be

promoted. A phased programme for implementation of REDD+ was proposed. The Durban Conference in South Africa (COP-17) dealt with questions about how to set reference emission levels, and how to conduct monitoring, reporting, and verification (MRV). A few developing countries came out with their plan and submitted policy measures and implementation strategies for REDD+. The COP-17 took a landmark decision to extend Kyoto Protocol into its second commitment period, the form for which would become clear in 2015. The issues relating to capacity building, support through multilateral channels, effective participation of different stakeholders and financing have been discussed in COP-17 and COP-18. It was expected that REDD+ becomes operational in the second commitment period of the Kyoto Protocol.

3. CARBON CREDITS MECHANISM UNDER KYOTO PROTOCOL

The first and only climate change international agreement; United Nations Framework Convention on Climate Change (UNFCCC) came into force in 1994, after it was ratified by 50 countries. The negotiation for actions to be taken for control of global warming began thereafter between Annex I and non-Annex I country parties. The Conference of Parties (COP) held its first meeting in 1995 and so far 18 COP meetings have been convened under the umbrella of UNFCCC. The first commitment period being 2008-2012, during which avoided deforestation is not included and only a few projects were registered in Afforestation/ Reforestation.

As a result of various negotiations, new market based international collaborations appeared on the scene through Carbon Trading as a tool for reducing global carbon emissions. An outcome of Kyoto Protocol (put forward in 3rd Conference of Parties) under

UNFCCC, carbon trading is relevant to both developed and developing countries. The schemes like emission trading (ET) and clean development mechanism (CDM) become ready as mandated and voluntary mechanisms respectively. The CDM mechanism became operational in 2005 and is anticipated to produce CERs amounting to more than 2.9 billion tonnes of CO₂ equivalent in the first commitment period of the Kyoto Protocol, 2008–2012. A summary of status of CDM projects is provided in Table 3.

Table 3: CDM Projects and Annual Average CERs (as on June 2012)

CDM Projects	Annual Average CERs	Expected CERs until end of 2012
CDM project pipeline: > 5600 of which:	N/A	> 2,700,000,000
a) 4297 are registered	611,427,877	> 2,150,000,000
b) 95 are requesting registration	12,084,014	(not given)

Source: <http://cdm.unfccc.int/Statistics/index.html>

In the existing form CDM enables the Annex I countries to meet their GHG reduction Kyoto targets by implementing projects in developing countries. Annex-1 countries will count certified emissions reductions (CERs) obtained from project activities in developing countries. Once certified, these reductions can be used to meet Annex-I commitments under the Kyoto Protocol to fulfill their 2008-12 target of reducing GHG emissions, taking 1990 as base year. Non- Annex-1 countries are intended to benefit in terms of sustainable development and to support faster access to and dissemination of clean technologies. Developed countries that have exceeded their allowed emissions levels can borrow or buy credits from other countries. Carbon trading thus allows countries to essentially right to emit carbon dioxide or other GHG.

The Clean Development Mechanism (CDM) has laid more stress on reducing the overall cost of GHG mitigation in achieving targets set for Annex I countries while promoting sustainable development. The CDM projects focus on industries and provisions for forestry projects are negligible. The 9th meeting of Conference of Parties adapted land use and land use change and forestry (LULUCF) as loss of forests can contribute up to 17 per cent of the total emissions. In the CDM Registry, Afforestation/ Reforestation (AR) projects were included. The methodologies have been evolved. China and India actively pursued CDM and CDM AR while other countries showed little motivation or drive to develop such projects. First Afforestation Clean Development Mechanism (CDM) was small scale activity on private lands affected by shifting sand dunes. It encouraged private entrepreneurs and forest departments to effectively use degraded lands to promote forestry sector activities in India and expected to generate 11,500 carbon credits annually for a period of 20 years. The contribution of CDM AR projects however remained low. Only 22 CDM AR projects were registered at the end of May, 2011 contributing 0.007% in total CERs (Prachi, 2012). The CDM had developed rigorous methods and set the basic guidelines. Yet CDM AR looked complex due to lengthy procedures and unresolved issues. There were difficulties in implementing CDM relating to a carbon trading mechanism in forestry sector as there is no overall reduction in the emissions targeted in CDM projects. While emissions reduction may be occurring at one place, CDM allows pollution to continue elsewhere through sale and purchase of carbon credits. The CDM focus in its first phase has been stabilization and not reduction of GHG emissions. Forestry sector projects on the other hand could help in reducing emissions and carbon mitigation through the removal of CO₂ from the atmosphere as trees sequester carbon and store it as biomass.

4. CURRENT STATUS OF REDD+ IN INDIA

Forests are the lifeline of 200 million people in India. According to the Forest Survey of India, total forest cover in India is 69.2 million hectares, which is approximately 21 % of the total land mass. The Forest Conservation Act came in to force in 1980 and various afforestation programmes were started. In India an increase of around 3 million hectares of forest cover over the last decade has been reported. The mitigation potential of the forestry sector has been estimated to be 2.7 to 13.8 giga tonnes CO₂ annually by the year 2030. This is approximately 8-13% of total carbon mitigation potential (TERI, 2012).

The Forest Rights Act, enacted in 2006, entitles forest dwelling communities to forest rights and titles. The government has launched 'Green India Mission' under the National Action Plan on Climate Change 2008, at a budget of Rs.46,000 crore over a period of 10 years. The objective of the Mission is to raise the forest cover in 5 m ha and recover the quality of forest cover in another 5 m ha. Thus, it will help in improving the ecosystem, forest-dependent livelihoods and income of around 3 million forest dwellers in 10 m ha of land.

Indian Network for Climate Change Assessment (INCCA), has released its report on the study of the impact of climate change on India's forests in November 2010. A technical group to develop methodologies and procedures to assess and monitor contribution of REDD+ actions has been set up. A National REDD+ Coordinating Agency is being established. A National Forest Carbon Accounting Programme is being institutionalized. India hosted the Conference of Parties (COP-11) of the Convention on Biological Diversity at Hyderabad in 2012, to coincide with 20 years of Rio Summit.

4.1 Anticipated Benefits from REDD+

India has taken a strong stand in favor of REDD+ in view of short-term and long-term benefits of REDD anticipated as below:

4.1.1 Biodiversity Conservation - A global REDD+ mechanism will benefit India in protecting India's Biodiversity. Tropical forests provide a habitat to innumerable species, some of which are threatened/ endangered and may not be found elsewhere in the world. Deforestation and forest degradation are the major causes of biodiversity loss and extinction of species. In addition communities also suffer as local people are dependent on forests. Burning and logging of forests leads to loss of resources and affects their livelihood and results in migration.

4.1.2 Climate Change Mitigation - An integrated approach to implementation of REDD+ mechanism together with policy interventions can lead to climate change mitigation and adaptation, increase in forest cover and quality of forest cover, biodiversity conservation and improvement of living conditions of local communities and forest dwellers. All of these are vital to sustainable development. According to the Intergovernmental Panel on Climate Change (IPCC) protecting and restoring forests should be the immediate response to climate change. Implementing pro-forest agriculture and management methodologies can prevent more than 300 billion tons of carbon dioxide emissions over the next 40 years. REDD+ has the potential to become the most suited strategy for carbon sequestration to combat global warming and climate change.

4.1.3 Earning Carbon Credits - REDD+ opens up the possibility to get carbon credit rewards for its pro-conservation and Sustainable Forest Management (SFM) approach, which would make further increase of forest cover and thereby forest carbon stocks achievable.

According to the Ministry of Environment and Forests, India's forests sequester approximately 24,000 metric tons of CO₂ worth Rs. 6,00,000 crores. Increases in cost of carbon are going to push that amount up even more. Implementation of REDD+ programme in India is estimated to capture more than 1 billion tonnes of additional CO₂ over the next 3 decades and provide more than USD 3 billion as carbon service incentives under REDD+.

4.1.4 Women Empowerment - The REDD was seen as an instrument for women empowerment and making them responsible for developing strategies for adaptation and mitigation of climate change. Carbon incentives would be passed onto local communities specially women, who are the land owners and can be involved in safeguarding forests, ensuring sustained partnerships and protection of forests. REDD implementation would entail women empowerment by promoting eco-earnings. Inclusion of new methodologies within REDD+ framework, capacity building, and awareness among women folks as future directions in climate change mitigation options are important.

4.2 Need for Carbon Accounting in REDD+

Reducing Emissions from Deforestation and Degradation (REDD) proposed in the Bali meeting of 13th COP in 2007 as a means of CO₂ sequestration through 'avoided deforestation' is a carbon trading mechanism. With more than 60 per cent of the Indian population depending on agriculture or forests, the significance of carbon trading mechanisms in these sectors is being deliberated. REDD+ has multi folds targets through a single course of action; reducing deforestation and land degradation while also enhancing ecosystem-based adaptation strategies in communities that depend on forest resources. A carbon accounting system has to be robust to address all five elements of REDD+ as per

national and international guidelines. For example, avoided deforestation activities involve preserving the carbon stock of forests. Although linkages of forestry sector to poverty alleviation as it exists in REDD+ provides incentives to local people for protecting forests, the terminology are complex and there are no clear definitions or database on deforestation or forest degradation in India (Rabindranath et al, 2012).

Different forest carbon pools are defined as in Table 4. The annual changes in carbon stock from these pools in forest land remaining forest land during the ten year period 1994-2004 and annual change in carbon stock in land converted to forest land during same period are worked out as 21.7 and 37.5 million tones of carbon respectively. These aggregate levels show an entirely different picture at the State level. The soil has a significant role in CO₂ capture.

Table 4: Different forest carbon pools

Carbon Pools		Description
Living Biomass	Above ground biomass (AGB)	All living biomass above the soil including stem, stump, branches, bark, seeds and foliage
	Below ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter (country specific) are often excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead Organic Matter	Dead wood	Includes all non-living woody biomass not contained in the litter, either standing or lying on the ground. Dead wood also includes dead roots and stumps larger than or equal to 10cm in diameter or any other diameter used by the country.
	Litter	Includes all non-living biomass with a diameter less than a minimum diameter chosen by the country (for FSI 5 cm), lying dead, in various states of decomposition above the mineral or organic soil.
Soil	Soil organic matter	Includes organic carbon in mineral and organic soils (including peat) to a specific depth chosen by the country (for FSI 30 cm) and applied consistently through the time series.

Source: India state of forest report, 2011.

We need a robust carbon accounting plan which works both at the national level and at the State level with transparent monitoring & reporting system for ensuring participation in

REDD+ under UNFCCC. How the dense forest covers, moderately dense forest cover and open forest change and how different forest carbon pools contribute in different locations need to be assessed scientifically.

5. CONCLUSIONS AND FUTURE PERSPECTIVES

Forests are 'storehouses' of not only biological diversity; but also are effective means for carbon capture and sequestration and help in maintaining natural carbon cycle. They store around 300 billion tonnes of carbon in their biomass. Reductions in deforestation and forest degradation (REDD+), can greatly benefit the biodiversity conservation, poverty alleviation and sustainable development efforts. Apparently, REDD+ is an appropriate mechanism for involving developing countries in global climate change mitigation efforts. It is estimated that through the REDD+ mechanism, up to 40% carbon mitigation potential of developing countries could be harnessed. While funds and financiers posing a major limitation in the execution of the REDD+ plans, there are a number of issues which need to be addressed. Taking lessons from CDM, REDD+ strategies need to be developed further. Developing country strategies are expected to include drivers of deforestation and forest degradation, forest governance issues, land tenure issues and safeguards for Annex I s through relevant international conventions.

Beyond the carbon value of forests, REDD+ takes into consideration other aspects too such as gender-related issues and eco-services to local communities. Indian strategy therefore requires a carbon accounting REDD+ readiness plan, which requires handling complex issue of dynamics of projects boundary, reduce displacement of emission, risks of reversals, promotion of agricultural practices to mitigate climate change and huge database on existing

forest reserves with division and enforcement of land and forestry rights. In the international negotiation a nationally driven and coordinated REDD+ plan would require State level participation so that the benefits are occurred to local communities.

As against large scale deforestation, India should focus on small deforestation women centric activities through REDD+ mechanisms. It can have huge potential to promote sustainable management of forests, promote eco conservation and eco earnings, while preventing global warming from reaching tipping points and mitigating climate change.

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