Environmental Sciences Proceedings

MDPI

Proceedings

Forest Carbon in Climate Change Supermarket: Is India Prepared to Sail? †

Lokesh Chandra Dube[1] and S Chatterjee[2]

[1] Department of Natural Resources, TERI School of Advanced Studies, Institutional Area, Vasant Kunj and New Delhi (Corresponding author). Email: lokeshchandra.dube@terisas.ac.in

[2] Department of Natural Resources, TERI School of Advanced Studies, Institutional Area, Vasant Kunj, New Delhi. Email: s.chatterjee@terisas.ac.in

† Presented at the 1st International Electronic Conference on Forests (IECF), 15–30 November 2020; Available online: https://sciforum.net/conference/IECF2020

Published: DD MONTH 2020

Abstract: Several market-based instruments have been developed to facilitate effective mitigation of climate change through voluntary and regulatory measures. A number of such instruments are expected to hit the carbon markets with the take-off of the new global deal on climate change- The Paris Agreement, agreed in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC), along with other planned and potential regional, national and sub-national regimes to address the problem of climate change. With the possibility of inter-linking the carbon market segments in times to come, we see a complex picture of the existing carbon markets turning into a future supermarket. India is a leading country in terms of registered clean development mechanism (CDM) projects in afforestation and reforestation (AR) sector. We explore the potential of India becoming a leading party in forest-based carbon supermarkets. We triangulated existing literature, on-ground observations from two registered AR CDM projects being implemented in Kashi and Mahoba forest divisions in the Indian state of Uttar Pradesh, and the expert interviews. We list out the constraints and gaps in India's readiness to identify and embrace the opportunity of being a top player in the upcoming climate change supermarket in the context of forest restoration.

Keywords: Carbon Markets; CDM; Paris Agreement; Forest Carbon.

1. Introduction

Several instruments have been developed to facilitate effective mitigation of climate change through forestry activities under the voluntary and regulatory market structures. Recent trends tell us that the initiatives of carbon pricing and co-operations among jurisdictions for carbon markets, including their expansion and interlinking are on ascendence across national and sub-national entities. Currently, there are 61 carbon pricing initiatives, including 31 emission trading schemes and 30 carbon tax regimes implemented or scheduled throughout the world. These initiatives cover around 22% of the world's total greenhouse gas emissions and are spread across 36 national and 32 sub-national jurisdictions. The forestry sector has been on the forefront and delivered 42% of the total carbon credits issued in the last five years. There are dedicated forestry-based offset mechanisms such as Beijing Forestry Offset Mechanism and Fujian Forestry Offset Crediting Mechanism in China, and Saitama forest absorption certification system in Japan [1]. In this paper, we postulate that further expansion and interlinking of market-based instruments across legislations, treaties, voluntary initiatives, jurisdictions and sectors will transform the carbon markets into a global climate change supermarket with forestry sector playing a crucial role. This supermarket will encompass mitigation, adaptation and joint mitigation and adaptation (JMA) activities. We explore the potential of India as a leading party in the postulated climate change supermarkets in the context of the forestry sector.

2. Methods

We triangulated existing literature, on-ground observations from two registered Afforestation and Reforestation Clean Development Mechanism (AR-CDM) projects, and the expert interviews. Information about India's forestry sector initiatives aiming to enhance forest carbon stock was gathered from the official documents of the Government of India. We chose two registered small-scale AR-CDM project activities being implemented in the Mahoba and Kashi forest divisions of the Indian state of Uttar Pradesh. Impression about the carbon market was gathered through interaction with local forest department officials and local stakeholders of these projects. Web-based expert interviews were conducted with carbon market consultants, researchers, government officials and others. Questions were asked to explore if India is ready for a domestic carbon market for forestry and if the experts foresee India as a leading country in the event of international carbon markets reviving on implementation of the Paris Agreement, post-2020.

3. Results and Discussion

3.1. The supermarket postulate

Kyoto Protocol to the UNFCCC established CDM as a market-based mechanism that included developing countries as host Parties to implement mitigation projects. After first commitment period of Kyoto Protocol expired in 2012, the demand for carbon credits (a generic and colloquial term used for emission reductions arising from mitigation projects) diminished, and their prices fell to a level that the compliance market of CDM credits almost crashed. Future of the second commitment period of the Protocol, proposed in its Doha Amendment was uncertain at that time. After eight years of uncertainty, the Doha Amendment now stands ratified by the requisite number of Parties and is set to enter into force on 31 December 2020 [2],[3]. With the Amendment coming into force, there are chances of demand being generated in the carbon market with corresponding supplies being met through already registered and operational projects as most of the certified emission reductions issued so far have already been used to fulfil compliance demand in the European Union's Emission Trading Scheme (EU ETS), the UNFCCC or have been retired [4]. Given the rules of accounting and other scenarios in picture, it is expected that most demand will come from Switzerland [5].

Among Land Use, Land Use Change and Forestry (LULUCF) activities, only afforestation and reforestation were included as eligible activities under the CDM [6]. Activities such as reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries (collectively called *REDD-plus*) were later included under the ambit of UNFCCC but remained outside CDM. Several decisions were taken by the Conference of Parties to UNFCCC on *REDD*-plus in different sessions of Conference of Parties [7]. There are various schemes outside the UNFCCC regime that include regional, national or sub-national legislations mandating emitters to reduce emissions of greenhouse gases, *e.g.* European Union Emission Trade Scheme (EU-ETS). Some of these schemes include forestry activities as eligible options to earn carbon credits.

Voluntary Carbon Market (VCM) aims to offset the emission footprints of activities, products and services of a company, organisation or individual by trading Voluntary Emission Reductions (VERs) to achieve carbon neutrality. A large portion of forestry activities including forest conservation, revegetation and avoided deforestation are excluded from the regulatory markets such as CDM but are allowed under various schemes of the VCM. Time consumed in developing A/R projects is generally high, and these projects are also considered complex as compared to other CDM projects. Besides, the EU had decided not to purchase carbon credits generated from A/R CDM. These factors cumulatively contributed to the low number of A/R CDM projects globally and late arrival of forest-based carbon credits in the market [8]. To the contrary, forestry is a leading sector in VCM [9].

Many compliance and voluntary instruments are expected to hit the carbon markets with the take-off of the new global treaty on climate change for the post-2020 period- The Paris Agreement, along with other planned and potential regional, national and sub-national regimes to address climate change. Countries are coming forward with their aims and plans to achieve full or partial

carbon neutrality or the status of net-zero emissions, which would also create demand for carbon credits. Such plans may have cascading effects on international trade policies such as in the form of border carbon adjustments. Countries have communicated their Nationally Determined Contributions (NDCs) that they intend to achieve towards meeting the long term common global goal set by the Agreement. Article 6 of the Paris Agreement permits countries to use market mechanisms and non-market approaches for Mitigation [10]. The Paris Agreement also establishes a new type of mitigation 'currency' known as internationally tradable mitigation outcomes (ITMOs) that can be traded towards meeting NDCs. The detailed rules of ITMOs are still to be prepared. The NDCs of several countries have indicated that the level of their commitment is conditional upon having access to international carbon markets. According to an ADB study [11], 102 countries which are collectively responsible for 58.6% of the global GHG emissions, have mentioned the use of market mechanisms in their respective NDCs. Article 6.4 of the Paris Agreement presents a new market mechanism to which some refer as Sustainable Development Mechanism (SDM) [12] and some as Sustainable Mitigation Mechanism (SMM) [13]. The mechanism is seen as the successor of CDM [14]. The Paris Agreement also recognises the role of forests in addressing climate change [10]. Forestry is an essential component in NDCs of many countries, and NDCs hold noteworthy options for carbon forestry projects [15]. United Nations General Assembly has proclaimed the decade of 2021-2030 as UN Decade on Ecosystem Restoration. Emphasis has recently picked up on nature-based solutions. Given these international circumstances and multilateral attention, we expect forestry sector playing a major role in addressing climate change, especially in emerging economies like India. With the possibility of inter-linking the carbon market segments in times to come, we see a complex picture of the existing carbon markets turning into a future supermarket that will include both climate change mitigation and adaptation.

3.2. Policy landscape of forest carbon in India

India's national forest policy suggests a national goal of bringing 33% of country's geographical area under forest and tree cover in the plains while 66% of the area should be under forest cover in the hilly regions [16]. The National Forest Policy is currently under review, and the draft new policy aims to bring 33% of the government-owned forests under community forest management regime by 2030. It also intends to double the trees cover area outside forest by 2030. An objective of the draft policy is also to integrate climate change mitigation and adaptation measures in forest management and enhance the carbon sequestration in forests and trees by 33% by 2030 [17].

Indian Remote Sensing Organization (ISRO) is the national body for all matters related to space applications, including generation of remote sensing data. ISRO has a network of regional centers and autonomous bodies spread across different states in the country. Remote sensing data is widely used in India for biodiversity characterization, wetlands mapping, forest and biomass assessments, land degradation and desertification processes, forest fires incidents etc. Forest and tree cover of India is monitored using satellite-based remote sensing data and is reported biennially by the Forest Survey of India (FSI) in the form of India- State of the Forest Reports. India's forest and tree cover is on ascendence and currently account for 24.56% of total geographical area [18]. The forest and tree cover sequester about 16% of India's annual carbon dioxide emissions [19]. India has an impressive but ambitious NDC goal of creating an additional carbon sink of 2.5 to 3 billion tCO_2e through additional forest and tree cover by 2030 [20].

India is implementing several promotional and legislative measures to conserve and enhance the forest and tree cover. National Mission for a Green India (GIM) is the forest-related national mission under India's National Action Plan on Climate Change (NAPCC). One of the objectives of the Mission is enhancing annual CO_2 sequestration by 50 to 60 million tonnes in the year 2020 [21]. To recognise and entrust the right of the forest-dwelling Scheduled Tribes and other traditional forest dwellers to use and occupy forest lands, the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act was enacted in 2006. A Compensatory Afforestation Fund Management and Planning Authority (CAMPA) Act was legislated in 2016 to provide institutional arrangements for utilising the funds collected under the provisions of the Forest (Conservation) Act,

1980. The funds are to be utilized for undertaking artificial regeneration (plantations), assisted natural regeneration, protection of forests, forest-related infrastructure development, wildlife protection and other related activities. Afforestation is being carried out under the National Afforestation Programme, National Mission on Clean Ganga, National Green Highway Mission, Nagar Van Scheme and other schemes. Pradhan Mantri Ujjawala Yojna was started in the year 2016 to encourage the use of clean fuel for cooking and has helped reducing dependence on forests for fuelwood, thereby tackling an important driver of forest degradation [22].

A number of forestry projects with carbon component have been implemented with financial support from bilateral and multilateral institutions in different parts of the country. For example, the Japan International Cooperation Agency (JICA) has assisted Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (UPPFMPAP) that includes ten registered AR-CDM projects. USAID has funded The Partnership for Land Use Science (Forest-PLUS) project. GIZ and World Bank have partnered in AR CDM projects in Odisha and Himachal Pradesh respectively.

3.3. Observations from the registered forest carbon projects

India has the highest number of registered AR-CDM projects in the world. Within India, Uttar Pradesh is the leading state with ten registered AR-CDM projects. All these projects are being implemented on degraded lands by the state's forest department in joint forest management (JFM) mode. Two of these projects located in Kashi and Mahoba forest divisions were visited, and interactions were done with forest department officials and local people, including the members of JFM Committees. It was observed that though these projects have been registered and the after due monitoring of both the projects, a third party designated operational entity has completed the verification process. The emission reductions are in the pipeline of issuance.

3.4. Expert Survey

India is yet to see a domestic carbon market of any sort. There is a need to have a comprehensive domestic mechanism of emission trading in India. In our survey, out of a total of 43 responding experts, 25 experts (58%) believed that India is somewhat ready for a forest-based domestic carbon market, while 17 experts (40%) believed that India is not ready for it. Only one expert (2.3%) believed that India is absolutely ready. The World Bank's ongoing Partnership of Market Readiness (PMR) project in India does not include forestry sector as a priority for piloting market-based mechanism [23]. A framework for emission trading scheme in India was proposed [24], with the following elements: a Regulatory Authority, inclusion of industries, allocation of allowances among states, compliance plans, containment of price volatility. A top-down approach with standard protocols can be used for carbon offset projects. Once domestic markets in India are in place, the question of interlinking it with other regional markets would arise. The interlinking of carbon markets in the Asia-pacific region is possible in the long run but there are huge bottlenecks in near-terms [25]. However, some guiding principles and diversification of strategies can help in reducing the risks and in establishing a healthy forestry-based market.

The Paris agreement allows countries to reduce their carbon emissions by flexible means and on a bottom-up basis. It is high time that India should design its own carbon market. The forestry sector is an emerging sector and an investment opportunity as it provides not only climate change mitigation but also several adaptation benefits and other co-benefits such as livelihood and biodiversity. Of the total, 72% of the respondent experts foresee India as a leading country in the event of international carbon markets reviving on implementation of the Paris Agreement, post-2020. The carbon market is volatile and has many associated risks. The new markets have higher risks than established and mature markets. Even policymakers and investors cannot control the risks that depend on many macro- and micro-economic factors and the uncertainties associated with these factors; for example, prices of carbon in even established emission trading schemes have fallen due to slowed down economic activities because of COVID-19 pandemic [1].

Followings constraints and gaps were identified in India's readiness to identify and embrace the opportunity of carbon markets in forest restoration:

- A legislative or strong voluntary framework agreeable to all stakeholders
- Setting up sub-national goals
- Encouraging private and civil society participation
- Ensuring fair price for forest carbon
- Enabling the funding environment and new channels of investments
- Technical know-how and technology application
- Tools and methods suiting India
- Institutional mechanism and effective governance including better coordination among agencies and between the center and state governments, fund allocation from government, pilot projects, vision
- Monitoring, Reporting and Verification concerning international norms, simplified yet transparent MRV
- Capacity building and awareness including capacity building of forestry personnel of the State forest departments

4. Conclusions

It is postulated that the market-based climate policy initiatives across territories will display increased levels of influence, interactions, interconnections and interdependence. Though India is currently not completely ready to take up domestic carbon markets in the forest sector, it has the potential of becoming a leading player in the new and upcoming international climate change supermarkets in the future. Currently, the understanding in India is limited to the implementation of the offset projects under international carbon markets. Some critical steps need to be considered while designing the domestic forestry carbon market in India. The structure and function of the domestic carbon market need to be planned carefully, keeping in line with national policies and schemes. Fair demand should be created at the national level to prevent potential market failure due to price shock and hyper-volatility. Risks for investments in such forestry projects must also be reduced through building innovative models.

Funding: This research received no external funding.

Acknowledgments The authors thank experts for participating in online survey/interview, forest department officials and local stakeholders of Kashi and Mahoba Forest Divisions for their valuable time and efforts.

Conflicts of Interest: The authors declare no conflict of interest.

References:

1. World Bank. *State and Trends of Carbon Pricing 2020*; World Bank: Washington DC, 2020; p. 347; DOI: 10.1596/978-1-4648-1586-7.
2. UNFCCC. Database of PAs and POAs 2020. Available online: https://cdm.unfccc.int/Statistics/Public/files/Database%20for%20PAs%20and%20PoAs.xlsx (accessed on 06 May 2020)
3. UN. Doha Amendment to the Kyoto Protocol 2020. United Nations. Available online: https://treaties.un.org/doc/Publication/CN/2020/CN.425.2020-Eng.pdf
4. Bagh, T.; Esparta, A.; Sangsun, H.; Kolmetz, S.; Madero, M.; Morton, T.; Patrickson, C.; Tuchten, O.; Vrolijk, C. *The Myth of Oversupply A PD Forum study*; Project Developer Forum, 2020; p. 17.
5. Michaelowa, A.; Shishlov, I. The Doha Amendment: ratification status and implications for credit demand 2020. P.6.

6. UNFCCC. *Kyoto Protocol to the UNFCCC*; 1997; P. 24. Available online: https://unfccc.int/sites/default/files/resource/docs/cop3/l07a01.pdf
7. UNFCCC. Key decisions relevant for reducing emissions from deforestation and forest degradation in developing countries (REDD+) 2016. UNFCCC Secretariat, Bonn. P. 46.
8. Robiedo, C. and H.O.M. Why there are so few forestry projects under the Clean Development Mechanism. *ITTO's Tropical Forests Update Online Newsletter*. 2008,.
9. Donofrio, S.; Maguire, P.; Merry, W.; Zwick, S. *Financing Emission Reductions for the Future: State of Voluntary Carbon Markets 2019*; Forest Trends' Ecosystem Marketplace: Washington DC, 2019; p. 9.
10. UNFCCC. Paris Agreement 2015. United Nations Framework Convention on Climate Change. P. 27.
11. Amarjargal, B.; Ebro, H.; Nylander, J.; Duggal, V.K. *Achieving Nationally Determined Contributions through Market Mechanisms in Asia and the Pacific*; ADB Sustainable Development Working Paper Series; Asian Development Bank, 2020; p. 60; https://doi.org/10.22617/WPS200088-2.
12. Segger, M.-C.C. Advancing the Paris Agreement on Climate Change for Sustainable Development. *CILJ* **2016**, *5*, 202–237, doi:10.4337/cilj.2016.02.03.
13. Olsen, K.H.; Arens, C.; Mersmann, F. Learning from CDM SD tool experience for Article 6.4 of the Paris Agreement. *Climate Policy* **2018**, *18*, 383–395, doi:10.1080/14693062.2016.1277686.
14. Gao, S.; Li, M.-Y.; Duan, M.-S.; Wang, C. International carbon markets under the Paris Agreement: Basic form and development prospects. *Advances in Climate Change Research* **2019**, *10*, 21–29, doi:10.1016/j.accre.2019.03.001.
15. van der Gaast, W.; Sikkema, R.; Vohrer, M. The contribution of forest carbon credit projects to addressing the climate change challenge. *Climate Policy* **2018**, *18*, 42–48, doi:10.1080/14693062.2016.1242056.
16. MoEF. National Forest Policy 1988. Ministry of Environment and Forests, Government of India. https://mpforest.gov.in/img/files/Policy_NFP.pdf
17. MoEFCC. Draft National Forest Policy, 2018. Ministry of Environment, Forest and Climate Change, Government of India, New Delhi. P. 12. http://moef.gov.in/wp-content/uploads/2019/05/Inviting-comments-from-concerned-Ministries-on-Draft-National-Forest-Policy-2018.pdf. Accessed on 06 Oct 2020.
18. FSI. *India State of Forest Report*; Forest Survey of India: Dehradun, 2019; p. 185;.
19. MoEFCC. *India Second Biennial Update Report to the UNFCCC*; Ministry of Environment, Forest and Climate Change: New Delhi, 2018; p. 228;.
20. MoEFCC. India's Intended Nationally determined contribution 2015. Ministry of Environment, Forest and Climate Change, Government of India.
21. MoEF, G. of I. National Mission for a Green India (Under The National Action Plan on Climate Change) not dated. NAEB, Ministry of Environment and Forests, Government of India, New Delhi. P. 37.
22. Rajya Sabha. *Status of Forests in India*; Department-Related Parliamentary Standing Committee On Science & Technology, Environment & Forests, Rajya Sabha, Parliament of India: New Delhi, 2019; p. 46;.
23. PMR. *PMR Project Management Status Report*; Partnership for Market Readiness, 2018; p. 12. Partnership for Market Readiness. Available online: https://www.thepmr.org/system/files/documents/India%20PMR%20Project%20Implementation%20Status%20Report__18%20Oct%202018.pdf. Accessed on 26 Oct 2020.
24. Shubham, J.; Rosencranz, A. Fighting India's war on carbon with an emissions trading program. *NLUD Student Law Journal* **2018**, *5*, 57–70.

25. Mo, L.; Lu, X. Barriers and Options for Carbon Market Integration. In *Investing on Low-Carbon Energy Systems*; Anbumozhi, V., Kalirajan, K., Kimura, F., Yao, X., Eds.; Springer Singapore: Singapore, 2016; pp. 391–434 ISBN 978-981-10-0760-6.