

India Follows Green Path to Meet Challenges of Global Climate Change

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The Intended Nationally Determined Contribution (INDC), which describes carbon emission reduction goals of each country, is the agreed model for negotiations to achieve global climate agreement during the 21st Session of Conference of Parties (CoP-21) to the United Nations Framework Convention on Climate Change (UNFCCC) to be held in Paris in December 2015. India, one of the major global economies, through its INDC, as submitted to the UNFCCC, has pledged to cut carbon emissions 33-35% by 2030. While taking forward the vision of a sustainable lifestyle and climate justice to protect the poor and vulnerable groups from adverse impacts of climate change, the comprehensive and ambitious document clearly reflects the fact that India is keen to work towards a low carbon emission pathway while simultaneously endeavoring to meet all the developmental challenges that the country faces today. As a result, it has received wide acclaim across diverse sections.

Looking at the global statistics, among the historical carbon space occupied by various countries in 2009 (1850 as base year), India has a share of only 3% as compared to 29% by the USA. India's share on global annual emission is low (5.7%) as compared to China (28.6%) and the USA (15.1%), which is only 1.6 t/capita CO₂ emission (USA 16.4, China 7.1 t/capita). India has always been a follower of low-emission philosophy that is well reflected in its contribution to global emission despite a growing economy and large population of development aspiring countrymen. Therefore, it aptly claims that "even though India is not a part of the problem, but it wants to be part of the solution".

Box I: India's Forest and Tree Cover: Contribution as Carbon Sink (Source: Kiswan et al. 2009)

Estimates (from 1995 to 2005) suggest that the carbon stocks stored in India's forests have increased from 6245 to 6622 million tonnes (mt), thereby registering an annual increment of 38 mt of carbon (i.e., 138.15 mt of CO₂ eq). This annual removal of CO₂ by forests is enough to neutralize about 9% of our total annual emissions of 2000. Estimates exhibit that the continued removal by the forests would still be able to offset 7% and 5% of our projected annual emissions in 2010 and 2020, respectively.

Bringing the forest connect

All through the journey of global climate change negotiations, forestry has remained in the central stage, as the forests have the potential to be carbon sink as well as the net source of carbon. Carbon management through forestation and tree plantations has emerged as the most common agenda in recent decades to mitigate global climate change. Forests are considered a much economic and easier way to restore carbon than industrial capture and storage. In this context, enormous potential of India's forests is well documented. It ranks 10th in the list of most forested nations in the world with forest and tree cover accounting for over 23.4% in 2008 of the total geographical area of the country, which has gone up to 24% in 2013. Further, over the years, in spite of prevailing circumstances such as India occupies only 2.4% of the world's surface area but retains about 17.5% each of the global human and cattle population, it has either maintained or registered slight growth in the forest and tree cover and aims at to increase the forest cover to 33% of the total geographical area of the country. It is not out of the place to indicate that over the past decades, national policies of India aiming at conservation and sustainable management of forests have helped maintaining India's forests as a net sink of CO₂ (BOX - I).

India has pledged for creating additional carbon sink of 2.5 -3.0 billion tonnes (bt) of CO₂ equivalent through additional forest and tree cover (increase of about 680 - 817 mt of carbon stock) by 2030. Aim is to further increase the forest/tree cover by 5 million hectares (mha) and improve quality of forest/tree cover on another 5 mha of forest/non-forest lands along with providing livelihood support. It is expected to enhance carbon sequestration by about 100 million tonnes CO₂ equivalent annually. Towards achieving this target, Green India Mission has been projected as the major initiative. Earlier estimates have indicated that the afforestation and reforestation of 6 mha of degraded forest land covered under the National Mission with participation of Joint Forest Management Committees would be able to add another 18 mt of carbon (i.e., 66 mt of CO₂ eq) by 2020. Annual addition of 6 mt of biomass due to operationalization of the Mission will increase the annual emissions removal capability of the forests from just < 5% to slightly > 5% of the corresponding projected emissions in 2020. Even if half (3 mt) of the annual biomass increment (6 mt) is removed annually on a sustainable basis from 2025 onwards, the emission removal capability of forestry sector would still be able to offset every year 5% of the 2020 level emissions.

Besides the 'Green India Mission', India has launched following specific projects, missions, and policies to increase forest/tree covers and additional carbon sink:

- "Integrated Ganga Conservation Mission - *Namami Gange*" considers development of tree cover through plantation along the River and afforestation as one major activity, which includes- (i) Development of green belt through greening of local ghats (bathing places), creation of sacred groves, avenue plantations on the roads along the river Ganga; (ii) Plantation along the major *nalas* in the urban areas and afforestation in the cities situated on the banks of river Ganga.
- "Green Highways (Plantation & Maintenance) Policy, 2015" aims to promote greening of highway corridors with a target to develop 140,000 km long tree-line along both sides of national highways.

- "National Agroforestry Policy (2014)" defines its pathway on an integrated approach of using the interactive benefits by combining tree plantation with crops and livestock and thus aims to target nearly 80% small land-holders or farmers of the country, owning 60% of the cultivated area.
- Financial incentives for forests, REDD+ and Compensatory Afforestation Fund Management and Planning Authority are the other initiatives which would help achieving the targets of further greening India. Incentivized greener distribution of resources through devolution of funds to the state from the federal pool, following a new formula that attaches 7.5% weightage to the area under forest cover. Thus, Finance Commission of India is going to transfer to the states roughly about USD 174 /ha of forest / yr as incentive for carbon sink, which is likely to give afforestation a massive boost.
- Joint Forest Management, National Afforestation Programme and several other programmes relating to improvement in agriculture and soil and water conservation has helped reducing the people's dependence on forests for non-timber products.

Strengthening the Actions

While the intentions of greening of India are well projected, there are doubts casted by people particularly due to continued onslaught on forests for developmental needs (Adave & Kothari 2015). Given the circumstances in the country such as huge human and cattle population, prevailing poverty, and growing developmental aspirations, the forests in the country are likely to remain under high pressure. This scenario raises the challenge of maintaining old, natural tracts of forests, which are important on account of rich biodiversity and important ecosystem services they support. In this direction, effective integration of provisions of the National Biodiversity Action Plan to improve biodiversity value of the areas, being brought under new plantations, would improve the situation. In this endeavour, forested landscape of Indian Himalayan Region (IHR) would also contribute.

Finding ways - IHR a case in point or a national asset in consideration

The Himalayan terrains, 16% of geographical coverage of the country, support a vast diversity of forests (Champion & Seth, 1968). Nearly 42% of its geographical area is under forest cover representing one-third (~ 32%) of the total forest cover in India and nearly half (47%) of it under "very good" forest cover category. As per the reports of Forest Survey of India (FSI), in last 25 years or so, IHR has registered about 5% increase in its contribution to India's forest cover (i.e., 27.4% - 1987; 32.1% - 2013). This implies that the IHR, with the broad trends of increasing forest cover, is going to play a critical role in meeting India's objective of increasing carbon sink to mitigate climate change. The rate of C sequestration in these forests (4.0-5.6 t C/ha/yr) is close to values reported for tropical forests. The C pool in IHR forests (forest biomass + soil C) has been estimated at 5.4 billion t C with a conservative value of C-sequestration estimated as Rs. 943 billion/yr and these forests can sequester about 65 mt C annually in above ground biomass alone (Singh, 2007). Hence, the planning for sustaining and enhancing carbon sink value of Himalayan forests holds much significance. Initiatives like the National Mission for

Sustaining the Himalayan Ecosystem (NMSHE) as coordinated by the Ministry of Science and Technology, under NAPCC, and the National Mission on Himalayan Studies (NMHS) under coordination of the Ministry of Environment, Forest and Climate Change (MoEF & CC) are going to play crucial role in this respect.

Building on rich traditions

Historically India has followed an *Aranya Sanskriti*- 'forest culture', which enshrines the philosophy that the life associated closely with the forest-dominated landscapes must rejoice in, which was also iterated by Josip Kozarac, an esteemed Croatian writer and forester, "*Lucky are nations sharing their lives with forests, even luckier are those who appreciate the wealth they possess*". We must also keep in our minds the famous words of a Kashmiri saint, Nundrishi, "*The food will last as long as the forests last*" - so true in the context of IHR where agriculture is largely powered by forest biomass, apart from a range of ecosystem goods and services provided to the people (Negi et al., 2012). Across the country, traditionally there has been a distinct social awareness on conservation of forests, as reflected by the world famous environmental movement *Chipko*, that has its roots in the Garhwal region of IHR. The unforgettable incident of 363 Bishnois people of Khejarali village in Jodhpur, who sacrificed their lives in 1730 AD while protecting green Khejri (*Prosopis juliflora*) trees that are considered sacred by the community, has been a forebear of the 20th-century *Chipko* Movement.

Moreover, IHR has a rich heritage of community-based forest management and conservation culture. The prominent examples include *Lath Panchayats* and *Van Panchayats* in Uttarakhand (Box - II), *Gaon Buras* (respected and experienced village elders) led natural resource management among tribes of the NE states through well defined customary norms and traditional institutions. Also, to conserve the forests and trees there is a rich tradition of sacred groves in India. In the various parts of the country, 13,720 sacred groves have been identified from 19 states dating back to several thousand of years when human societies were in primitive stage. These are named differently in various parts as *Ki Law Lyngdhoh* in Meghalaya, *Dev Vans* in Uttarakhand and Himachal Pradesh, *Pavithravana* in Arunachal Pradesh, *Sarana* in Jharkhand, *Jahera* in Orissa, *Devgudi* in Maharashtra, *Kavus* in Kerala and *Kovil Kadu* in Kanyakumari.

All these policies, programmes, actions and traditional wisdom would provide strong base for achieving the targets set by the Govt. of India. However, adequate support in terms of clean technology, capacity building and resources would have to be channelized from

Box II: Traditional Forest Management Institutions in Uttarakhand (Source: Semwal et al. 2012)

In the mountainous parts of Uttarakhand till 1865 the unwritten norms of informal village institution elected through consensus called *Lath Panchayat* (Lath means stick and Panchayat means meeting of members) were known for their sense of justice as these ensured equitable sharing of forest resources among the villagers and thus always commanded respect of the villagers (Semwal et al. 2012).

Subsequently the Van Panchayats (VPs) in Uttarakhand were initiated during British rule after the notification of Van Panchayat Act in 1931 on degraded forest sites under the control of the State Revenue Department. Today, there are about 12,089 VPs spread over an area of 5,44,965 ha (appx. 15% area of the forests) in Uttarakhand.

the developing world apart from domestic resources of developing countries such as ours to contribute effectively to this global cause of environment-friendly path of sustainable living.

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