India's Forest and Tree Cover

Contribution as a Carbon Sink

सत्यमेव जयते

Ministry of Environment and Forests
Government of India

Indian Council of Forestry Research and Education

Forest Survey of India

Indian Institute of Remote Sensing

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From the Minister's Desk

In India, we consider our forests a unique national treasure. Forests are responsible for India's rich biodiversity – India is one of the 12 "megadiverse" countries in the world. Our forests hold within them unique wildlife, flora and fauna, and are also a source of sustainable livelihoods to over 200 million people in our country.

It is therefore not surprising that we take our commitment to protecting, regenerating and growing our forests very seriously. India has a great tradition of institutionalized scientific forest conservation dating back 142 years, when the Imperial Forest Service was established in 1867. We also have one of the most progressive forest conservation legislations in the world, which puts severe restrictions on diversion of forest land for non-forestry purposes.

It is the result of these efforts that despite our rising population and the pressures of economic development, India is one of the few developing countries where the forest cover has increased over the last 20 years and continues to increase – today, more than a fifth of India's land area is under forest cover.

This is something that we are proud of, and intend to maintain and grow. We have taken a number of recent initiatives in this direction, including the launch of a landmark Fund for the regeneration and sustainable management of our forests with an initial corpus of US$ 2.5b, as well as an annual budget of about US$ 1b.

Forestry is at the centre-stage of global climate change negotiations. This is because forests have the potential to be a carbon sink as well as a source of carbon emissions. We are actively participating in the discussions on forestry that are taking place under the Bali Action Plan (BAP) and the United Nations Framework Convention on Climate Change (UNFCCC). It is India's view that we need an agreement on a comprehensive framework for compensation and positive incentives for forestry as part of the ongoing climate change negotiations.

It is important that any such agreement provides incentives not only for Reducing Emissions from Deforestation and Forest Degradation (REDD), but also for Sustainable Management of Forests (SMF) and Afforestation and Reforestation (A&R). A "REDD Plus" approach that includes SMF and A&R is required in order to fulfill the principles of equity and efficiency. India has put forward a formal submission on a potential conceptual framework for such an agreement as part of the UNFCCC process, which I believe sets up a sound foundation for discussion towards an agreement.

I hope that this publication will provide a useful snapshot of the carbon value of India's forests, and give a glimpse of the potential of India's forests to offset India's and the world's carbon emissions.

Carbon Storage and Sequestration Potential of India's Forests and Tree Cover

India's Forest Cover accounts for 20.6% of the total geographical area of the country as of 2005[1]. In addition, Tree Cover accounts for 2.8% of India's geographical area[2].

Over the last two decades, progressive national forestry legislations and policies in India aimed at conservation and sustainable management of forests have reversed deforestation and have transformed India's forests into a significant net sink of CO_2. From 1995 to 2005, the carbon stocks stored in our forests and trees have increased from 6,245 million tonnes (mt) to 6,662 mt, registering an annual increment of 38 mt of carbon or 138 mt of CO_2 equivalent.

Mitigation Service by India's Forest and Tree Cover

India's forests serve as a major sink of CO_2. *Our estimates show that the annual CO_2 removals by India's forest and tree cover is enough to neutralize 11.25 % of India's total GHG emissions (CO_2 equivalent) at 1994 levels, the most recent year for which comparable data is available for developing countries based on their respective National Communications (NATCOMs) to the United Nations Framework Convention on Climate Change (UNFCCC)[3]. This is equivalent to offsetting 100% emissions from all energy in residential and transport sectors; or 40% of total emissions from the agriculture sector.* Clearly, India's forest and tree cover is serving as a major mode of carbon mitigation for India and the world.

Carbon Stocks in the Future

As stated, India is one of the few developing countries in the world that is making a net addition to its forest and tree cover over the last two decades. Based on actual and projected trends of investments in the forestry sector, we present three scenarios of the future carbon stocks in the forest and tree cover of India.

In the **first scenario,** the carbon stocks in India's forest and tree cover decrease at the rate of the world average[4]. Under this scenario, the total carbon stored in India's forests in 2015 will decrease to 6,504 mt.

In the **second scenario,** the carbon stocks in India's forest and tree cover continue to increase at the historical rate of the last decade (0.6% p.a.). Under this scenario, the total carbon stored in India's forests in 2015 will increase to 6,998 mt.

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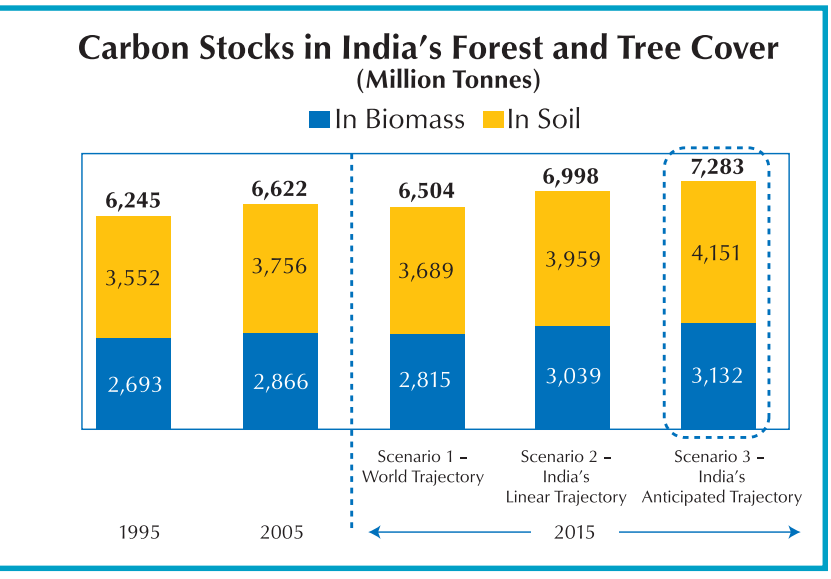
[1] Forest cover in India is defined as all lands, more than one hectare in area with a tree canopy density of more than 10%.

[2] Tree Cover is defined as tree patches outside recorded forest areas exclusive of forest cover and less than the minimum mappable area of one hectare.

[3] The Second National Communication (SNC), a comprehensive inventory of India's Greenhouse Gases, is under preparation and will be available by November 2010. This will provide data up to 2000 as required by UNFCCC.

[4] Assuming the same rate of decline in forest and tree cover as the world average between 2000-2005 (0.18% p.a.); Source: FAO, State of the World's Forests, Rome, 2005



In the **third scenario,** the carbon stocks in India's forest and tree cover increase at a rate higher than the historical rate of increase. Under this scenario, the total carbon stored in India's forests in 2015 will increase to 7,283 mt. This is the path that we intend to tread in India. India has launched a series of progressive policy initiatives on Sustainable Management of Forests (SMF) as well as Afforestation and Reforestation (A&R), which involve significant additional resources for sustaining and growing India's forest cover. This includes the world's largest Forest Restitution Fund[5] with US$ 2.5b as of June 2009, which is being deployed for SMF and A&R programmes, as well as a policy to include forestry related activities in the flagship employment scheme of the country. It also includes introducing new forestry related schemes on components such as capacity building in the forestry sector. These measures will provide annual public expenditure of US$ 1b on forestry related activities. This will lead to an increase in the quality and density of India's forests, as well as in the rate of increase of India's forest and tree cover. This explains the basis of the computation of carbon stocks in scenario three[6].

Value of Mitigation

Putting a conservative value of US$ 5 per tonne of CO_2 locked in our forests, this huge sink of about 24,000 mt of CO_2 is worth US$ 120b, or Rs 6,00,000 crores. Incremental carbon under scenario three will add a value of around US$ 1.2b, or Rs 6,000 crores every year to India's treasury of forest sink, assuming a value of US$ 7 per tonne.

Data and Methodology for Carbon Assessment

The methodology adopted for assessing forest and tree carbon stocks uses primary data for soil carbon pool and secondary data of growing stock from various sources for estimating the biomass carbon. Conversion factors for computing biomass and carbon in biomass have been adopted from different peer-reviewed scientific studies carried out in India and abroad.

Source: *Kishwan, J, et al, 2009, "India's Forest and Tree Cover: Contribution As a Carbon Sink", Technical Paper No 130 ICFRE Bl-23*

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[5] The Restitution Fund is a Fund into which industry and other users of forest land for non-forestry purposes, deposit payments to compensate for the expected environmental costs.

[6] It is expected that the Restitution Fund, coupled with other policy initiatives in the forestry and allied sectors will be able to improve the forest density of 50% of the open and degraded forests of India. It is also expected that increased funding and new forestry related initiatives will be able to improve the biomass in the treated open forests by 7% every year that would effect an increase of 285 mt of carbon in these forests up to the year 2015.

About the Organizations

Indian Council of Forestry Research and Education (ICFRE), an autonomous body of the Ministry of Environment and Forests, Government of India, is the apex organization for forestry research and education in India. It has an Observer Status of the UNFCCC. Its work has formed the basis of India's submissions to the UNFCCC on REDD, "REDD Plus", and Land Use, Land Use Change and Forestry (LULUCF).

www.icfre.org

Forest Survey of India (FSI), an organisation under the Ministry of Environment and Forests, Government of India, is responsible for monitoring the forest and tree cover of India through remote sensing technology, inventorising India's forest and non-forest areas and developing databases of India's forest resources.

www.fsi.nic.in

Indian Institute of Remote Sensing (IIRS), an institute under the Department of Space, Government of India, is the premier institution for remote sensing and geoinformatics related to natural resource management in India.

www.iirs-nrsa.gov.in

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www.envfor.nic.in