

# Sustainable Development and Climate Change

## 06 CHAPTER

*The Sustainable Development Goals (SDGs) constitute a befitting framework to answer the developmental challenges to achieve a sustainable future, free from social, economic, and environmental inequalities and thereby ensuring a greener and healthy Planet for future generations. India's achievement in the composite SDG index is commendable as the score has improved from 57 in 2018 to 60 in 2019. Along with following the holistic approach for achieving the SDGs by implementing a comprehensive array of schemes, India's progress in adopting, implementing, and monitoring SDGs stands noteworthy. The SDG indicator linked reporting and monitoring framework helped in exploring the nexus approach to attain development goals of India. As a responsible nation, with the introduction of various schemes, India has been continuously moving towards economic growth, keeping in mind the imperatives of sustainable development. India is among a few countries in the world where forest and tree cover have increased considerably. The forest and tree cover have reached 80.73 million hectare which is 24.56 per cent of the geographical area of the country. Increased focus on sustainability requires various actions towards building individual and institutional capacity, accelerating knowledge and enhancing technology transfer and deployment, enabling financial mechanisms, implementing early warning systems, undertaking risk management and addressing gaps in implementation and upscaling. These fair and justified demands have been discussed in various multilateral negotiations but remain largely unresolved. Global agenda of delivering sustainable development and addressing climate change can be delivered only if all nations act upon their fair share of responsibilities including the fulfillment on means of implementation by the developed world to the developing countries. Therefore, enhanced ambition and enhanced support should be on equal footing.*

## INTRODUCTION

6.1 The year 2019 marked the fourth anniversary of adoption of 2030 Agenda for Sustainable Development and the Paris Agreement. India is striving to combine the element of 'sustainability' to economic development through well-designed initiatives for inclusive

development enshrined in its policies: electrify rural households, augment the usage of renewable sources, eliminate malnutrition, eradicate poverty, access to primary education to all girls, provide sanitation and housing for all, equip young people with skills to compete in the global labor market, enable access to finance and financial services. India's efforts towards

the achievement of SDGs will contribute to their success at the global level. India is moving forward on the path of SDG implementation. India is among a few countries in the world where, despite ongoing developmental efforts, forest and tree cover are increasing considerably. A comparison with some other emerging economies shows that India's growth in forest cover has been in positive territory. Simultaneously, India's sustained actions on addressing climate change have helped her to achieve great strides which are reflected in reduction in the emission intensity of India's GDP by 21 per cent during 2005-2014. While India is on the path of sustained progress, global agenda of delivering sustainable development and addressing climate change can be delivered if and only if all nations exhibit the requisite momentum to act upon their fair share of responsibilities including the fulfillment of financial obligation by the developed world to the developing countries.

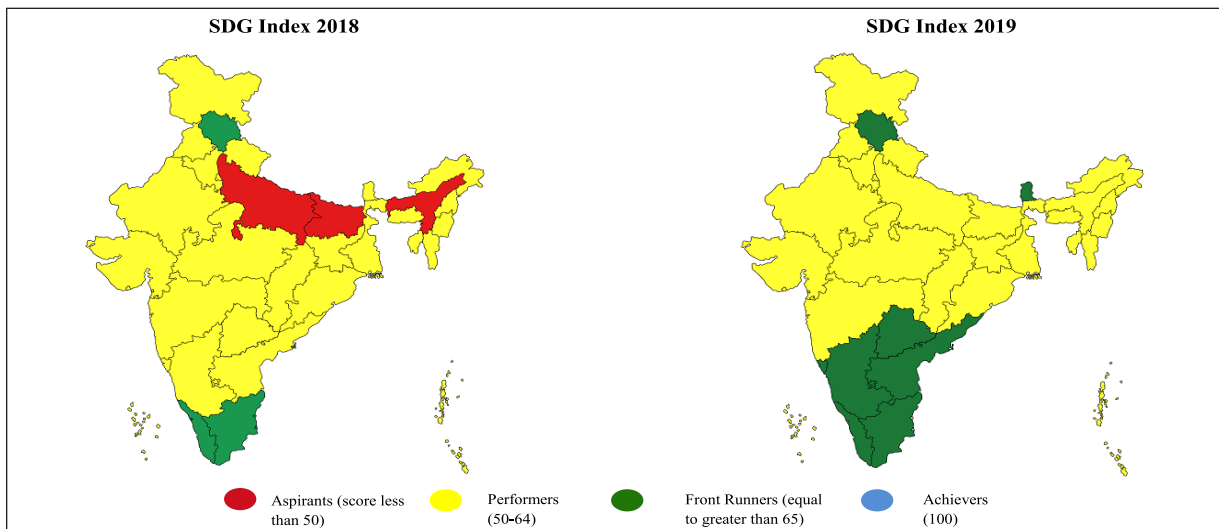
## INDIA AND THE SDGs

6.2 India follows a holistic approach for achieving the SDGs by implementing a comprehensive array of schemes. The progress towards SDGs has been assessed by SDG India Index 2019. The salient features of the SDG India Index Report, 2018 have been discussed in detail in the previous Economic Survey 2018-19, Volume II, Chapter 5. While the first edition measured progress of the States/ Union Territories (UTs) on a set of 62 indicators across 13 goals, the 2019 Index is more comprehensive and highlights the progress being made by the States/UTs on a wider set of 100 indicators spread across 16 goals. The Index also includes a qualitative assessment on SDG goal

17. Additionally, this year the SDG India Index 2019 report has a new section on profiles of States/UTs.

6.3 The States/UTs are ranked based on their aggregate performance across the 16 SDGs. The SDG score varies from 0 to 100. A score of 100 implies that the States/UTs have achieved the targets set for 2030; a score of 0 implies that the particular State/UT is at the bottom of the table. States with scores equal to/greater than 65 are considered as Front-Runners (in Green); as Performers (in Yellow) in the range of 50-64 and as Aspirants (in Red) if the score is less than 50. As per the SDG Index, Kerala, Himachal Pradesh, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka, Goa, Sikkim, Chandigarh and Puducherry are the front runners (Map 1). It is noteworthy that none of the States/UTs fall in the Aspirant category in 2019.

6.4 Overall, it is encouraging to note that the composite score for India has improved from 57 in 2018 to 60 in 2019, indicating the impressive progress made by the country in its journey towards achieving the SDGs. This positive stride towards achieving the target is largely driven by commendable country wide performance in five goals - 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 15 (Life on Land) and 16 (Peace, Justice and Social Institutions) - where India has scored between 65 and 99. The goals that demand special attention are - 2 (Zero Hunger) and 5 (Gender Equality) - where the overall country score is below 50. The overall country score lies between 50 and 64, indicates the scope for improvement in the coming years.

**Map 1: India SDG Index 2018 & 2019**

Source: NITI Aayog.

## SDG Nexus: A New Paradigm Approach

6.5 There exist interlinkages among SDGs and targets. Target-based approach can help reinforcement of policies and its implementation. With the adoption of SDGs, the aim of the government is to reinforce its development priorities with SDG indicators. There are linkages among the various SDGs and have strong impacts on reinforcement of policies. However, this approach needs to be further explored. The 'nexus' approach employs the principles of integrating management and governance across sectors and scales. It necessitates looking at systems instead of individual components or short-term outcomes; looking at the inter-related feedbacks from other sectors; and promoting cooperation among sectors while reducing competition for scarce resources. This approach recognizes the various socio-ecological processes that are inter-linked, and pressures felt on certain resources can get further exacerbated leading to serious long-term challenges due to demands from other 'nexus' sector activities. This demands greater co-ordination across institutions at local, national and international levels.

This approach aims to achieve the balance between environmental, social, and economic boundaries and simultaneously ensure well-being of the people. To follow this basic concept in India, the SDG goals are used as a medium which allows for interlinkages of different sectors and thematic areas. Since, a few SDGs have overlapping objectives with one another, the policies developed and aligned to achieve the goals must consider and identify these linkages and in-turn identify the potential trade-offs that might limit the physical achievement of the target under a goal.

## Examples of Nexus in Select Sectors

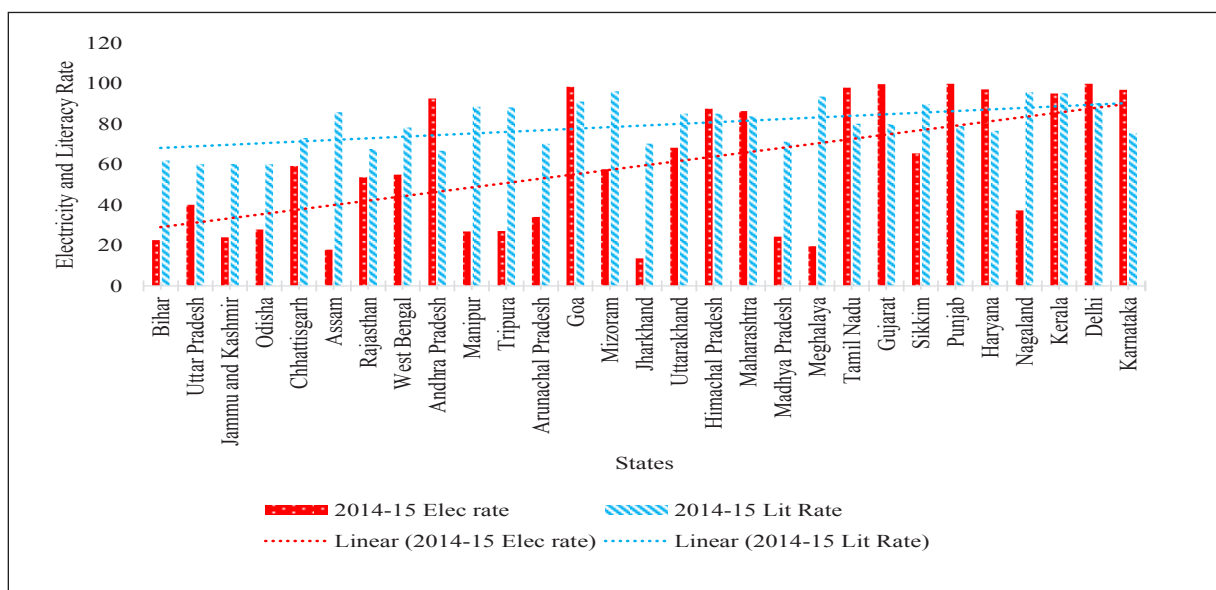
### Education and Electricity Nexus

6.6 Electricity in schools is a part of basic infrastructure requirements to provide quality education. It has been observed that basic infrastructure like electricity, separate toilets for girls and boys in schools create a healthy and positive environment at schools (UNDESA, 2014). It is observed that with electricity, the schools' access to modern methods and techniques of teaching helps holistic development of students and increase their attraction towards learning. Access to

Information and Communication Technologies (ICTs) methods and imparting knowledge of computer at schools requires reliable electricity connections. It then becomes obvious that schools having quality and reliable power would generally tend to have the facilities that the Government is providing under its Sarva Shiksha Abhiyan programme. Globally

it is observed that schools with electricity outperform the non-electrified schools in terms of staff-retention, drop-outs and other educational indicators. It is observed that States with lower literacy rates have low electricity rates at the schools and vice-versa (Figures 1a and 1b).

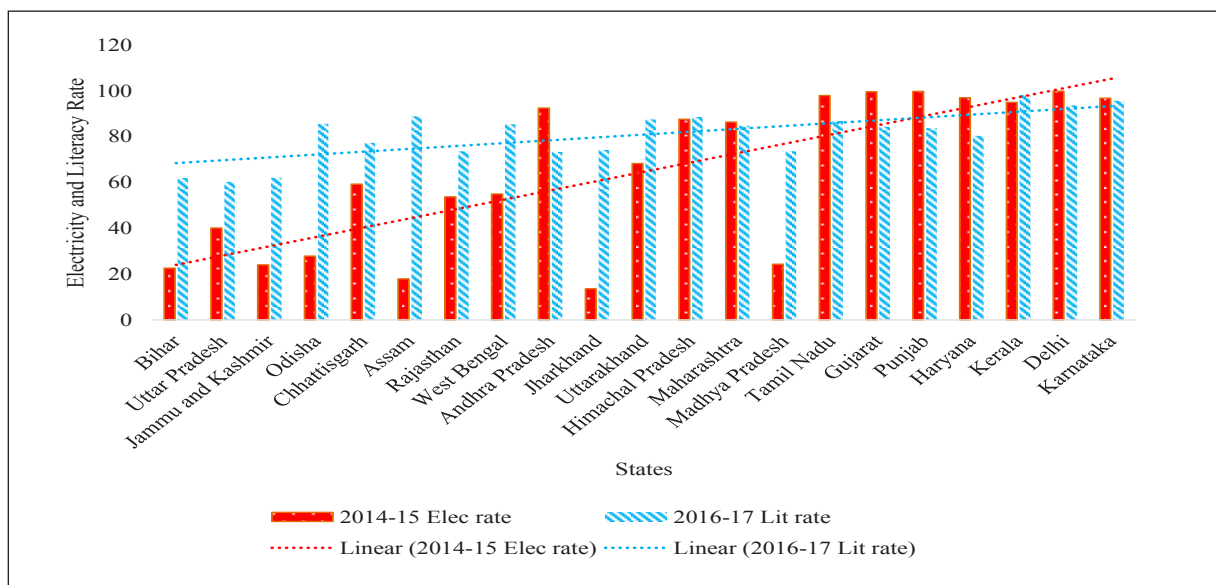
**Figure 1 (a) : Electricity Rate and Literacy rate nexus in Schools (all States) (in per cent)**



Source: DISE database for electricity rate & NSSO for literacy rate.

\* Electricity Rate = No. of school electrified / Total No. of school getting constructed (in particular year).

**Figure 1 (b): Electricity Rate and Literacy rate nexus in Schools (all States)**

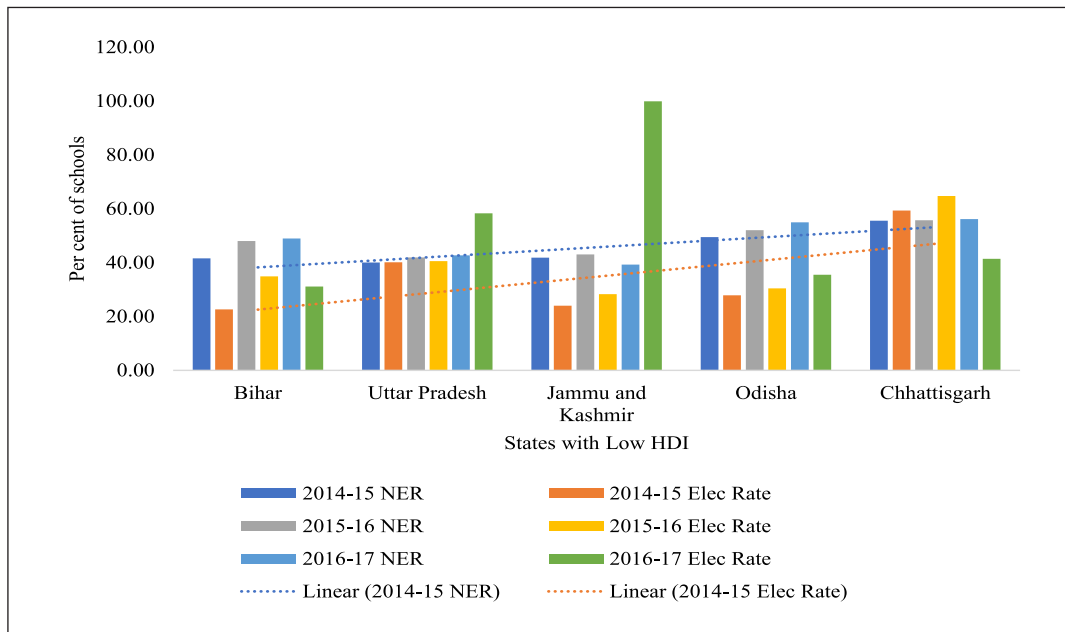


Source: DISE database for electricity rate & NSSO for literacy rate.

6.7 Figure 2, 3 and 4 showcase nexus between Net Enrolment Ratio (NER) and electrification of schools for selected States with low, medium and high Human Development Index (HDI) respectively. In case low and high HDI states, NER and electricity rate shows positive trend during 2014 to 2017. In

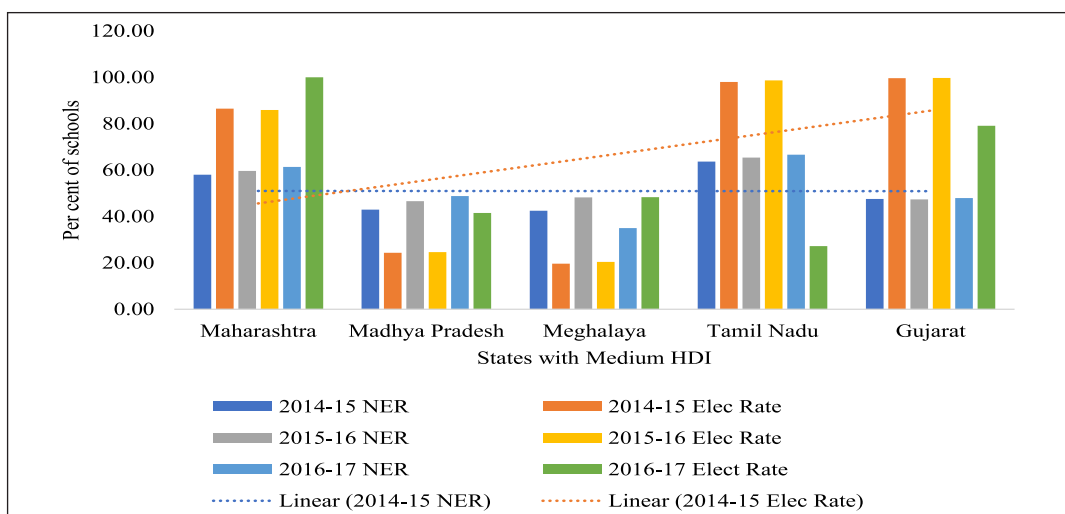
case of medium HDI states, there is no conclusive trend because of the rate of growth of electrified school is not so high to the of number of schools getting constructed as compared to high and low HDI states during the same time period.

**Figure 2: NER and Electricity Rate Nexus for selected States in India**



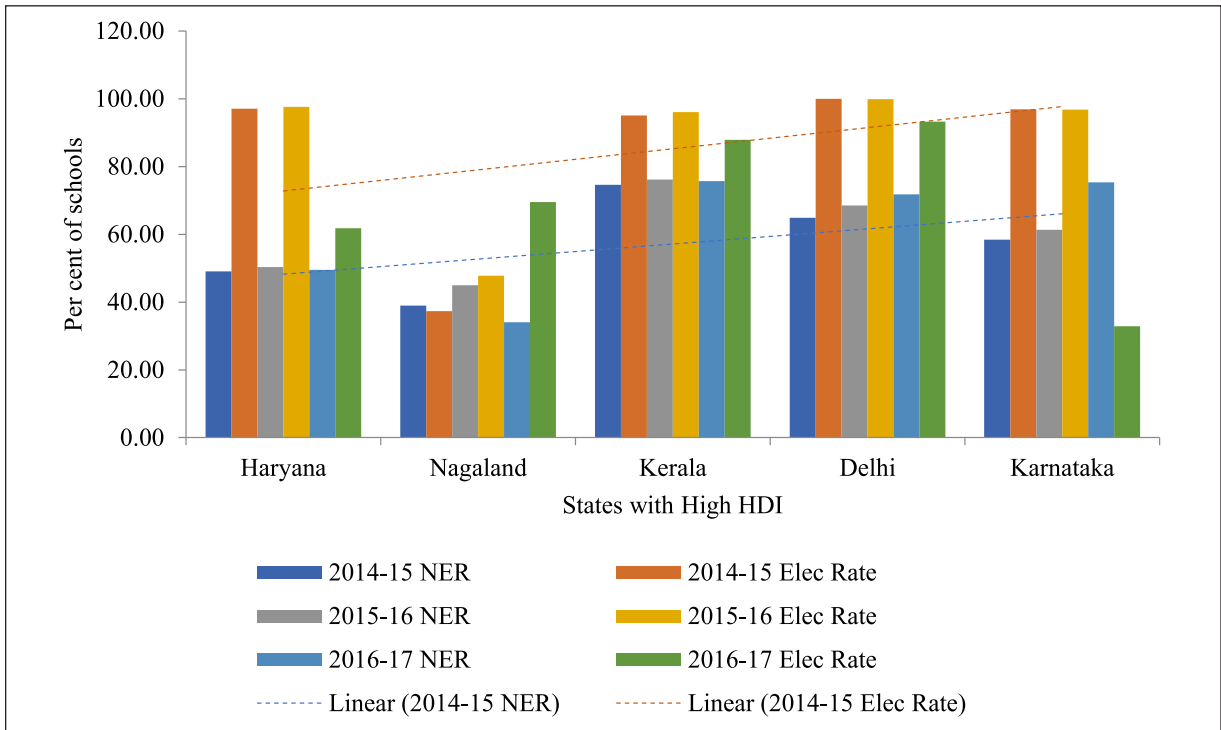
Source: DISE database.

**Figure 3: NER and Electricity Rate Nexus for selected States in India**



Source: DISE database.

**Figure 4: NER and Electricity Rate Nexus for selected States in India**



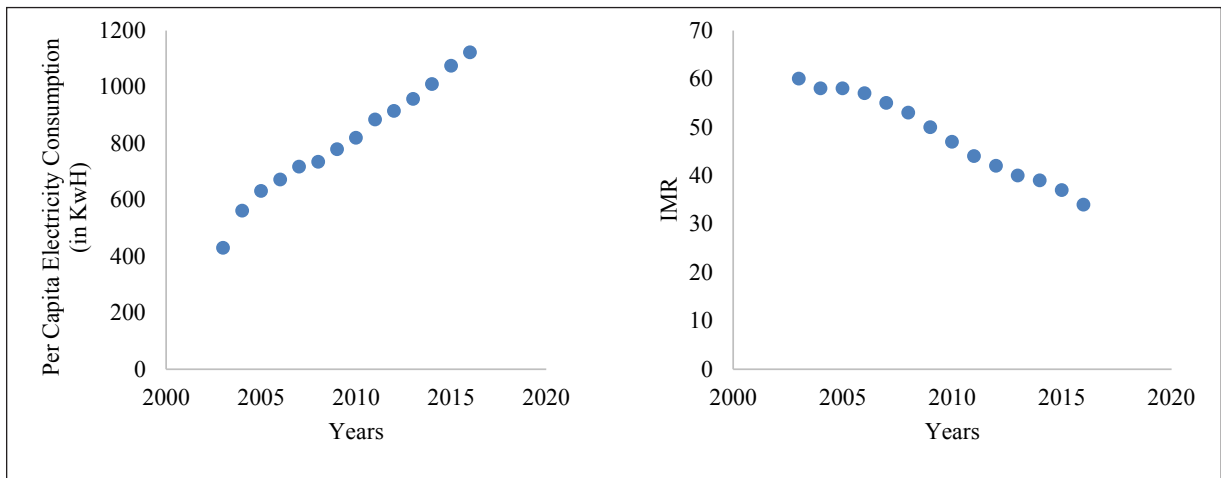
Source: DISE database.

**Health and Energy Nexus**

6.8 Many of the health improvement schemes- providing pediatric care, newborn emergency services, and successful vaccination rely heavily on the availability of electricity at the health centers. With the

growing importance of the indicators under the SDG goals, it is important that reliable electricity connections are provided at the health care centers. As witnessed, there is a positive relationship between the electricity consumption and fall in the Infant Mortality Rate (IMR) in the country (Figure 5).

**Figure 5: Nexus between Energy and Health**



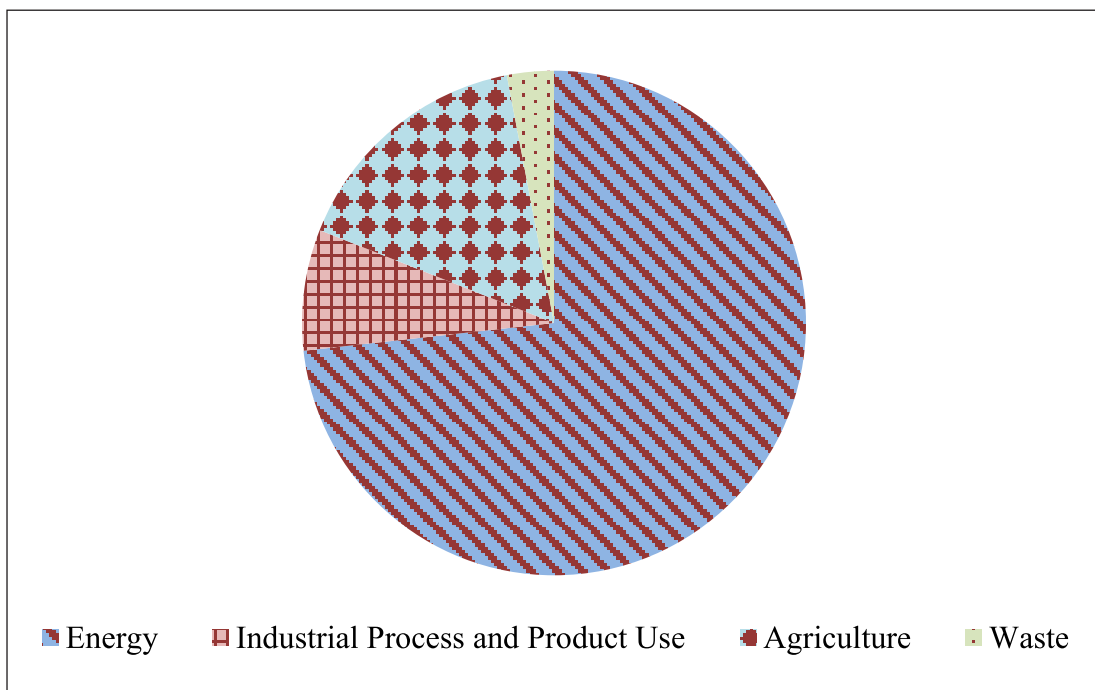
Source: Electricity Consumption: CEA various years, IMR: NITI Aayog various years.

## CLIMATE CHANGE

6.9 India submitted its Nationally Determined Contribution (NDC) under the Paris Agreement on a “best effort basis” keeping in mind the developmental imperatives of the country. In its NDC, India promised to reduce its emission intensity of GDP by 33 to 35 per cent below 2005 levels by the year 2030; 40 per cent of cumulative electric power installed capacity would be from non-fossil fuel sources by 2030 and increase its forest cover and additional carbon sink equivalent to 2.5 to 3 billion tons of carbon dioxide by 2030. The Paris Agreement is to be implemented in post-2020 period in line with the guidelines adopted under Paris Agreement Work Programme.

6.10 India has strived to ensure that it follows a growth path that delivers sustainable development and protects the environment by investing in various schemes aligned with its NDC, like Swachh Bharat Mission, National Smart Grid Mission, Atal Mission for Rejuvenation and Urban Transformation etc. Notwithstanding the economic actualities, India’s mitigation strategies have emphasized on clean and efficient energy system, enhanced energy efficiency, resilient urban infrastructure, safe, smart and sustainable green transportation network, planned afforestation, as well as holistic participation across all sectors. Swachh Bharat Mission (Urban) was launched in 2014 with the twin objectives of ensuring 100 per cent scientific solid waste management and making urban India open defecation free (ODF), to achieve

**Figure 6: India’s national GHG inventory (2014)\* (Gigagram)**



**Source: Ministry of Environment, Forest and Climate Change, Government of India.**

1 Gigagram (Gg) =  $10^9$  grams; Greenhouse gases are converted to CO<sub>2</sub> equivalent (CO<sub>2</sub>e or CO<sub>2</sub>eq) using their respective Global Warming Potentials. \*TOTAL without LULUCF.

total environmental improvement. In a span of five years, the Mission has made significant progress- all urban areas of 35 States/ UTs have become ODF and the percentage of waste processing rose from around 18 per cent in 2014 to 60 per cent. The year 2019 has seen a significant leap forward for renewable energy with India undertaking one of the world's largest renewable energy expansion programmes in the world. India had announced 175 Gigawatt (GW) targets for renewables by 2022 and has already achieved 83 GW. Further, Hon'ble Prime Minister in his address at the UN Climate Action Summit in September 2019 has stated that "India's renewable energy capacity would be increased to much beyond 175 GW and later till 450 GW". As a Party to the UNFCCC, India submitted its Second Biennial Update Report (BUR) to the UNFCCC towards fulfillment of the reporting obligation under the Convention. As per the BUR, the emission intensity of India's GDP has reduced by 21 per cent over the period of 2005-2014 which is the result of India's proactive and sustained actions on climate change. India is on track to achieve its nationally determined targets. In

2014, the net national GHG emissions after including LULUCF (Land Use, Land Use Change and Forestry) were 23,06,295Gg CO<sub>2</sub> equivalent (around 2.306 billion tons of CO<sub>2</sub> equivalent) (Figure 6).

### Progress in India's Climate Change Policies

6.11 Launched in 2008, India's National Action Plan on Climate Change (NAPCC) identifies a number of measures that simultaneously advance the country's development and climate change related objectives of adaptation and mitigation through focused National Missions. It was also meant to focus on key adaptation requirements and creation of scientific knowledge and preparedness as climate change acts as a "risk multiplier" for the vulnerable groups, worsening existing social, economic and environmental stresses. India has decided to revise the NAPCC in line with the NDCs under the Paris Agreement to make it more comprehensive in terms of priority areas. The progress of implementation of eight national missions is briefly explained in Box 1.

#### Box 1: National Missions and Progress

**The Perform, Achieve and Trade (PAT)** scheme under National Mission for Enhanced Energy Efficiency (NMEEE) designed on the concept of reduction in Specific Energy Consumption. In PAT cycle –V (April 2019), 110 Designated Customers (DC) from the existing sectors have been notified. The total energy consumption of these DCs comes out to be 15.244 Million Tons of Oil Equivalent (Mtoe) and it is expected to get a total energy savings of 0.5130 Mtoe. It is envisaged that by 2020, about 20 Mtoe of energy savings will be achieved through the implementation of this scheme.

**National Solar Mission** aims to increase the share of solar energy in the total energy mix. The cumulative targets under the mission for Grid Connected Solar Power Projects consists of 40 GW Grid connected Rooftop projects and 60 GW large and medium size land based solar power projects. The combined target is now set at 100 GW. The total investment in setting up 100 GW will be



around ₹ 6,00,000 crore. A cumulative 32.5 GW of solar electric generation capacity has been installed

**National Water Mission** focuses on monitoring of ground water, aquifer mapping, capacity building, water quality monitoring and other baseline studies. There are 1071 assessment units categorized as over exploited as per 2011 assessment of Central Ground Water Authority (CGWA). Directions have been issued by CGWA under Section 5 of “The Environment Protection Act, 1986” for mandatory Rain Water Harvesting / Roof Top Rain Water Harvesting for all target areas in the country including UTs. While granting ‘No Objection Certificate’ for drawing ground water, CGWA insists for mandatory rain water harvesting as per the guidelines issued.

**National Mission for a Green India** envisages a holistic view of greening and focuses on multiple ecosystem services along with carbon sequestration and emission reduction. The mission emphasized the landscape approach to treat large contiguous areas of both forest and non-forest, public and private lands with a key role of the local communities in planning, implementation and monitoring. A sum of ₹ 343.08 crore has so far been released under the mission for undertaking afforestation activities over an area of 126916.32 ha in 13 states. Energy efficient devices have been provided to 56,319 households to promote alternative energy sources in project areas. Convergence Guidelines with Mahatma Gandhi National Rural Employment Guarantee Scheme and Compensatory Afforestation Fund Management and Planning Authority have been issued.

**National Mission on Sustainable Habitat** is being implemented through three programmes: Atal Mission on Rejuvenation and Urban Transformation, Swachh Bharat Mission, and Smart Cities Mission. Energy Conservation Building Rules 2018 for commercial buildings having connected load of 100 KW or above has been made mandatory. Mass Rapid Transit Systems are being implemented across the country and standards have been developed for six sub-sectors namely, solid waste management, water and sanitation, storm water drainage, urban planning, energy efficiency and urban transport. Under Mass Rapid Transit System, 585 km of metro rail is in operation; 620 km is under construction. Under the Bus Rapid Transit System (BRT), 223 kms of BRT corridors operational in 8 cities and 505 kilometers of BRT corridors are under construction in 14 cities.

**National Mission for Sustainable Agriculture** aims at enhancing food security and protection of resources. Key targets include covering 3.5 lakh hectare of area under organic farming, 3.70 under precision irrigation, 4.0 lakh hectare under System of Rice Intensification, 3.41 lakh hectare under diversification to less water consuming crop, 3.09 lakh hectare additional area under plantation in arable land and 7 bypass protein feed making. The mission has resulted in the formation of National Innovations on Climate Resilient Agriculture, a network project.

**National Mission for Sustaining the Himalayan Ecosystem** aims to evolve suitable management and policy measures for sustaining and safeguarding the Himalayan Ecosystem. The key achievements include setting up of: - Centre of Glaciology at Wadia Institute of Himalayan Geology, thematic task forces in 6 lead institutions, State Climate Change Centers in 11 out of 12 Himalayan States, 40 Training Programmes under State Climate Change Centres organized with 5500 people trained, formation of Inter-University Consortium of 4 universities on Himalayan Cryosphere and Climate Change.

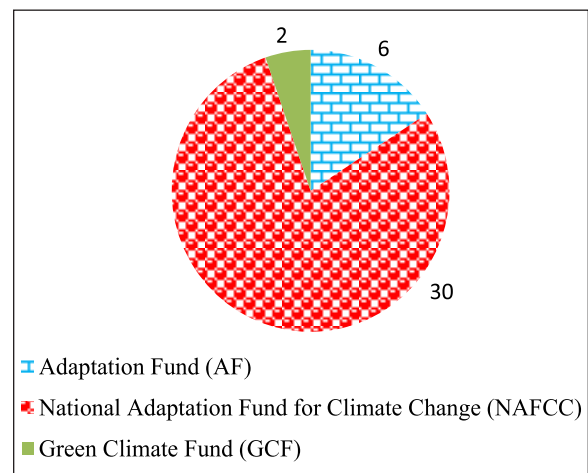
**National Mission on Strategic Knowledge for Climate Change** seeks to build a knowledge system that would inform and support national action for ecologically sustainable development. Key achievements include setting up of 11 Centres of Excellence and 10 State Climate Change

Centres. 116 Training programmes have been launched and 14000 people have been trained; a total of 23 major R&D programmes have been spread over the country; 7 Human Capacity Building and National Knowledge Network programmes in the areas of climate change science, adaptation and mitigation have been launched. 8 Global Technology Watch Groups in the areas of Renewable Energy Technology, Advance Coal Technology, Enhanced Energy Efficiency, Green Forest, Sustainable Habitat, Water, Sustainable Agriculture and Manufacturing have been set up.

6.12 Another major initiative is launching of Climate Change Action Program (CCAP) in 2014, a central sector scheme, with a total cost of ₹ 290 crore for five years, to build and support capacity at central and state levels, strengthening scientific and analytical capacity for climate change assessment, establishing appropriate institutional framework and implementing climate actions. Energy Audit Studies have revealed savings potential to the extent of 40 per cent in end use. The Energy Conservation Building Code (ECBC) sets minimum energy performance standards. It resulted in estimated energy saving of 84.34 million kWh, reduction in GHG emission of 69,154 tons of CO<sub>2</sub> per year. The same is also launched for residential sector. ECBC 2017 prescribes energy performance standards for new commercial buildings to be constructed across India to achieve a 50 per cent reduction in energy use by 2030 translating to energy savings of about 300 Billion Units by 2030 and peak demand reduction of over 15 GW in a year. Schemes like UJALA for LED bulb distribution has crossed 360 million whereas under street light national program, 10 million conventional streetlights have been replaced by LED street lights thus cumulatively saving 43 million tons of CO<sub>2</sub> emission. As part of the National Electric Mobility Mission Plan (NEMMP) 2020, Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) scheme was formulated in 2015 to promote manufacturing and sustainable growth of electric and hybrid vehicle technology. As of November 2019, a total of 280,994 vehicles have been sold. The National Bio-fuels Policy

2018 targets 20 per cent blending of ethanol in petrol and 5 per cent blending of biodiesel in diesel by 2030. National Adaptation Fund on Climate Change (2015) supports concrete adaptation activities for the States/UTs that are particularly vulnerable to the adverse effects of climate change and are not covered under on-going schemes. The allocation for the period 2017-18 to 2019-20 is of ₹ 364 crores. The Scheme has been taken as Central Sector Scheme with National Bank for Agriculture and Rural Development (NABARD) as the National Implementing Entity. Till date 30 projects on adaptation in agriculture, water, forestry, ecosystem & biodiversity, etc. have been approved. NABARD is implementing a number of climate adaptation and mitigation projects involving a total financial support of ₹ 1819.62 Crore across India, supported under both multilateral and domestic national funds (Figure 7).

**Figure 7: Climate Change Projects (as on 31 December 2019) by NABARD (In Number)**



Source: NABARD.

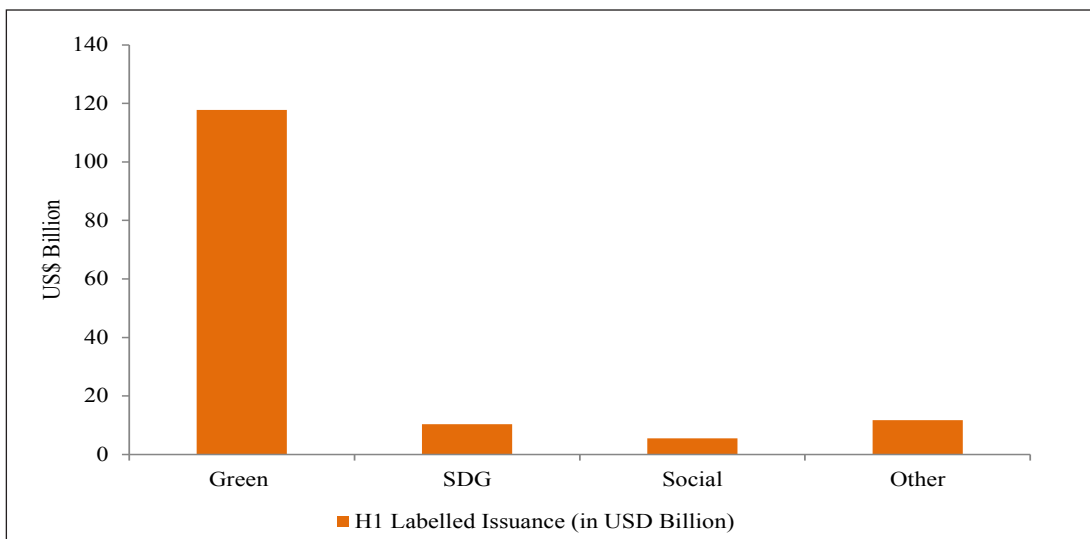
## Aligning Financial System with Sustainability

6.13 Cleaner forms of production essentially require a sound financial system. This is more so as estimates point towards requirement of trillions of dollars to achieve SDGs globally. Hence, the spotlight is now on aligning the financial system with sustainable development. In December 2007, RBI had sensitized banks in India to the various international initiatives and was asked to keep abreast of the developments in the field of sustainability and dovetail/modify their lending strategies/plans in the light of such developments. In 2012, the Securities and Exchange Board of India (SEBI), mandated the Annual Business Responsibility Reporting (ABRR), a reporting framework based on the National Voluntary Guidelines (NVGs) on Social, Environmental and Economic Responsibilities of Business released by the Ministry of Corporate Affairs. These guidelines serve as a driver to pursue sustainable management practices. Indian Institute of Corporate Affairs in 2011 developed a concept of NVG for adoption by

the corporate sector. SEBI mandated adoption of NVGs by the listed Indian companies including banks. In 2014-15, a Working Group was set up by Indian Banks' Association (IBA) to generate the concept of responsible financing. The Working Group finalized the guidelines on 'NVGs for Responsible Financing'. These guidelines lay down 8 principles, which cover different aspects of environmental, social and governance (ESG) responsibilities to informed business action. Each principle details its 'Description and Applicability' and 'Areas of Disclosure' which would enable Financial Institutions to integrate the ESG principles in their business decision making, structure and processes.

6.14 Green bonds are debt securities issued by financial, non-financial or public entities where the proceeds are used to finance 100 per cent green projects and assets. The first half of 2019 saw sustainability/SDG bonds maintaining their place in a wider labeled market with US\$ 10.3 billion of transactions (Figure 8) as issuers and investors continue to adopt policies and strategies linked to

**Figure 8: H1\* 2019 Labeled Issuance of Bonds (in US\$ Billion)**



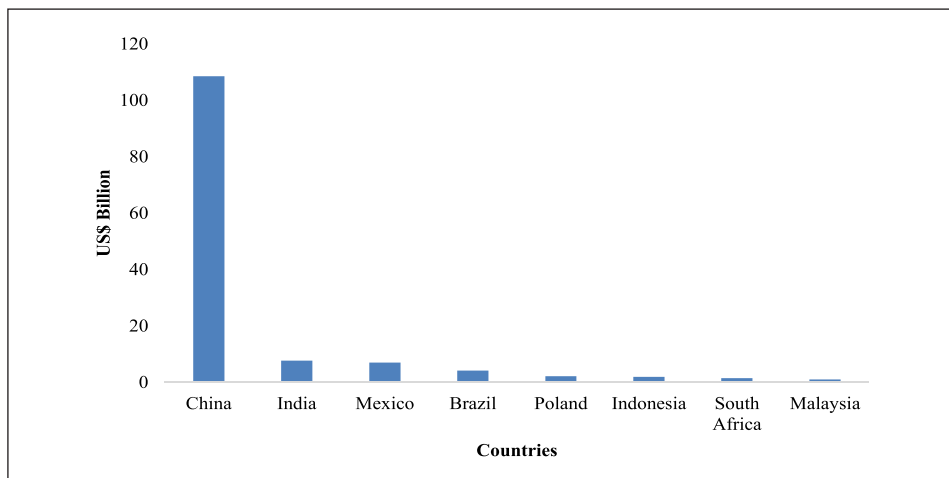
Source: Climate Bonds Initiative (as on 19.12.2019).

\*H1: January - June

SDGs. Social bonds also maintained visibility with US\$ 5.5 billion of issuance within the labeled market which totals a healthy US\$ 145.4 billion for the half year. Climate Bonds remains focused on green bonds, which are specifically linked to climate-change mitigation, adaptation and resilience. India has the second largest Emerging green bond

market after China (Figure 9). A number of Government agencies have contributed to issuance: Indian Renewable Energy Development Agency (IREDA) and the Indian Railway Finance Corporation (IRFC). In 2018, the SBI entered the market with an US\$ 650 million Certified Climate Bond.

**Figure 9: Major Emerging Markets for Green Bonds Issuance 2012-18 (US\$ Billion)**



Source: Emerging Market Green Bonds Report 2018.

6.15 In order to scale up the environmentally sustainable investments, India joined the International Platform on Sustainable Finance (IPSF) in October 2019. The Platform acknowledges the global nature of financial markets which has the potential to help finance the transition to a green, low carbon and climate resilient economy by linking financing needs to the global sources of funding. The main objectives are exchange and disseminate information to promote best practices in environmentally sustainable finance; compare the different initiatives and identify barriers and opportunities to help scale up environmentally sustainable finance internationally while respecting national and regional contexts.

### Green Climate Fund

6.16 Under the UNFCCC and also Paris Agreement, the intent and obligation

of climate finance is unambiguous, that developed country Parties shall provide financial resources to developing countries to undertake adaptation and mitigation actions in accordance with the country needs and priorities. In 2009, developed countries committed to a goal of mobilizing jointly US\$ 100 billion a year by 2020 to address the needs of developing countries and decided that a significant portion of such funding should flow through the GCF. In contrast, the total pledges to the GCF in the Initial Resource Mobilization (IRM) in 2014, the largest dedicated climate fund, are a meagre US\$ 10.3 billion. Approximately US\$ 10.2 billion of the pledges had been converted into contribution agreements/arrangements. The GCF Board has approved US\$ 5.2 billion to support the implementation of 111 climate change adaptation and mitigation projects and programmes in 99 developing

countries. GCF's first replenishment (2020-2023) process so far witnessed 28 countries pledging resources to replenish the Fund for an amount of US\$ 9.7 billion, which is even quantitatively lower than the IRM period. While the calls for raising of the

ambition level of all countries and closing the emissions gap to limit temperature rise by 1.5 – 2 degree C above pre-industrial level were very intense at the recent climate talks, the key enabler, the climate finance, the major crunch issue remained unresolved (Box 2).

### Box 2: India and COP 25

The 25<sup>th</sup> session of the Conference of the Parties (COP 25) to the UNFCCC was held at Madrid, Spain under the Chilean Presidency. India reiterated its commitment to implement the Paris Agreement in its letter and spirit and to act collectively to address climate change including consideration of principles of equity and common but differentiated responsibilities and respective capabilities. The COP 25 decision, titled Chile Madrid Time for Action, emphasizes the continued challenges that developing countries face in accessing financial, technology and capacity-building support, and recognizes the urgent need to enhance the provision of support to developing country Parties for strengthening their national adaptation and mitigation efforts. The decision also recalls the commitment made by developed country Parties to a goal of mobilizing jointly US\$ 100 billion per year by 2020 to address the needs of developing countries. On the issue of global ambition for combating climate change, the decision adopted provides for a balanced and integrated view of ambition that includes not only efforts for climate change mitigation, but also for adaptation and means of implementation support from developed country parties to developing country parties.

Under the review of Warsaw International Mechanism (WIM) for Loss and Damage, the decision recognizes urgency of scaling-up of action and support, including finance, technology and capacity-building, for developing countries for averting, minimizing and addressing loss and damage. The decision also established the Santiago network for catalyzing technical assistance for implementation of relevant approaches in developing countries. On adaptation matters, the COP 25 decision recalls that the provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation, taking into account country-driven strategies, and the priorities and needs of developing country Parties, considering the need for public and grant-based resources for adaptation. On technology matters, the adopted decision requests the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN) to continue to implement their mandates with strengthened efforts on all themes of the technology framework. GCF has also been requested to collaborate with CTCN and TEC for strengthening cooperative action on technology development and transfer at different stages of the technology cycle. India hosted 'India Pavilion' at COP-25 with the theme '150 years of celebrating the Mahatma', designed to depict Mahatma Gandhi's life and messages around sustainable living.

## INDIA'S INITIATIVES AT THE INTERNATIONAL STAGE

### International Solar Alliance (ISA)

6.17 ISA is the first treaty based inter-governmental organization headquartered in India. With 83 signatory countries, ISA creates a multi-stakeholder ecosystem where sovereign nations, multilateral organizations, industry, policymakers and innovators work

together to promote the common and shared goal of meeting energy demands of a secure and sustainable world. The ISA aims to pave the way for future solar generation, storage and technologies for Member countries' needs by mobilizing over US\$ 1000 billion by 2030. Achievement of ISA's objectives will also strengthen the climate action in Member countries, helping them fulfill the commitments expressed in their NDCs.

6.18 In 2019, ISA has taken up the role of an ‘enabler’ by institutionalizing 30 Fellowships from the Member countries with a premier institution (IIT Delhi) in the host country, and training 200 Master Trainers from ISA Member countries; of a ‘facilitator’ by getting the lines of credit worth US\$ 2 Billion from EXIM Bank of India and US\$ 1.5 Billion from Agence Francaise de Development (Afd), France, by ensuring MDB investments in solar, and garnering project preparation support; of an ‘incubator’ by nurturing initiatives like the Solar Risk Mitigation Initiative and of an ‘accelerator’ by developing tools to aggregate demand for more than 1000 MW solar rooftop, 10,000 MW of Solar Mini-Grid and 270,000 solar water pumping systems.

6.19 The ISA’s Programme on Scaling Solar Applications for Agriculture Use focuses on providing greater energy access and a sustainable irrigation solution through deployment of Solar Water Pumping Systems in member countries. To make the projects viable and affordable, the ISA aggregated demand for solar water pumps from various countries in an effort to substantially reduce the system costs. The ISA received a cumulative demand of approx. 2.72 lakhs of solar water pumping systems from 22 member countries. The discovered prices through the tender would serve as the benchmark or reference prices for these member countries for procuring pumps.

6.20 In the field of innovative financing instruments, the Solar Risk Mitigation Initiative, launched by World Bank and AfD in support of the ISA, aims at supporting the development of bankable solar programs in developing countries leveraging private sector investments. World Bank has also committed US\$ 337 million Risk Mitigation Fund for 23 member countries in off grid sector in Africa in partnership with ISA. The European Investment Bank has started

working on a 60 Million Euros grant project to create a concessional financial facility and risk mitigation Fund to promote off grid applications in Africa. The ISA secretariat is also developing a robust implementation plan for the Scaling Solar Mini-grids Programme. The Asian Development Bank is providing a US\$ 2 Million Knowledge Support and Technical Assistance (KSTA) to Six South Asian Countries in partnership with the ISA. The KSTA will facilitate deployment of Solar Energy at scale via three pillars: Identification and preliminary development of Solar Project Pipeline; Identification of Financial Instruments and mobilization of low-cost finance; and Knowledge support & Capacity Building.

6.21 To strengthen ISA’s partnership with the UN and its agencies and responding to the mandate received from the first Assembly of the ISA, the Secretariat has initiated follow-up actions for requesting a Permanent Observer Status of the ISA at the UN General Assembly and for negotiating a cooperation agreement with the UN for establishing institutional linkages between the ISA and the UN. ISA has also signed MoU with UNESCAP in May 2019 and with Sustainable Energy (SE4) All in June 2019, institutionalized solar awards in collaboration with Government of Haryana (Kalpana Chawla Solar Award), Government of Madhya Pradesh (Acharya Vinoba Bhave international award) and Government of Karnataka (Sri Visveswaraya Award) to strengthen the institution.

### **Coalition for Disaster Resilient Infrastructure**

6.22 India launched the Coalition for Disaster Resilient Infrastructure (CDRI) on the sidelines of UN Secretary General’s Climate Action Summit in September, 2019. This international partnership of national governments, UN agencies, multilateral development banks, private sector, and

knowledge institutions will promote the resilience of new and existing infrastructure systems to climate and disaster risks, thereby ensuring sustainable development. Developed through consultations with more than 35 countries, CDRI envisions enabling measurable reduction in infrastructure losses from disasters, including extreme climate events. CDRI aims to enable the achievement of objectives of expanding universal access to basic services and enabling prosperity as enshrined in the SDGs, while also working at the intersection of the Sendai Framework for Disaster Risk Reduction and the Paris Climate Agreement.

6.23 CDRI will conduct country-specific and global activities and provide member countries technical support and capacity development, partnerships to facilitate and encourage investment in disaster resilient infrastructure systems. In its formative stage, CDRI will focus on developing resilience in ecological infrastructure, social infrastructure with a concerted emphasis on health and education, and economic infrastructure with special attention to transportation, telecommunications, energy, and water. Within 2-3 years, the coalition aims to have a 3-fold impact of achieving considerable changes in member countries' policy frameworks, future infrastructure investments and high reduction in economic losses from climate-related events and natural disasters across sectors.

### **India and the UNCCD**

6.24 India hosted 14<sup>th</sup> session of the Conference of Parties (COP 14) to the United Nations Convention to Combat Desertification (UNCCD) from 2-13 September, 2019. The commemoration of World Day to Combat Desertification 2019 envisaged the release of COP 14 Logo with the Slogan "Restore Land, Sustain Future". India, as President of COP to UNCCD

stated that human actions have contributed to accelerating climate change, land degradation, and biodiversity loss and that, similarly, strong human intent, intelligence as well as technology will be needed to reverse the damage. Hon'ble Prime Minister of India while addressing the High-Level Segment on 9<sup>th</sup> September, 2019 announced India's support for, among other actions, for enhanced South-South Cooperation that aims to share India's experiences with cost-effective and sustainable land management strategies; and a "Global Water Action Agenda" to maximize synergies through holistic land and water management. As a party to the UNCCD, India has voluntarily committed to raise its ambition of the total area that would be restored from its land degradation status, from 21 million to 26 million hectares between now and 2030. His announcement, inter-alia, include, to set up a centre for excellence in India at the Indian Council of Forestry Research and Education; and has offered its resources in space and remote sensing technology to member countries who wish to manage their land degradation programmes through cutting-edge technology. COP 14 adopted the New Delhi Declaration: Investing in Land and Unlocking Opportunities. Through the Declaration, Ministers expressed support for new initiatives or coalitions aiming to improve human health and well-being, the health of ecosystems, and to advance peace and security. Attention was also drawn to the role of private sector in land restoration, including through promoting sustainable value chains.

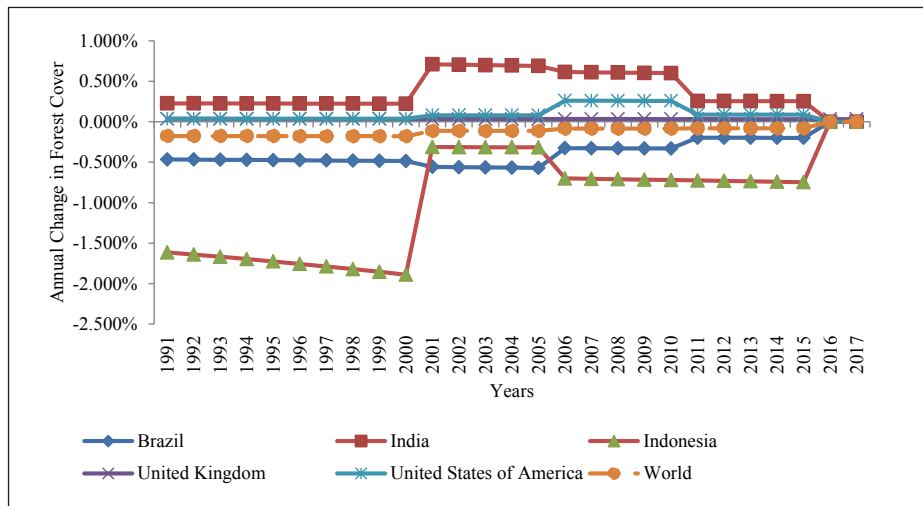
### **INDIA AND ITS FORESTS**

6.25 India is among a few countries in the world where, despite ongoing developmental efforts, forest and tree cover are increasing considerably. A comparison with some other emerging and advanced economies shows that India's growth in forest cover has been

in positive territory (Figure 10). In terms of canopy density classes, area covered by Very Dense Forest (VDF) is 99,278 sq. km (3.02 per cent), Moderately Dense Forest (MDF) is 3,08,472 sq. km (9.39 per cent) and Open Forest (OF) is 3,04,499 sq. km (9.26 per cent) (Figure 11). The forest and tree cover have reached 80.73 million hectare which is 24.56 per cent of the geographical area of the country. The total

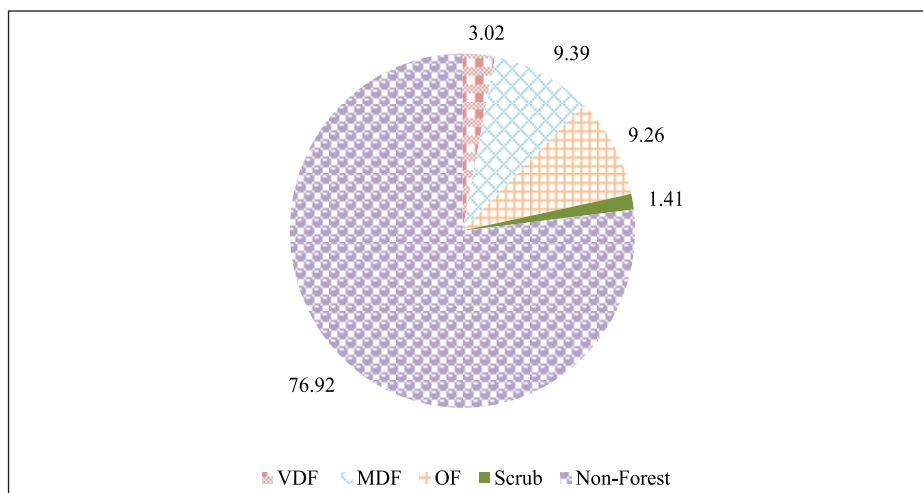
forest cover of the country, as per current assessment 2019 is 7,12,249 sq. km which is 21.67 per cent of the total geographic area of the country. There has been an increase of 3,976 sq. km (0.56 per cent) of forest cover, 1,212 sq. km (1.29 per cent) of tree cover and 5,188 sq. km (0.65 per cent) of forest and tree cover put together, at the national level as compared to the previous assessment 2017.

**Figure 10: Annual change in forest cover (per cent)**



Source: World Development Indicators.

**Figure 11: Forest Cover of India (2019) (per cent)**

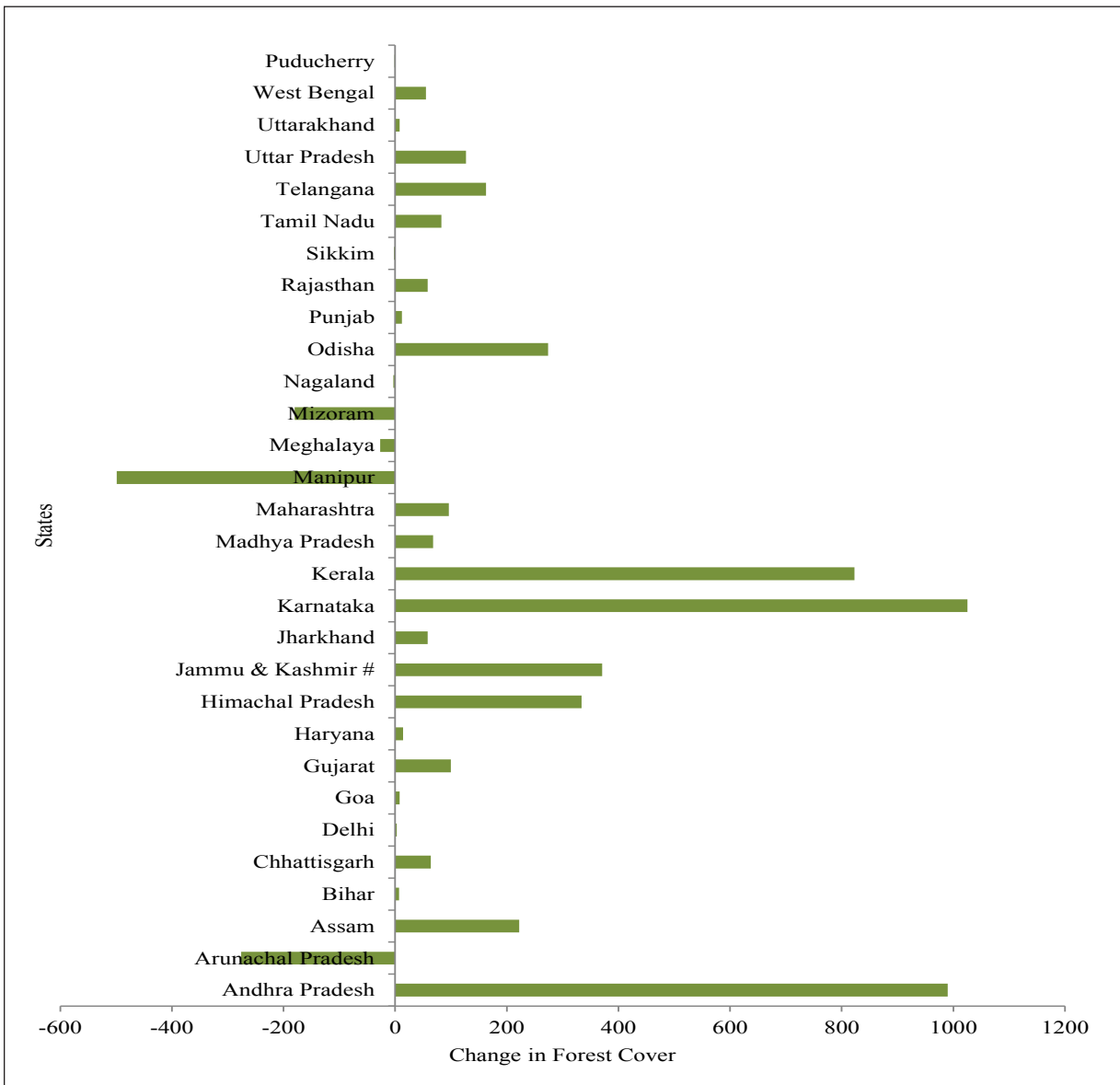


Source: India State of Forest Report 2019.

6.26 The States/UTs showing significant gain in forest cover are Karnataka (1,025 sq. km), Andhra Pradesh (990 sq. km), Kerala (823 sq. km) and Jammu &

Kashmir (371 sq. km) whereas States showing loss in forest cover are Manipur, Meghalaya, Arunachal Pradesh and Mizoram (Figure 12).



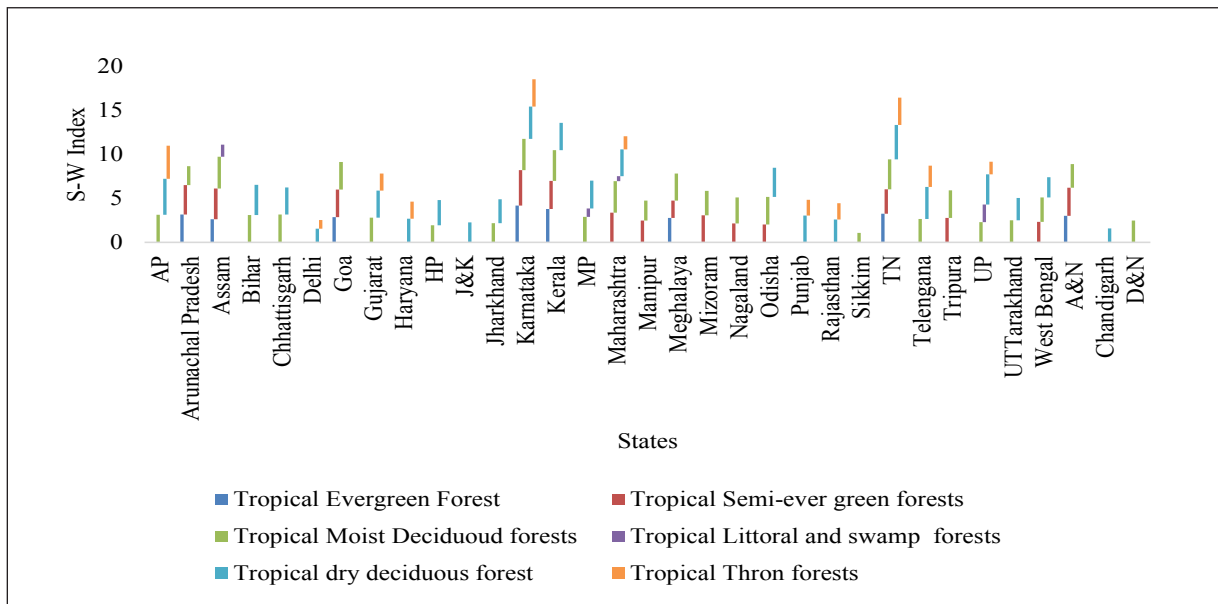
**Figure 12: Change in the forest cover for India in 2019 as compared to 2017(area in sq. km)**

Source: World Development Indicators.

6.27 India is one of the 17 mega diverse countries in the world. This is evident in the Shannon-Weiner Index for Diversity which is used for measuring species richness and abundance. The index also compares diversity of species among various habitats. India State of the Forest Report 2019 assessed Shannon-Weiner Index for 16 bio-diverse areas. The index for six bio-diverse areas such as Tropical wet evergreen forest, Tropical semi-evergreen forest, Tropical moist deciduous forest, Littoral and Swamp

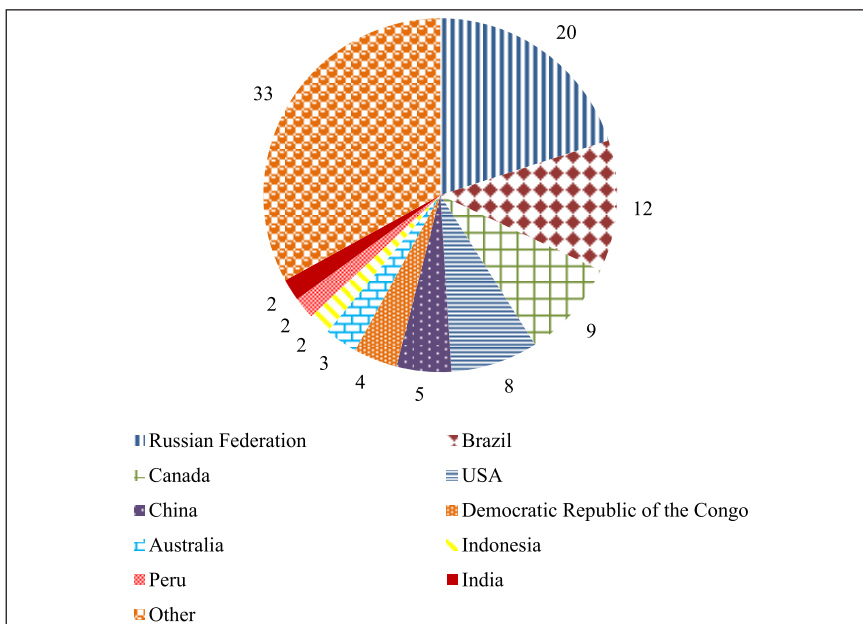
forest, Tropical dry deciduous forest and Tropical Thorn forests are given in Figure 13. The Index shows that Tropical Evergreen forest is high in Karnataka followed by Kerala. Tropical moist deciduous forests cover is high in Arunachal Pradesh, Karnataka and Maharashtra. Tropical dry deciduous forest is high in Arunachal Pradesh and semi-evergreen forest are high in Karnataka. Tropical Littoral and swamp forests are high in UP and tropical thorn forests are seen widely in Andhra Pradesh.

**Figure 13: Shannon-Weiner Index for Trees**



Source: India State of Forest Report 2019.

**Figure 14: Forest area for top ten countries (per cent)**



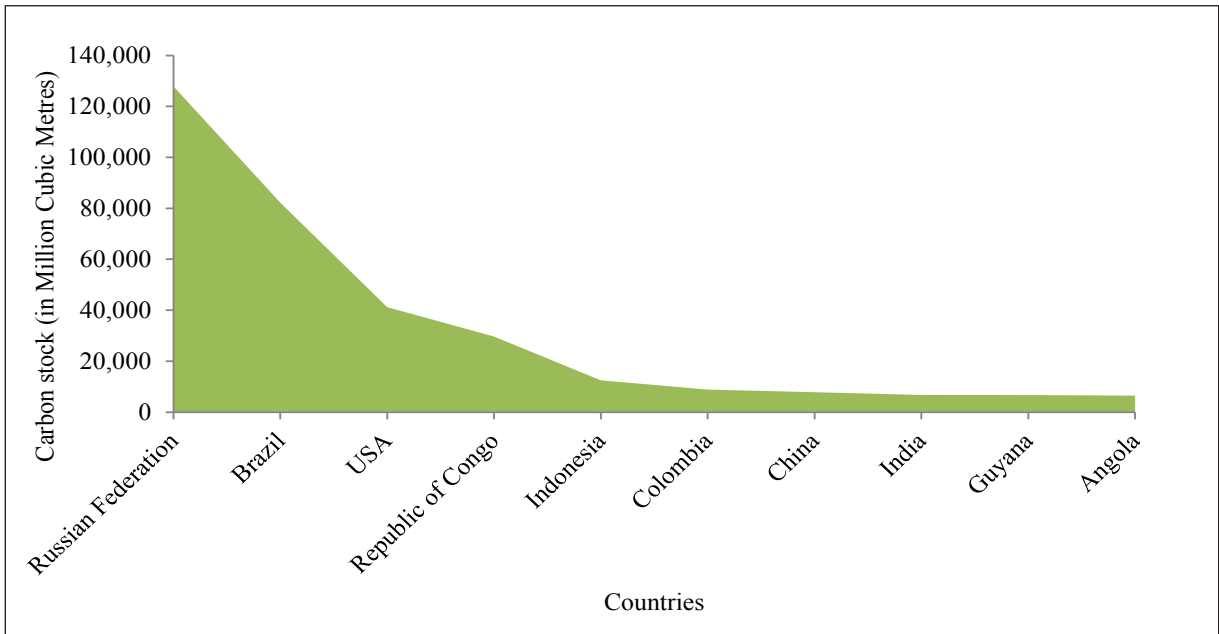
Source: India State of Forest Report 2019.

India accounts for 2 per cent of the total global forest area in 2015 (Figure 14) as per the Global Forest Resource Assessment (FRA) by FAO.

6.28 Forest plays a crucial role in adaptation and mitigation to climate change. Forests help to store more carbon than any other terrestrial

ecosystem (India State of Forest Report, 2019). In the Forest Report, 2019, the total carbon stock in forest is estimated as 7,124.6 million tons. There is an increase of 42.6 million tons in the carbon stock of the country as compared to the last assessment 2017. The carbon stock of the top 10 countries is given at Figure 15.

**Figure 15: Carbon Stock (Million Cubic Metres)**

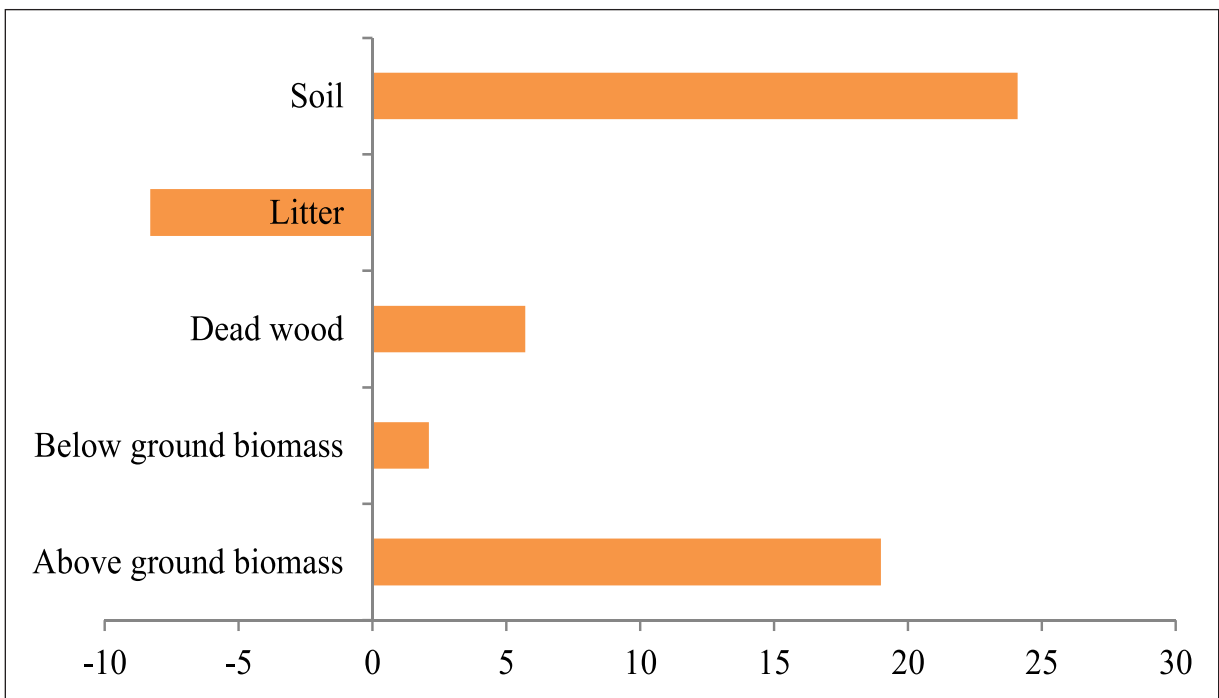


Source: India State of Forest Report 2019.

6.29 Net change in carbon stock in India shows that net change is highest in soil organic carbon followed by Above Ground

Biomass (AGB) and Dead wood. Litter carbon registered negative growth rate as compared to 2017 assessment. (Figure 16)

**Figure 16: Net Change in Carbon Stock in forest in 2019 as compared to 2017 assessment (in per cent)**



Source: India State of Forest Report 2019.

## AGRICULTURAL RESIDUE BURNING—A MAJOR CONCERN

6.30 Burning of agricultural wastes in the fields is a practice that results in a number of environmental problems. India, being the second largest agro-based economy with year-round crop cultivation, generates a large amount of agricultural waste, including crop residues. Open burning of crop residues in the agricultural fields has become an environmental concern in India, particularly during paddy harvesting season. Varieties of surplus crop residues are burnt especially in northern States of Punjab, Haryana, UP, and Rajasthan depending on the agro-climatic region; however, about 50 per cent of all crop residue burnt in the country are residues of rice crop (TIFAC, 2018). Use of combine harvesters leaves the crop residues in field, and in order to clear the fields for the next crop in easiest way, farmers' burn the residues. About 178 million tonnes of surplus crop residues are available in the country (TIFAC, 2018). Burning of these residues leads to rise in pollutant levels and deterioration of air quality.

6.31 Various source apportionment studies at city scales have shown that agricultural burning contributes significantly in PM<sub>2.5</sub> (particulate matter, diameter measurements of 2.5 micrometers or less) concentrations. Because huge volumes of residues are burnt in a very short duration (of few weeks), it leads to significant contributions in pollutant levels like PM<sub>2.5</sub> (TERI, 2018, SAFAR 2019). The effect of stagnant atmospheric condition over Delhi during the harvest season of kharif crop has aggravated the deterioration of the ambient air quality in the region (Kanawade et al., 2019). Emission pollutants released due to burning depends on the type of crop residue e.g. PM<sub>2.5</sub> emission (g/Kg) from the

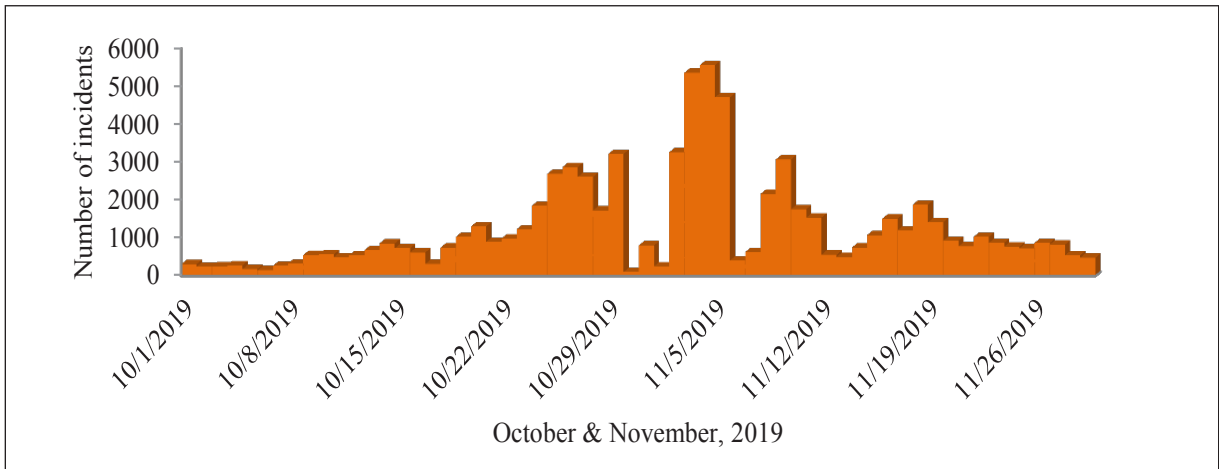
burning of different crop residues followed this order; Sugarcane (12.0), Maize (11.2), Cotton (9.8), Rice (9.3), wheat (8.5) (TERI, 2019). There are studies which have reported that open burning of crop residues has ill effects on soil organic carbon and soil fertility (Hesammi et al. 2014).

6.32 The stubble burning incidents in the month of October and November, 2019 are given in Figure 17 which shows the fire hot spot detected by NASA NPP-VIIRS satellite over North India during October-November, 2019. This satellite overpass India sometime around 1:30 local solar time (afternoon). As the figure shows, number of fire events are high from the mid of October till the first week of November, 2019. This has led to an increase in PM<sub>2.5</sub> and PM<sub>10</sub> in Delhi in the month of October and November as compared to that of September, 2019 (Figure 18). In the month of September, the highest level of PM<sub>10</sub> and PM<sub>2.5</sub> was 134 and 80.34 respectively. In the month of October, the highest level of PM<sub>10</sub> was 384 which is more than double as compared to the maximum PM<sub>10</sub> of September, 2019. Similarly, the highest level of PM<sub>2.5</sub> in the month of October was 306 which is higher than the September assessment. In the month of November, PM<sub>10</sub> crossed 550 and PM<sub>2.5</sub> crossed 510. PM<sub>10</sub> and PM<sub>2.5</sub> started falling in December, 2019 and the lowest level of PM<sub>10</sub> and PM<sub>2.5</sub> was 188 and 153 respectively.

6.33 Various studies suggest ways to address this issue, which include:

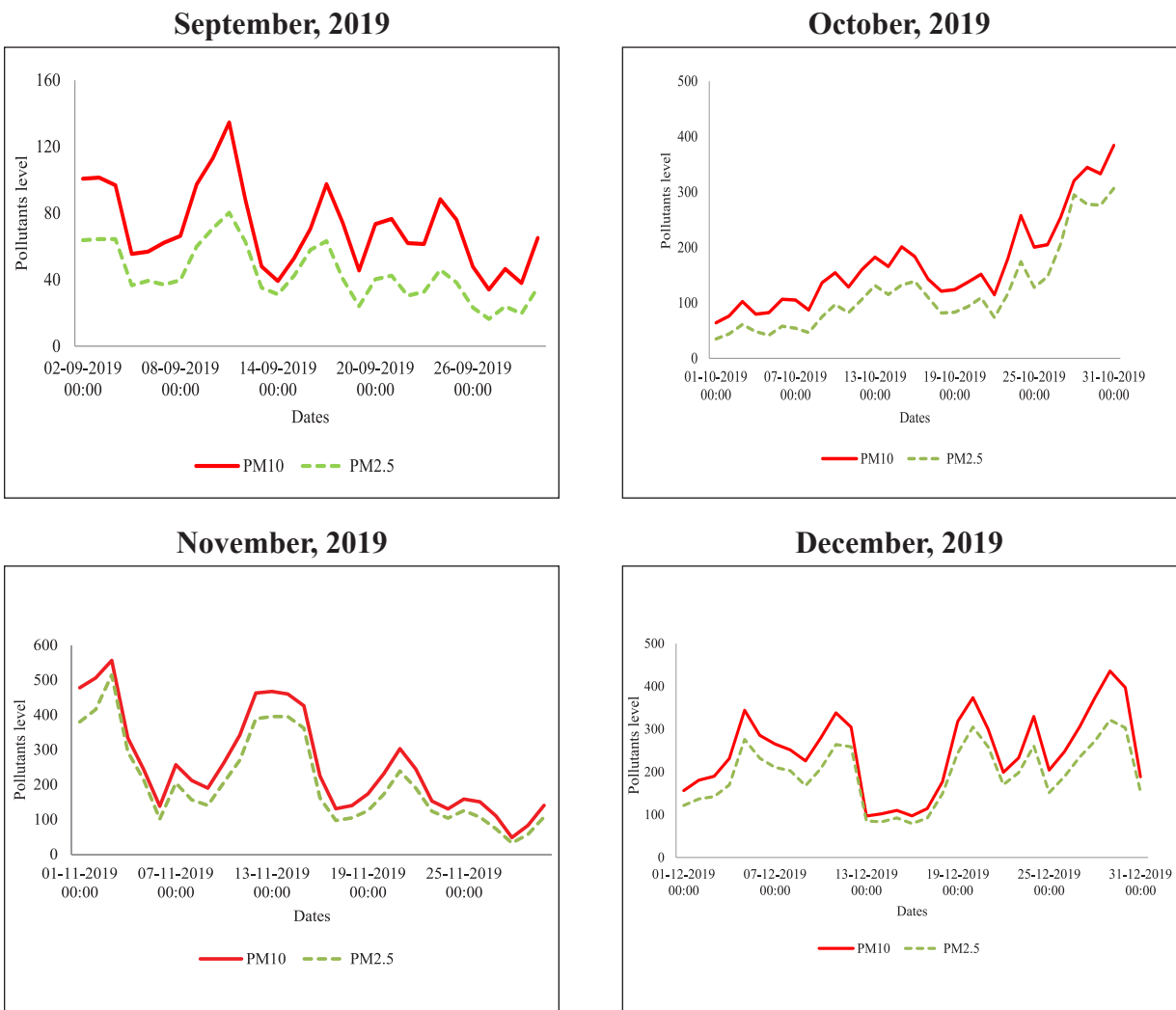
- Promote the practice of conservation of agriculture with low lignocellulosic crop residues like rice, wheat, maize etc. Agricultural machineries can help farmers to sow the seeds of the next crop without any problem associated

**Figure 17: Stubble burning incidents during October- November, 2019**



Source: NASA.

**Figure 18: Ambient Air Quality of Delhi (ITO) in the month of September, October, November and December, 2019.**



Source: Central Pollution Control Board.

with residues of the previous crops and also without affecting the crop productivity. This can improve or sustain the productivity of the crop land in the long term, as in-situ management. Apart from this, there are other options to utilize the crop residues ex situ from the crop land and some efforts have already been made for ex situ utilization of the crop residues.

- Create markets for crop residue-based briquettes and mandate nearby thermal power plants to undertake co-firing of crop residues with coal. It is also important to create infrastructure for setting up biomass depots for storage of bailed crop residues in areas that have shown high fire incidents or high production of a particular crop.
- Create special credit line for financing farm equipment and working capital for private sector participation.
- Promote use of crop residue-based biochar briquettes in local industries, brick kiln and hotel/dhaba as an alternate fuel.
- Pollution control as a parameter for deciding incentives and allocation to States/UTs.

6.34 National Green Tribunal in the order passed on 10.12.2015, directed and prohibited agricultural residue burning in any part of the NCT of Delhi, State of Rajasthan, State of Punjab, State of Uttar Pradesh and State of Haryana. Any person or body that is found violating the directions of National Green Tribunal is liable to pay Environmental Compensation which is collected by the

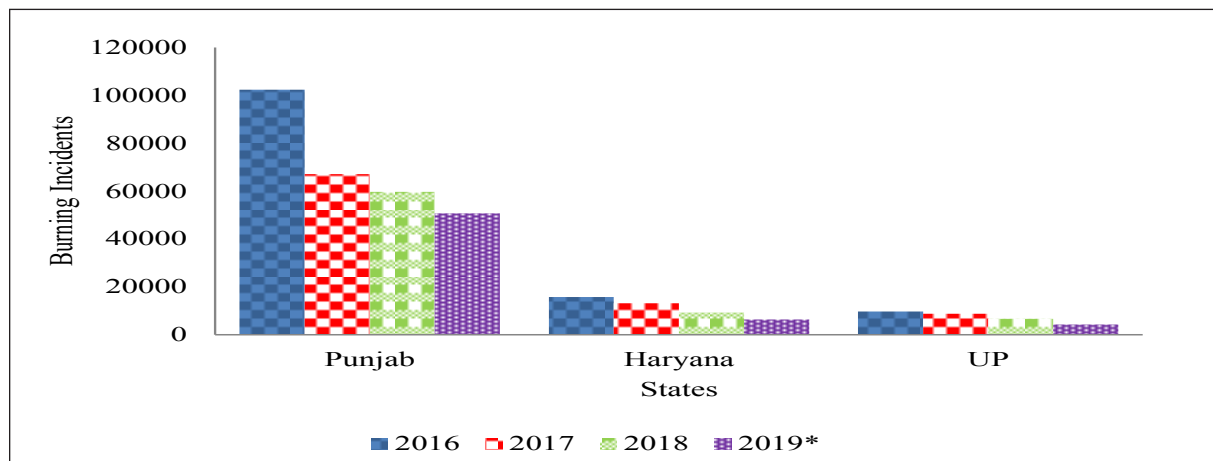
concerned State Governments. In 2014, the Union government had released the National Policy for Management of Crop Residue, which NGT directed the States to implement. Burning crop residue is a crime under Section 188 of the IPC and under the Air and Pollution Control Act of 1981.

6.35 A new Central Sector Scheme on 'Promotion of Agricultural Mechanization for In-Situ Management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi' for the period from 2018-19 to 2019-20 is being implemented with the total outgo from the Central funds of ₹ 1151.80 crore (₹ 591.65 crore in 2018-19 and ₹ 560.15 crore in 2019-20). Under this Scheme, the agricultural machines and equipment for in-situ crop residue management such as Super Straw Management System for Combine Harvesters, Happy Seeders, Hydraulically Reversible MB Plough, Paddy Straw Chopper, Mulcher, Rotary Slasher, Zero Till Seed Drill and Rotavators are provided with 50 per cent subsidy to the individual farmers and 80 per cent subsidy for establishment of Custom Hiring Centres.

6.36 With various efforts, overall, the total number of burning events recorded significant reduction (Figure 19). However, continuation of this practice by farmers is reported every year starting winter and the serious concerns about its impact on air quality are raised.

### **Construction and Demolition (C&D) Waste: Its Impact**

6.37 Unscientific disposal of C&D waste is one of the key contributors to the air and water pollution. Annual consumption of

**Figure 19: Stubble burning incidents (in numbers)**

Source: Report of the Committee on ‘Promotion of Agricultural Mechanization for in-situ management of crop residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi’, 2019, \* Source: Consortium for Research on Agroecosystem Monitoring and Modelling from Space (CREAMS), ICAR.

construction materials (sand, soil & stone) in India is estimated to be 3,100 million tonnes. As per a study conducted by IIT Kanpur in 2015, C&D is a key contributor towards particulate matter emissions in

Delhi. Therefore, investing in a circular economy driven approach in C&D waste management shall have large payoff in terms of avoiding health and environmental damage (Box 3).

### Box 3: Public Private Partnership experience in C&D waste management: The Circular Economy approach in Delhi

In 2009, the Municipal Corporation of Delhi and IL&FS Environmental Infrastructure and Services Ltd. (IEISL) pioneered setting up a project to recycle 500 Tonnes Per Day (TPD) of C&D waste at Burari, Delhi (first of its kind facility in the country) to address the waste generated during Commonwealth Games preparations. Since then, the Burari facility along with two other C&D recycling facilities (under East Delhi Municipal Corporation and Delhi Metro Rail Corporation respectively) in Delhi are together recycling over 2,650 TPD C&D waste. The pioneering facility of Burari also helped in paving the way forward in formulating the C&D Waste Management Rules, 2016. All three Delhi plants have together processed over 5 million tonnes C&D waste.

Application of recycled C&D products: Standards for utilization of manufactured Coarse and Fine Aggregates have been prescribed by Bureau of Indian Standards (BIS). The recycled products have been included in the Delhi Schedule of Rates issued by CPWD. The civic bodies of Delhi and other Government Departments such as CPWD, DDA, DMRC, NBCC, PWD, Delhi State Industrial and Infrastructure Development Corporation Ltd., Irrigation & Flood Control (I&FC) are actively using the recycled C&D materials & products for ongoing civil works. Among the landmark projects where it has been used are the Supreme Court Annex building and MP flats, where over 2.3 million bricks were used. The material has also been used in the construction of a 100m wide road connecting NH-1 and Bakkarwala, Delhi.

Source: IL&FS Environment.

## WAY FORWARD

6.38 India very well understands that action towards sustainability is an undeniable concern for humanity. India's National agenda mirrors the SDGs and its policies ensuring the balance among three pillars of development- economic, social and environmental. SDGs can be achieved through high standards of governance, monitoring and implementation at all levels. In the spirit of cooperative federalism, the States and Central Government are walking together to bring a change that India needs.

6.39 India has reduced emissions intensity of GDP by 21 per cent during 2005-2014 and is on track to achieve the goals announced. India had announced 175 GW targets for renewables by 2022. Further, Hon'ble Prime Minister in his address at the UN Climate Action Summit in September 2019 has stated that "India's renewable energy capacity would be increased to much beyond 175 GW and later till 450 GW". India has also taken up a voluntary target for restoration of 26 million of degraded land by 2030 during the 14<sup>th</sup> COP of UNCCD in Delhi. This is one of the largest programs in the world to ensure carbon sink in land resources. Internationally, CDRI which is a partnership to support countries through knowledge exchange and provide technical support on developing disaster and climate resilient infrastructure was launched.

6.40 India is among a few countries in the world where, despite ongoing developmental efforts, forest and tree cover is increasing

considerably. The forest and tree cover have reached 80.73 million hectare which is 24.56 per cent of the geographical area of the country. In 2019, total carbon stock in forest is estimated as 7,124.6 million tons, There is an increase of 42.6 million tons in the carbon stock of the country as compared to 2017.

6.41 Agriculture crop residue burning and construction and demolition waste continues to be major concerns. Many countries are already using recycled C&D products in construction. In India, the Delhi PPP model in C&D waste management can be a beacon for the other States/ cities to replicate, enabling the Swachh Bharat Mission and supporting the SDGs.

6.42 Despite the continuous and definitive efforts of stakeholders from various walks of life, scarce financial resources continue to be the biggest constraint. Developed countries should honor their financial obligations and promises under the multilateral environmental agreements. The world that benefited from carbon emissions that made them developed, must repay. Technology development and transfer at affordable costs is also crucial for developing countries. Hence, adequate provision of finance, technology transfer, and capacity building to developing countries to facilitate the effective implementation of the SDGs and Paris Agreement on climate change are critical. India has and will continue to do its fair share of responsibilities while strongly calling for developed countries to take the lead.



## CHAPTER AT A GLANCE

- India is moving forward on the path of SDG implementation through well-designed initiatives for inclusive development which is enshrined in its policies. India's achievement in the composite SDG index is commendable as the score has improved from 57 in 2018 to 60 in 2019.
- As per the SDG Index, Kerala, Himachal Pradesh, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka, Goa, Sikkim, Chandigarh and Puducherry are the front runners.
- India is the second largest Emerging Green Bond Market after China.
- GCF's first replenishment (2020-2023) witnessed 28 countries pledging resources to replenish the Fund for an amount of US\$ 9.7 billion, which is even quantitatively lower than the IRM period.
- At COP 25 of UNFCCC at Madrid, India reiterated its commitment to implement Paris Agreement in accordance with the principles of equity and common but differentiated responsibilities. COP 25 decision provides for balanced and integrated view of ambition that includes efforts for climate change mitigation, adaptation and means of implementation from developed country parties to developing country parties.
- ISA has taken up the role of an 'enabler' by institutionalizing 30 Fellowships from the Member countries; of a 'facilitator' by getting the lines of credit worth US\$ 2 Billion from EXIM Bank of India and US\$ 1.5 Billion from AfD, France; of an 'incubator' by nurturing initiatives like the Solar Risk Mitigation Initiative and of an 'accelerator' by developing tools to aggregate demand for 1000 MW solar and 270,000 solar water pumps.
- India launched the CDRI, focus on developing resilience in ecological, social and economic infrastructure.
- Government of India hosted COP 14 to UNCCD from 2-13 September, 2019. COP 14 adopted the Delhi Declaration: Investing in Land and Unlocking Opportunities.
- India is among a few countries in the world where, despite ongoing developmental efforts, forest and tree cover is increasing considerably. The forest and tree cover have reached 80.73 million hectare which is 24.56 per cent of the geographical area of the country.
- Burning of agricultural residues, leading to rise in pollutant levels and deterioration of air quality, is still a major concern though the total number of burning events recorded reduced due to various efforts taken.

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