Sustainable Development and Climate Change

06

CHAPTER

In 2020-21, India progressed further on achieving the Sustainable Development Goals (SDGs). India's overall score on the NITI Aayog SDG India Index & Dashboard 2020-21 improved to 66 from 60 in 2019-20 and 57 in 2018-19. The number of Front Runners (scoring 65-99) increased to 22 states and UTs in 2020-21 from 10 in 2019-20. Kerala and Chandigarh were the top state and UT respectively on SDG performance in 2020-21. In North East India, 64 districts were Front Runners and 39 districts were Performers in the NITI Aayog North-Eastern Region District SDG Index 2021-22.

India has the tenth largest forest area in the world. In 2020, India ranked third globally in increasing its forest area during 2010 to 2020. The forests covered 24 per cent of India's total geographical, accounting for two per cent of the world's total forest area in 2020. India's forest cover has increased by more than three per cent during 2011 to 2021. This is mainly attributed to increase in very dense forest, which grew by 20 per cent during the period.

In August 2021, the Plastic Waste Management Amendment Rules, 2021 was notified which is aimed at phasing-out single use plastic by 2022. The draft regulation on the Extended Producer Responsibility for plastic packaging has been notified. The regulation seeks to strengthen the circular economy of plastic packaging waste, promote development of new alternatives to plastics and sustainable plastic packaging.

The chapter discusses ground water resource management and the findings indicate that states/UTs need to manage its ground water resources carefully, including recharge, and to stem over-exploitation. The compliance status of Grossly Polluting Industries (GPIs) located in the Ganga main stem and its tributaries improved from 39 per cent in 2017 to 81 per cent in 2020. The consequent reduction in effluent discharge has been from 349.13 milllions of liters per day (MLD) in 2017 to 280.20 MLD in 2020.

India had announced its first Nationally Determined Contribution (NDC) under the Paris Agreement in 2015. The Hon'ble Prime Minister of India, as a part of the national statement delivered at the 26th Conference of the Parties (COP 26) in Glasgow in November 2021, announced ambitious targets to be achieved by 2030 to enable further reduction in emissions. The need to start the one-word movement 'LIFE' which means Lifestyle For Environment urging mindful and deliberate utilization instead of mindless and destructive consumption was underlined.

In 2021, India continued exercising significant climate leadership at the international stage under the International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI) and Leadership Group for Industry Transition (LeadIT Group). The chapter also discusses several initiatives taken in the area of sustainable finance by the Ministry of Finance, RBI and SEBI.

INDIA'S PROGRESS ON SUSTAINABLE DEVELOPMENT GOALS

6.1   In September 2015, 193 countries including India committed to the Sustainable Development Goals (SDGs) as detailed in the UN resolution, "Transforming our world: the 2030 Agenda for Sustainable Development". The SDGs comprehensively cover social, economic and environmental dimensions and build on the Millennium Development Goals (MDGs), which covered the earlier fifteen-year period from 2000 to 2015.

6.2   India has been making strides towards achieving the social, economic and environmental goals covered under SDGs. This achievement gains further significance in the face of the considerable human and economic costs imposed by the COVID-19 pandemic, which has set countries back on their developmental goals and created serious impediments to the attainment of the SDGs, the world over.

Goal wise performance of India as a whole: NITI Aayog SDG India Index Report and Dashboard 2020-21

6.3   India's overall score on the NITI Aayog SDG India Index & Dashboard improved to 66 in 2020-21 from 60 in 2019-20 and 57 in 2018-19, showing progress in India's journey towards achieving the SDGs (see Box 1 for details about the NITI Aayog SDG India Index). Despite 2020-21 being a pandemic year, India performed well on eight of the 15 SDGs measured by the NITI Aayog SDG India Index. These included – goal 3 (good health and well-being), goal 6 (clean water and sanitation), goal 7 (affordable and clean energy), goal 10 (reduced inequalities), goal 11 (sustainable cities and communities), goal 12 (responsible consumption and production), goal 15 (life on land) and goal 16 (peace, justice, and strong institutions).

Box 1: NITI Aayog SDG India Index and Dashboard 2020-21
India's federal structure implies that states must take charge to enable progress on achieving the country's SDGs. The NITI Aayog SDG India Index is the world's first government-led sub-national measure of SDG progress. It has been developed to capture the progress of all states and union territories (UTs) in their journey towards achieving the SDGs. This index recognizes that action is required at all levels, and it is therefore based on the approach of cooperative and competitive federalism.

NITI Aayog has been publishing the SDG India Index annually since 2018. The third edition of the NITI Aayog SDG India Index (2020-21) computes goal-wise scores on the 16 SDGs for each state and UT, and a qualitative assessment on Goal 17, covering:

SDG 1: No Poverty

SDG 2: Zero Hunger

SDG 3: Good Health and Well-Being

SDG 4: Quality Education

SDG 5: Gender Equality

SDG 6: Clean Water and Sanitation

SDG 9: Industry, Innovation and Infrastructure

SDG 10: Reduced Inequality

SDG 11: Sustainable Cities and Communities

SDG 12: Responsible Consumption and Production

SDG 13: Climate Action

SDG 14: Life Below Water (calculated only for the nine coastal states – Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal)

SDG 7: Affordable and Clean Energy

SDG 8: Decent Work and Economic Growth

SDG 15: Life on Land

SDG 16: Peace, Justice and Strong Institutions

SDG 17: Global Partnerships

Overall state and UT scores are generated from goal-wise scores to measure aggregate performance of the sub-national unit based on its performance across the 16 SDGs. These scores range between 0–100, with states/UTs being categorised as Aspirant (score 0-49), Performer (score 50-64), Front Runner (65-99) and Achiever (score 100) based on their score.

The figure below depicts the evolution of the NITI Aayog SDG India Index since its first baseline report in 2018. The 2018 baseline assessment is not strictly comparable with later assessments due to its lower coverage of targets and indicators.

Evolution of the NITI Aayog SDG India Index

| Goal-wise ranking of States/ UTs and overall ranking based on performance on all goals | Promotes competition among the States/ UTs in line with NITI Aayog's approach of competitive federalism | Enable States/ UTs to learn from peers |
| | Supports States/ UTs in identifying priority areas | Highlights gaps in statistical systems |

Baseline report – 2018	V2.0 report – 2019-20	V3.0 report – 2020-21
13 goals	16 goals + qualitative analysis on goal 17	16 goals + qualitative analysis on Goal 17
39 targets	54 targets	70 targets
62 indicators	100 indicators	115 indicators
Goal-wise ranking on States/ UTs	Goal-wise ranking on States/ UTs + State/ UT profiles	Goal-wise ranking on States/ UTs + State/ UT profiles
Preceded National Indicator Framework (NIF)	Aligned with NIF: 68 indicators completely aligned, 20 refined, 12 new to cover goals 12, 13, and 14	Aligned with NIF: 76 indicators completely aligned, 31 refined, 8 in consultation with the line ministries

Source: NITI Aayog

Note: Ministry of Statistics and Programme Implementation (MoSPI) has developed the National Indicator Framework (NIF) comprising 306 statistical indicators for monitoring of SDGs at the national level

Performance of States and UTs on the NITI Aayog SDG India Index, 2021

6.4   Figure 1 shows that the number of Front Runners (scoring 65-99) increased to 22 states and UTs in 2020-21 from 10 in 2019-20. All remaining states and UTs were Performers (scoring 50-64). Amongst states, additions to the Front Runner category in 2020-21 included Uttarakhand, Gujarat, Maharashtra, Mizoram, Punjab, Haryana and Tripura. Amongst UTs, additions to the Front Runner category included Andaman and Nicobar Islands, Delhi, Jammu and Kashmir, Ladakh and Lakshadweep.

**Figure 1: Performance of States/UTs on the NITI Aayog
SDG India Index (2019 and 2020)**
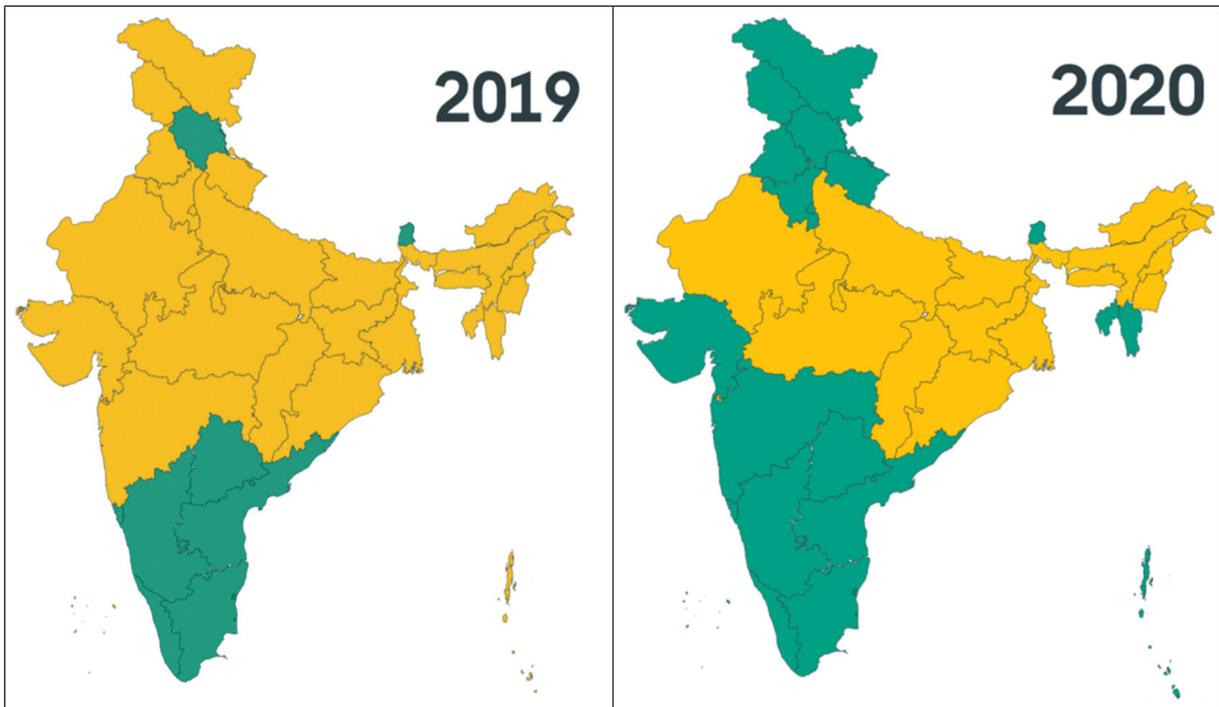
Source: NITI Aayog
Note: Yellow indicates Performer (Score 50-64), Green indicates Front Runner (Score 65-99)

6.5   Figure 2 shows the scores achieved by states on the NITI Aayog SDG India Index 2020-21, and change in score from 2019-20. In 2020-21, states achieved scores between 52-75 and UTs scored between 62-79, as against scores of 50-70 for states and 59-70 for UTs in 2019-20. All states have improved their overall scores by 1-12 points. Kerala (score of 75) retained its top rank amongst states in 2020-21. Tamil Nadu and Himachal Pradesh ranked second while Goa, Uttarakhand, Karnataka and Andhra Pradesh ranked fourth. Mizoram, Haryana, and Uttarakhand are the top gainers in 2020-21, in terms of improvement in score from 2019, with an increase of 12, 10 and 8 points respectively.

Figure 2: Performance of States on the NITI Aayog SDG India Index 2020-21

(i) Front Runners

(ii) Performers
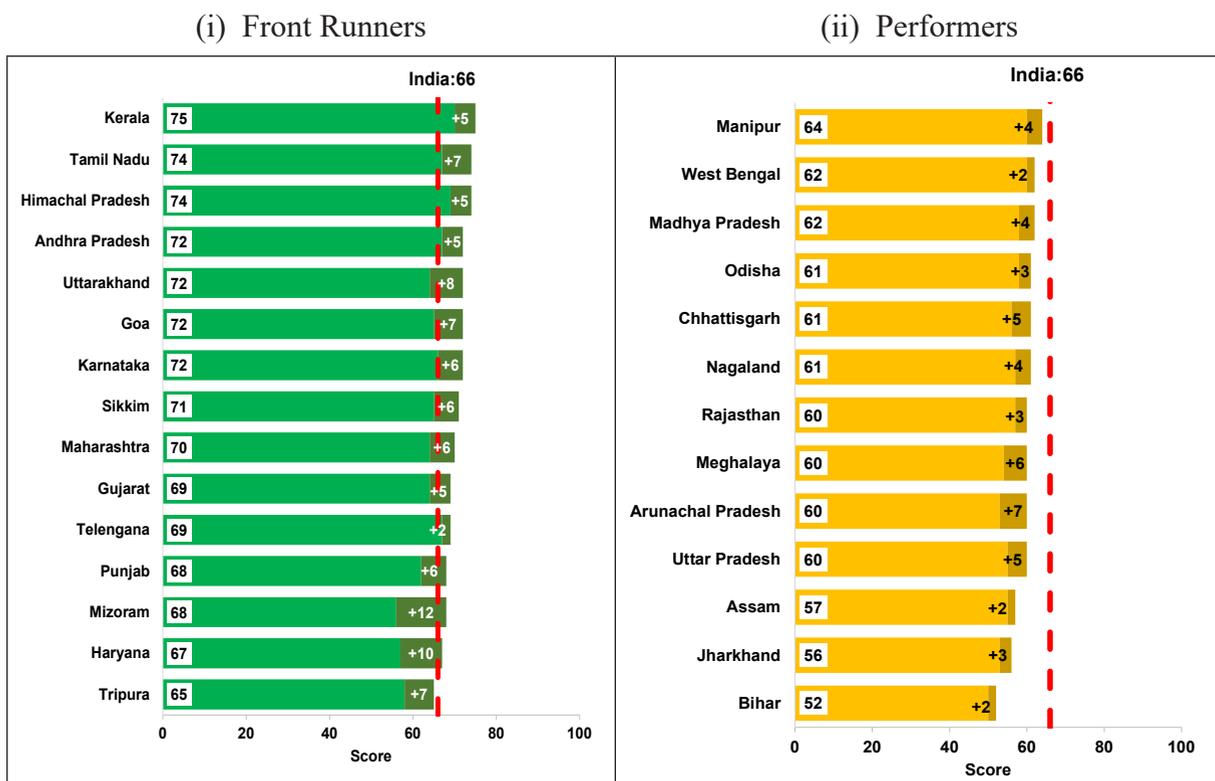
Source: NITI Aayog

6.6   Figure 3 shows the performance of UTs on the NITI Aayog SDG India Index 2020-21, and change in score from 2019-20. Chandigarh (score of 79) retained its top rank amongst UTs in 2020-21 while Puducherry, Lakshadweep and Delhi (score of 68) ranked second. Puducherry made the highest gain (nine points) in 2020-21, followed by Delhi, Jammu and Kashmir and Ladakh (seven points each).

Figure 3: Performance of UTs on the NITI Aayog SDG India Index 2020-21
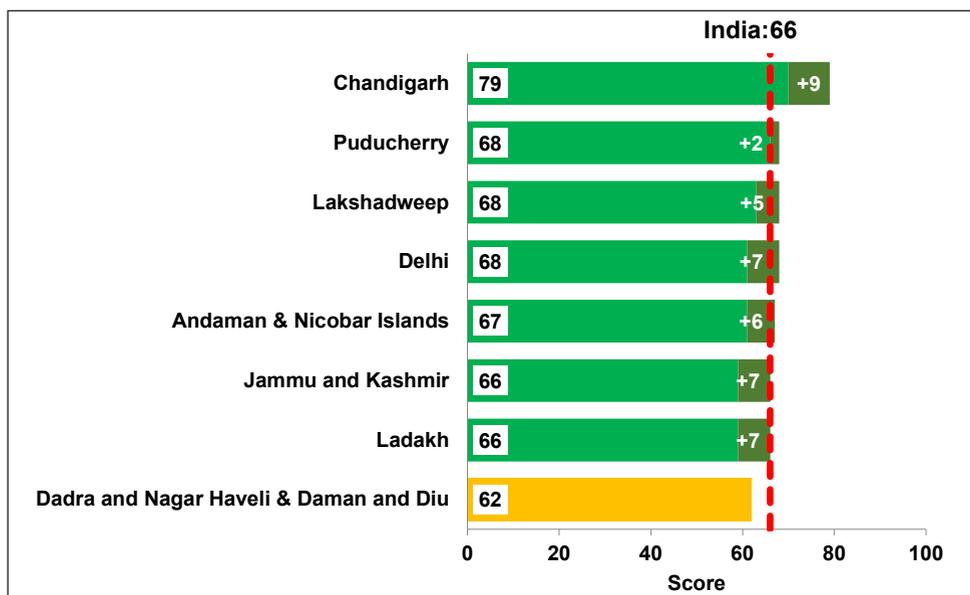
Source: NITI Aayog
Note: Yellow indicates Performer (Score 50-64); Green indicates Front Runner (Score 65-99)

Table 1: Goal-wise Performance of States/UTs on the NITI Aayog SDG India Index 2020-21

States	SDG7	SDG6	SDG12	SDG16	SDG11	SDG3	SDG10	SDG1	SDG15	SDG8	SDG4	SDG2	SDG13	SDG5	SDG9	Composite SDG
Kerala	100	89	65	80	75	72	69	83	77	62	80	80	69	63	60	75
Himachal Pradesh	100	85	77	73	79	78	78	80	68	78	74	52	62	62	61	74
Tamil Nadu	100	87	78	71	79	81	74	86	63	71	69	66	61	59	71	74
Andhra Pradesh	100	92	84	77	78	77	74	81	69	67	50	52	63	58	52	72
Goa	100	100	47	63	89	72	75	83	59	76	71	78	44	55	68	72
Karnataka	100	85	89	76	78	78	67	68	67	66	64	53	62	57	64	72
Uttarakhand	100	85	82	86	76	77	77	74	64	63	70	61	60	46	56	72
Sikkim	100	89	76	72	85	62	61	80	73	71	58	69	65	58	52	71
Maharashtra	100	90	82	69	87	83	71	66	52	62	64	44	58	51	66	70
Gujarat	94	93	50	82	87	86	64	66	61	64	52	46	67	49	72	69
Telangana	100	96	73	71	76	67	67	68	81	73	63	50	43	41	59	69
Mizoram	100	85	87	81	61	79	64	80	48	51	60	72	66	54	32	68
Punjab	100	66	71	76	91	77	68	69	48	57	60	73	51	45	69	68
Haryana	100	80	77	71	81	72	68	69	48	59	64	58	51	43	66	67
Tripura	83	82	99	80	67	67	85	82	69	57	42	52	41	39	35	65
Manipur	96	87	89	69	65	68	70	60	60	36	63	64	57	41	35	64
Madhya Pradesh	86	88	78	66	81	62	51	44	84	60	45	43	49	55	37	62
West Bengal	98	81	79	81	45	76	71	59	53	57	54	46	39	41	53	62
Chhattisgarh	78	89	64	71	78	60	72	49	65	64	55	37	38	64	36	61
Nagaland	69	87	91	79	48	61	46	73	63	48	39	64	69	48	30	61
Odisha	80	86	73	59	70	67	66	41	83	48	45	42	70	46	46	61
Arunachal Pradesh	85	67	77	64	39	64	69	54	93	50	41	66	58	37	31	60
Meghalaya	50	75	73	72	51	70	88	77	64	48	48	37	62	51	25	60
Rajasthan	100	54	74	73	81	70	45	63	43	57	60	53	49	39	45	60
Uttar Pradesh	100	83	79	79	77	60	41	44	61	53	51	41	39	50	42	60
Assam	98	64	66	62	55	59	65	51	78	50	43	41	53	25	39	57
Jharkhand	77	83	55	70	71	74	65	36	71	54	45	19	25	51	37	56
Bihar	78	91	59	73	67	66	48	32	62	50	29	31	16	48	24	52
UNION TERRITORIES	SDG7	SDG6	SDG12	SDG16	SDG11	SDG3	SDG10	SDG1	SDG15	SDG8	SDG4	SDG2	SDG13	SDG5	SDG9	Composite SDG
Chandigarh	100	99	78	73	98	74	100	75	85	70	79	97	61	58	45	79
Delhi	100	61	50	62	65	90	72	81	81	65	75	63	55	33	66	68
Lakshadweep	83	100	63	77	56	78	75	61	67	62	62	74	68	58	40	68
Puducherry	98	91	66	86	76	70	62	75	50	68	70	59	23	66	59	68
Andaman and Nicobar Islands	100	87	73	46	85	68	67	71	72	59	57	45	77	68	23	67
Jammu and Kashmir	100	88	95	74	57	70	65	69	52	47	49	71	63	46	42	66
Ladakh	100	84	95	74	57	70	65	79	27	59	49	71	66	46	48	66
Dadra and Nagar Haveli & Daman and Diu	71	95	62	75	89	80	66	65	62	57	56	27	18	53	47	62
India	92	83	74	74	79	74	67	60	66	61	57	47	54	48	55	66
Target	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

● Aspirant (0-49) ● Performer (50-64) ● Front Runner (65-99) ● Achiever (100)

The heatmap displays the performance of each State/UT on each of the Goals. The States/UTs are arranged in a descending order according to their composite scores. The State/UT with the highest composite score is in the top of their respective list while the one with the lowest score is at the bottom of the list. The columns are arranged according to the average performance of all States/UTs in a certain Goal, with the Goal where all States/UTs have on an average performed well (i.e. Goal 7) being in the left-most column and the Goal where all States/UTs have on an average performed relatively poorly (i.e. Goal 9) being in the right-most column (before the composite score).

Source: NITI Aayog SDG India Index and Dashboard 2020-21
Note: SDG 1: No Poverty; SDG 2: Zero Hunger; SDG 3: Good Health and Well-Being; SDG 4: Quality Education; SDG 5: Gender Equality; SDG 6: Clean Water and Sanitation; SDG 7: Affordable and Clean Energy; SDG 8: Decent Work and Economic Growth; SDG 9: Industry, Innovation and Infrastructure; SDG 10: Reduced Inequality; SDG 11: Sustainable Cities and Communities; SDG 12: Responsible Consumption and Production; SDG 13: Climate Action; SDG 15: Life on Land; SDG 16: Peace, Justice and Strong Institutions.

6.7   Table 1 shows the performance of states and UTs on 15 SDGs in the NITI Aayog SDG India Index 2020-21. Within goals, goal 7 has been achieved (score: 100) by 15 states and 5 UTs, goal 6 has been achieved by one state (Goa) and one UT (Lakshadweep), and goal 10 has been achieved by one UT (Chandigarh). Amongst states, goal 6 has the highest number of Front Runners (25 states), goal 8 has the highest number of Performers (18 states), and goal 5 and goal 9 have the highest number of Aspirants (14 states each). All UTs are Front Runners in goal 3, goal 8 has the highest number of Performers and goal 9 has the highest number of Aspirants.

6.8   Figure 4 shows the performance of nine coastal states on SDG 14 (life below water) on the NITI Aayog SDG India Index 2020-21. Odisha and Andhra Pradesh are Front Runners, followed by six Performers – Karnataka, Gujarat, Maharashtra, Kerala, Goa and West Bengal. Tamil Nadu is an Aspirant, and has the lowest score on SDG 14 amongst coastal states.

Figure 4: Performance of Coastal States on SDG 14 on NITI Aayog SDG India Index 2020-21
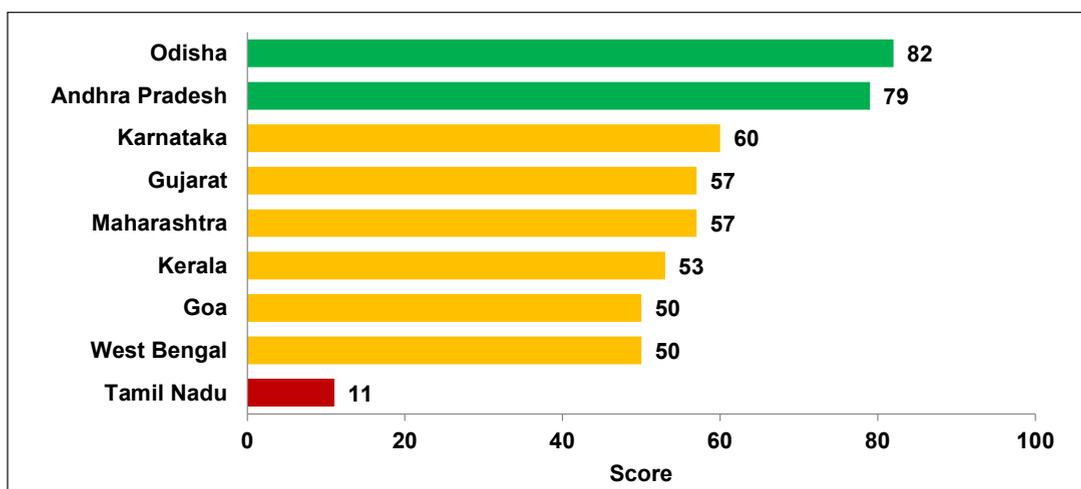
Source: NITI Aayog SDG India Index and Dashboard 2020-21
Note: SDG 14: Life Below Water. Red indicates Aspirant (Score 0-49), Yellow indicates Performer (Score 50-64), Green indicates Front Runner (Score 65-99);

6.9   Special attention is being paid to achievement of SDGs in the North-East region, with a North-Eastern Region (NER) District SDG Index 2021-22 developed by NITI Aayog. The index is constructed from 84 indicators and covers 15 global goals, 50 SDG targets and 103 districts in the eight states of the North Eastern Region. The index will facilitate in identifying crucial gaps and inform interventions to fast-track progress towards achieving the SDGs in the region. Figure 5 shows the district-wise overall performance in the NITI Aayog NER District SDG Index 2021-22. The score for the 103 districts range from 75.87 in East Sikkim (Sikkim) to 53.00 in Kiphire (Nagaland). There are 64 districts in the Front Runner category and 39 districts in the Performer category. All districts of Sikkim and Tripura fall in the Front Runner category.

Figure 5: District-wise overall performance on the NITI Aayog NER District SDG Index 2021-22
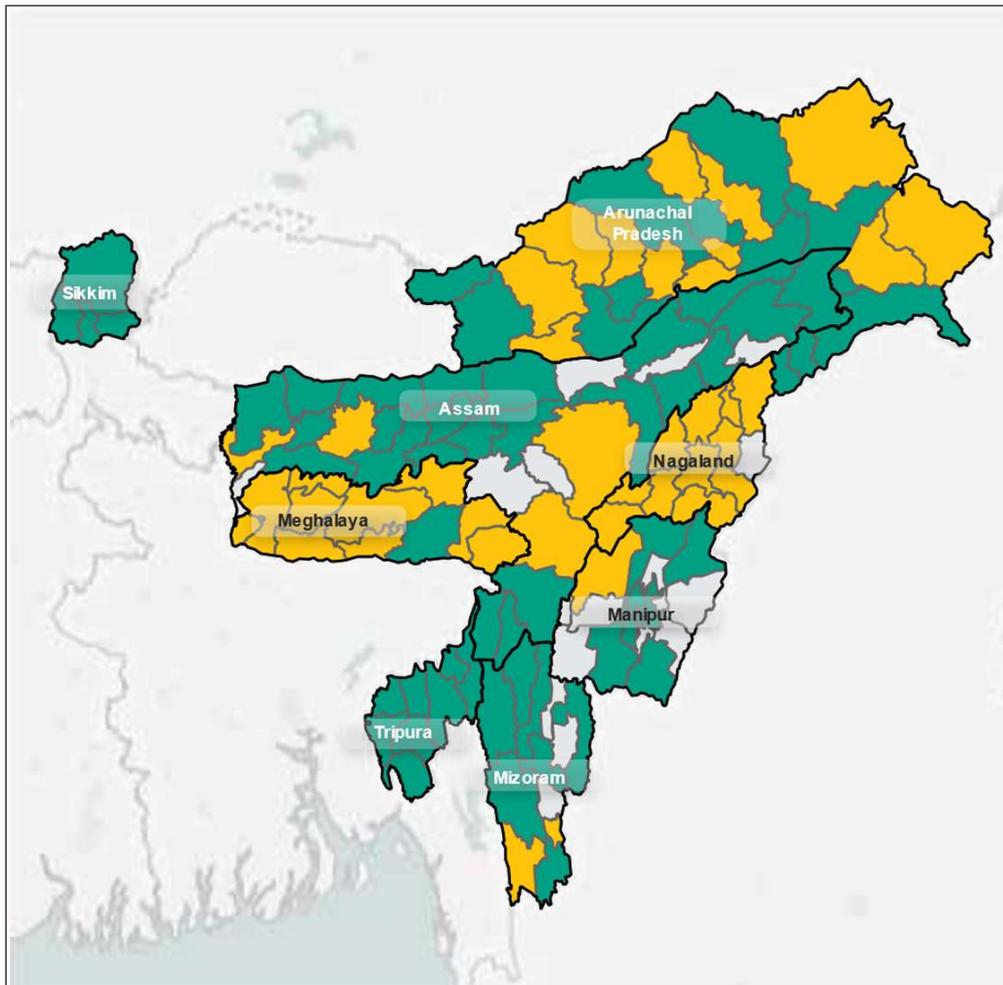
Source: NITI Aayog

Note: Yellow indicates Performer (Score 50-64), Green indicates Front Runner (Score 65-99). Uncoloured areas are districts that have not been covered.

STATE OF THE ENVIRONMENT

6.10 Sustainable development requires balancing of rapid economic growth with conservation, ecological security and environmental sustainability. This section explores state of the environment across land, water and air.

Land Forests

6.11 Forest Area refers to area recorded as forest in government records and is also called "recorded forest area". Figure 6 shows that Russia, Brazil, Canada, USA and China were the top five largest countries by forest area in 2020, while India was the tenth largest country by forest area.

Figure 6: Top Ten Countries by Forest Area in 2020
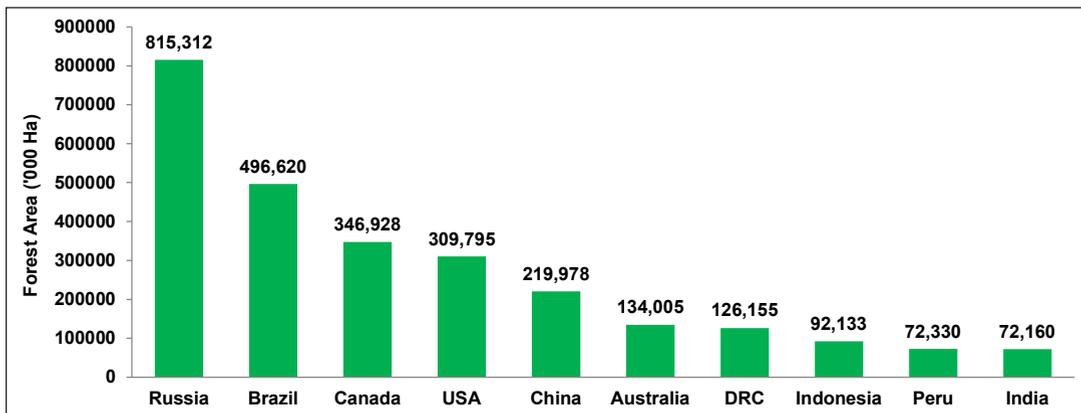
Source: India State of Forest Report 2021
Note: DRC: Democratic Republic of the Congo

6.12 Forests covered 24 per cent of India's total geographical area accounting for two per cent of the world's total forest area in 2020. Figure 7 shows the top ten countries by forest area as per cent of the total geographical area of the country and per cent of world forest area. The top 10 countries account for 66 per cent of the world's forest area. Of these countries, Brazil (59 per cent), Peru (57 per cent), Democratic Republic of Congo (56 per cent) and Russia (50 per cent) have half or more of their total geographical area under forests.

Figure 7: Top Ten Countries by Forest Area in 2020 w.r.t Country and World Forest Area
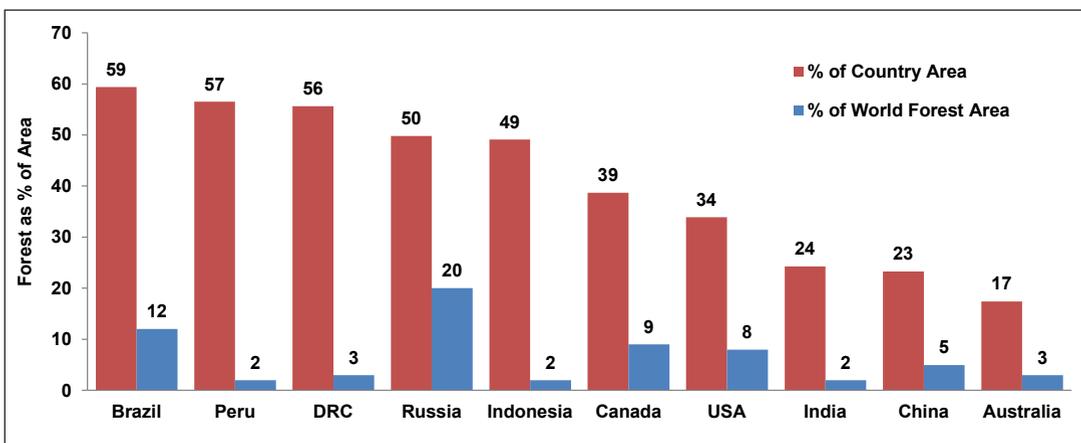
Source: India State of Forest Report 2021
Note: DRC: Democratic Republic of the Congo

6.13 India has increased its forest area significantly over the past decade. It ranks third globally in average annual net gain in forest area between 2010 to 2020, adding an average 2,66,000 ha of additional forest area every year during the period, or adding approximately 0.38 per cent of the 2010 forest area every year between 2010 to 2020 (Figure 8).

Figure 8: Top Ten Countries by Average Annual Net Gain in Forest Area (2010-20)
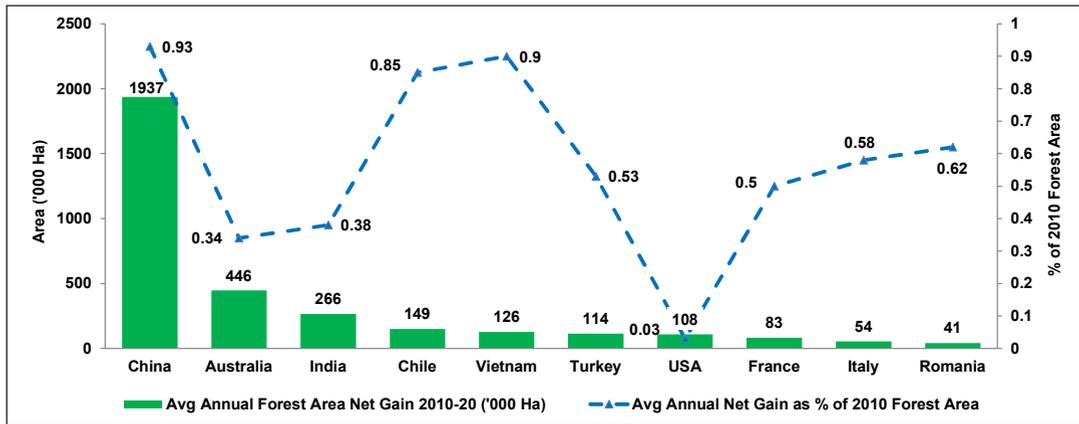
Source: India State of Forest Report 2021

6.14 Forest cover comprises all lands, more than one hectare in area, with a tree canopy density of more than 10 per cent, irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area, and also include orchards, bamboo and palm plantations. Figure 9 shows that India's total forest cover was 7,13,789 sq km in 2021 reflecting an increase of 3.14 per cent in the forest cover over 2011, from 21.05 per cent of the country's geographical area in 2011 to 21.71 per cent in 2021. This increase in total forest cover is mainly attributed to increase in very dense forest (all lands with tree canopy density of 70 per cent and above), which rose by 19.54 per cent between 2011 and 2021. Open forest (all lands with tree canopy density between 10-40 per cent) also improved by 6.71 per cent, while moderately dense forest (all lands with tree canopy density between 40-70 per cent) declined by 4.32 per cent between 2011 and 2021.

Figure 9: Forest Cover of India (2011 and 2021)
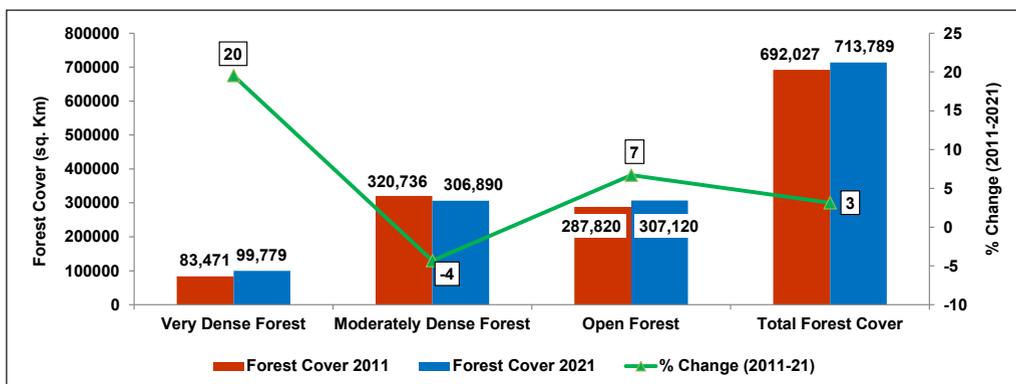
Source: India State of Forest Report 2021 and 2011
Note: Very dense forest: All lands with tree canopy density of 70 per cent and above); Moderately dense forest: All lands with tree canopy density between 40-70 per cent; and Open forest: All lands with tree canopy density between 10-40 per cent

6.15 Amongst states, Madhya Pradesh (11 per cent of India's total forest cover) had the largest forest cover in India in 2021, followed by Arunachal Pradesh (9 per cent), Chhattisgarh (8 per cent), Odisha (7 per cent) and Maharashtra (7 per cent). Figure 10 shows the composition of very dense forest, moderately dense forest and open forest in these five states as well as the per cent of states' geographical area under forest cover in 2021.

Figure 10: Top Five States in India by Forest Cover, 2021
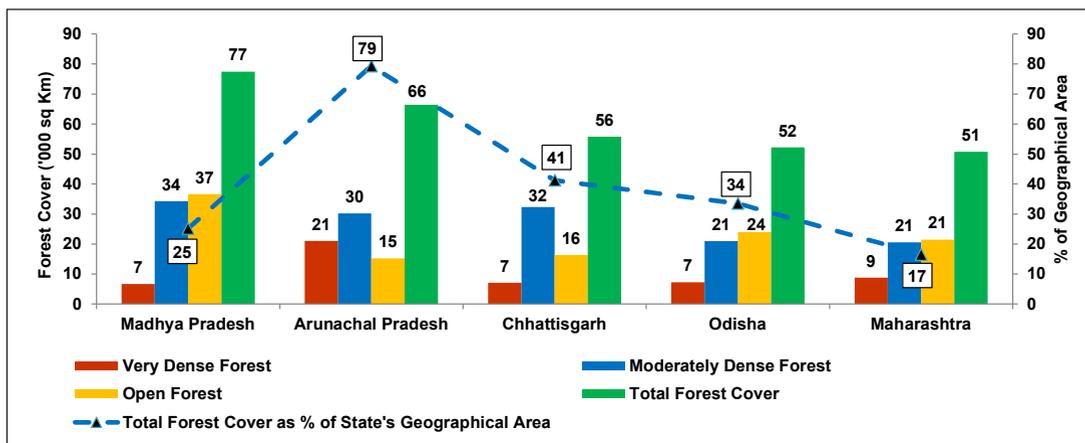
Source: India State of Forest Report 2021
Note: Very dense forest: All lands with tree canopy density of 70 per cent and above); Moderately dense forest: All lands with tree canopy density between 40-70 per cent; and Open forest: All lands with tree canopy density between 10-40 per cent

6.16 Mizoram (85 per cent), Arunachal Pradesh (79 per cent), Meghalaya (76 per cent), Manipur (74 per cent) and Nagaland (74 per cent) were the top five states in terms of highest per cent of forest cover w.r.t. total geographical area of the state in 2021 (Figure 11).

Figure 11: Top Five States by per cent of State Geographical Area under Forest Cover, 2021
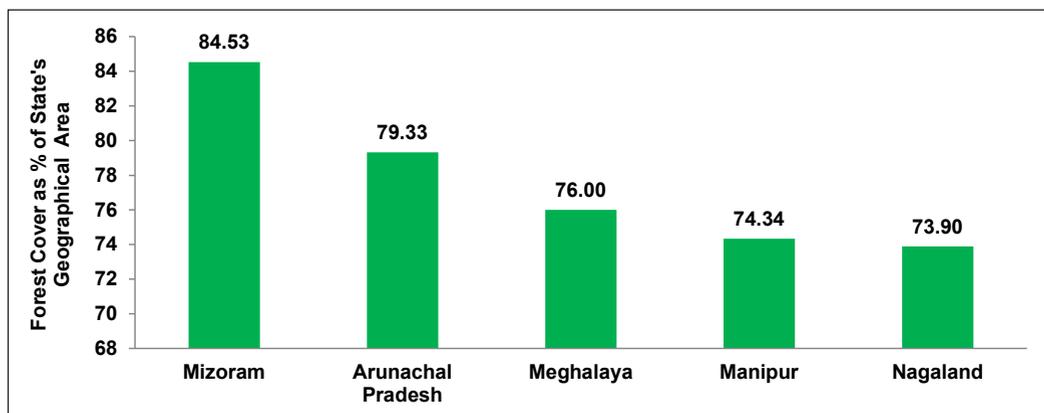
Source: India State of Forest Report 2021

6.17 Figure 12 shows the top five states in terms of very dense forest in 2021. Arunachal Pradesh accounted for 21 per cent of India's very dense forest in 2021, followed by Maharashtra (9 per cent), Odisha (7 per cent), Chhatisgarh (7 per cent) and Madhya Pradesh (7 per cent).

Figure 12: Top Five States by Very Dense Forest, 2021
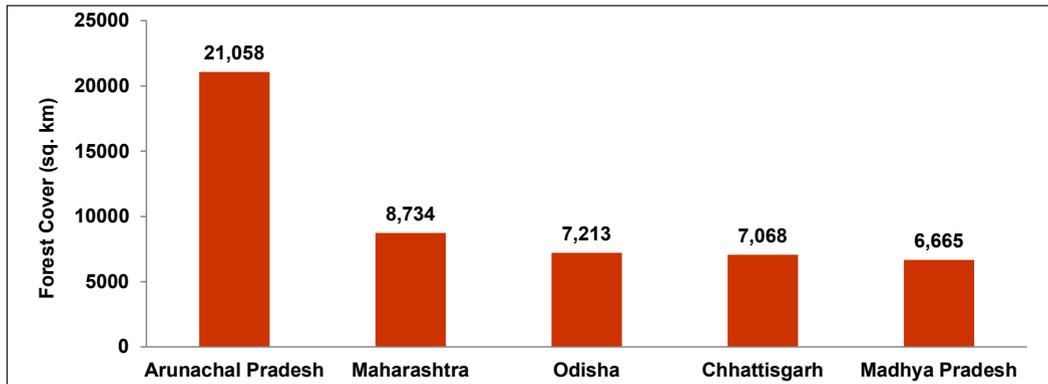
Source: India State of Forest Report 2021

6.18 Figure 13 shows the top five states in terms of moderately dense forest in 2021. Madhya Pradesh and Chhattisgarh accounted for 11 per cent of India's moderately dense forest in 2021, followed by Arunachal Pradesh (10 per cent), Odisha (7 per cent) and Karnataka (7 per cent).

Figure 13: Top Five States by Moderately Dense Forest, 2021
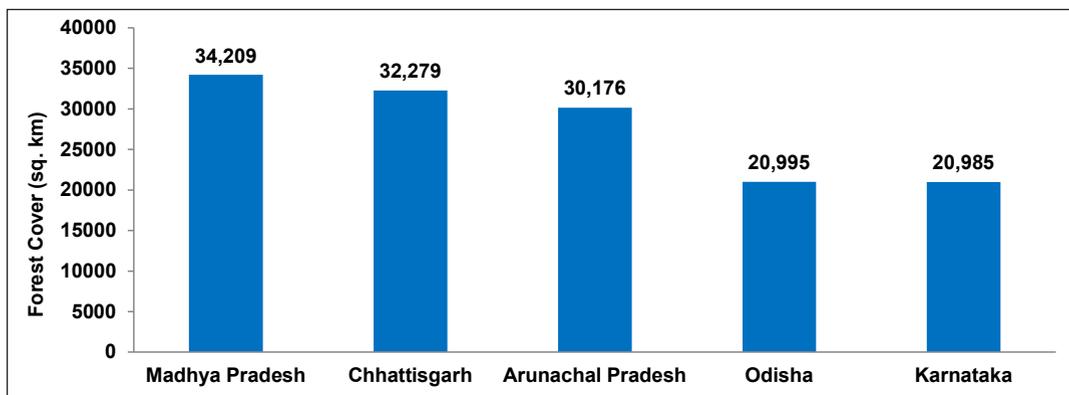
Source: India State of Forest Report 2021

6.19 Figure 14 shows the top five states in terms of open forest in 2021. Madhya Pradesh accounted for 12 per cent of India's moderately dense forest in 2021, followed by Odisha (8 per cent), Maharashtra (7 per cent), Chhattisgarh (5 per cent) and Assam (5 per cent).

Figure 14: Top Five States by Open Forest Cover, 2021
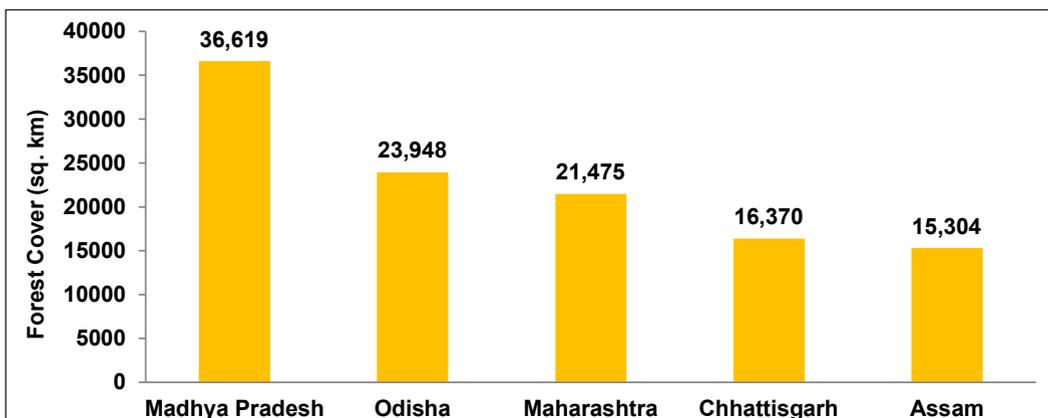
Source: India State of Forest Report 2021

6.20 Figure 15 shows the forest cover in seven major cities – Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata and Mumbai, in 2011 and 2021. Figure 16 shows the composition of forest cover in seven major cities – Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata and Mumbai, in 2021.The total forest cover in these seven major cities in 2021 was 509.72 sq km, which was 10.21 per cent of the total geographical area of these cities, and 0.07 per cent of India's forest area.

Figure 15: Forest Cover in Seven Major Cities (2011 and 2021)
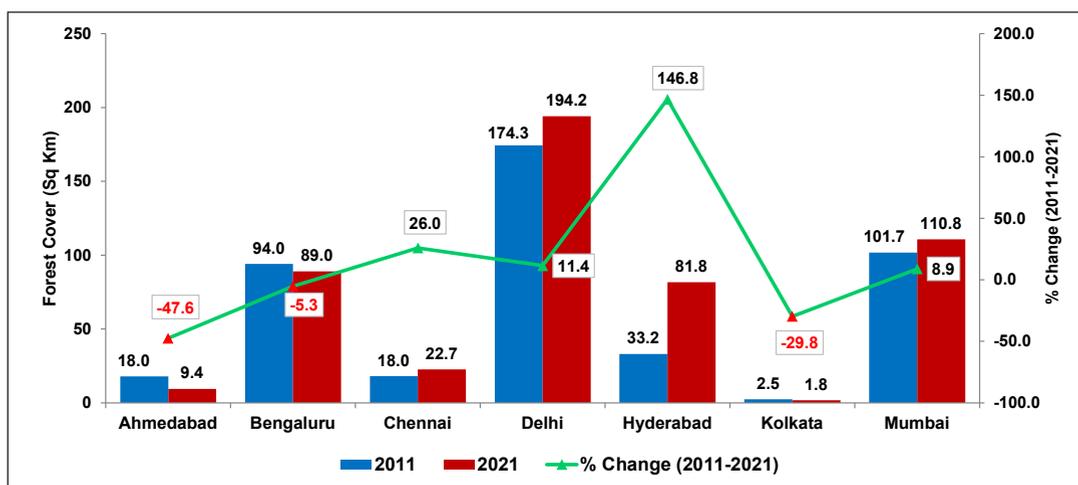
Source: India State of Forest Report 2021

Figure 16: Composition of Forest Cover in Seven Major Cities, 2021
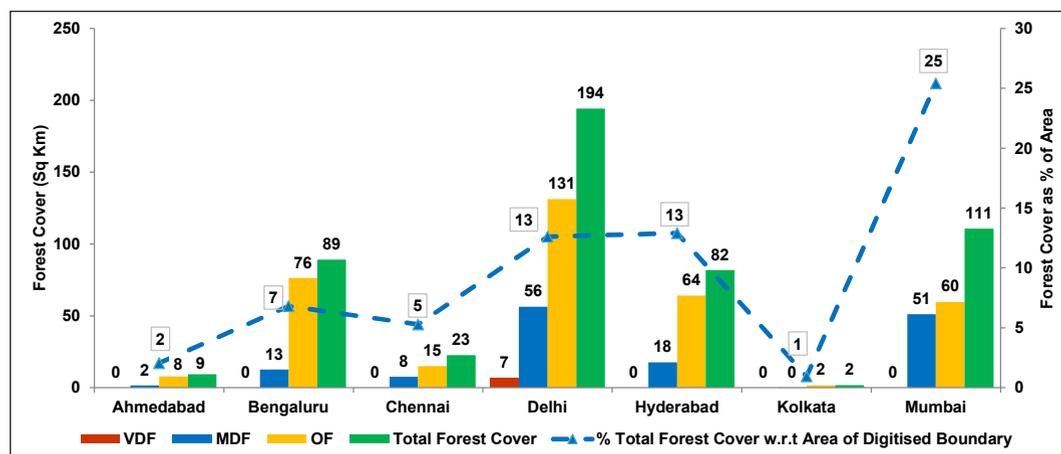
Source: India State of Forest Report 2021
Note: VDF: Very Dense Forest; MDF: Moderately Dense Forest; OF: Open Forest

Plastic Waste Management and Elimination of Identified Single Use Plastics

6.21 India is committed to mitigate pollution caused by littered single use plastics. In 2018, the Hon'ble Prime Minister announced that India would phase-out single use plastic by 2022. The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 as amended regulate the import of identified plastic waste into the country by SEZ and EOUs. The regulation of import of plastic waste prevents dumping of plastic waste by other countries in the country and allows for recycling of plastic waste generated in the country.

6.22 India piloted a resolution on "Addressing Single Use Plastic Product Pollution" which was adopted by the Fourth United Nations Environment Assembly held in 2019. The resolution recognizes the need for the global community to act on the single use plastic products pollution. The adoption of this resolution was a significant step.

6.23 The following domestic regulatory actions have been taken in 2021:

  i. In August 2021, the Ministry of Environment, Forest and Climate Change, Government of India, notified the Plastic Waste Management Amendment Rules, 2021 prohibiting identified single use plastic items, which have low utility and high littering potential, by 2022. The manufacture, import, stocking, distribution, sale and use of identified single-use plastic, including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the July 1, 2022.

  ii. In order to stop littering due to light-weight plastic carry bags, the thickness of plastic carry bags has been increased from fifty microns to seventy five microns with effect from September 30, 2021 and to one hundred and twenty microns with effect from December 31, 2022. Increased thickness of plastic bags will also allow reuse.

  iii. The plastic packaging waste, which is not covered under the phase out of identified single use plastic items, shall be collected and managed in an environmentally sustainable way through the Extended Producer Responsibility of the Producer, Importer and Brand Owner (PIBO), as per Plastic Waste Management Rules, 2016.

  iv. For effective implementation of Extended Producer Responsibility the Guidelines for Extended Producer Responsibility being brought out have been given legal force through Plastic Waste Management Amendment Rules, 2021.

  v. In October 2021, the Ministry of Environment, Forest and Climate Change notified the draft Regulations on the Extended Producer Responsibility for plastic packaging under Plastic Waste Management Rules, 2016, as amended from time to time, in the Gazette of India vide GSR No. 722 (E) for public consultation. The regulation proposes to mandate reuse, minimum level of recycling of plastic packaging waste, use of recycled plastic content, and environmentally sound management of plastic waste. It also seeks to strengthen the circular economy of plastic packaging waste, promote development of new alternatives to plastics and sustainable plastic packaging.

6.24 The waste management infrastructure in the States/UTs is also being strengthened through the Swachh Bharat Mission. All States/UTs have been requested to constitute a Special Task Force for elimination of single use plastics and effective implementation of Plastic Waste Management Rules, 2016. In addition, State /UT Governments and concerned Central Ministries/ Departments have also been requested to develop a comprehensive action plan for elimination of single use plastics and effective implementation of Plastic Waste Management Rules, 2016, and its implementation in a time bound manner. A National Level Taskforce has been constituted by the Ministry of Environment, Forest and Climate Change for taking coordinated efforts to eliminate identified single use plastic items and effective implementation of Plastic Waste

Management Rules, 2016. All States/UTs and concerned central ministries are members of the National Task Force. The first meeting of the National Task Force was held on 31st August 2021. The Government has also been taking measures for awareness generation towards elimination of single use plastics and effective implementation of Plastic Waste Management Rules, 2016.

Water

Ground Water

6.25 Ground water is a crucial resource for India's agriculture, industry and drinking water security. However, unsustainable extraction, i.e. extraction in excess of, or close to, annual recharge, can severely compromise ground water resources.

Figure 17: Ground Water Resource Assessments (2004-2020)
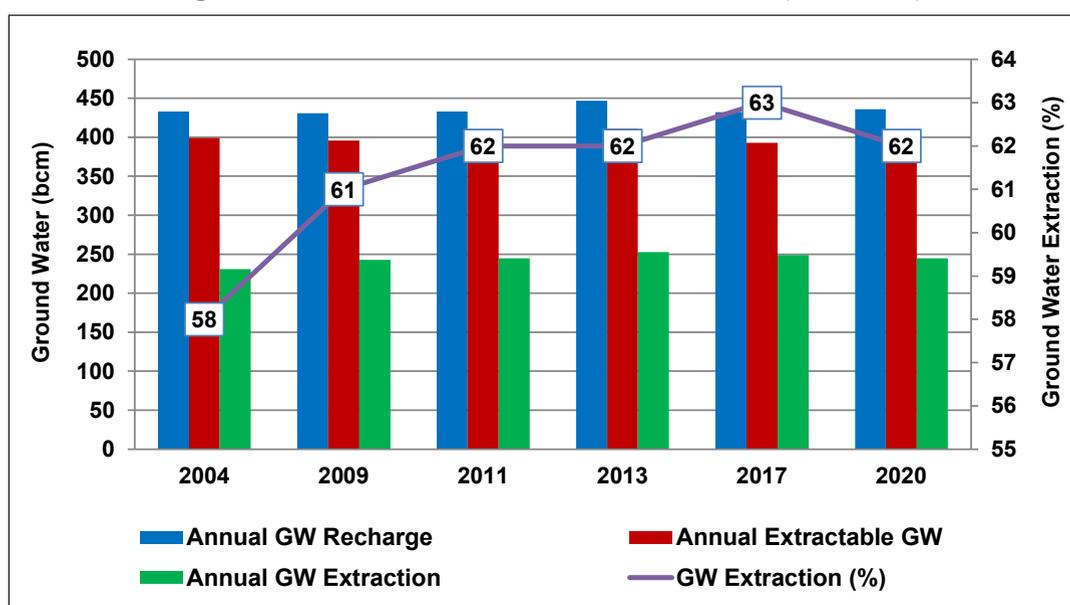
Source: National Compilation on Dynamic Ground Water Resources of India, 2020

6.26 Ground Water Resources Assessment of states/UTs is carried out jointly by state groundwater/ nodal departments and Central Ground Water Board at periodic intervals, and the Dynamic Ground Water Resources of India is published by compiling the state/UT wise ground water resources assessed. Such ground water assessments have been undertaken in 2004, 2009, 2011, 2013, 2017 and 2020. Figure 17 shows the annual ground water recharge, annual extractable ground water resources, annual ground water extraction and the stage of total ground water extraction (ratio of annual ground water extraction and annual extractable resources i.e. utilization vs availability expressed in per cent) of India during 2004-2020. It may be seen that the annual ground water recharge has remained similar during 2004-2020 (except in 2013). Overall, the annual ground water extraction has been in the range of 58-63 per cent during this period.

Figure 18: Categorization of Ground Water Resource Assessment Units (2004-2020)
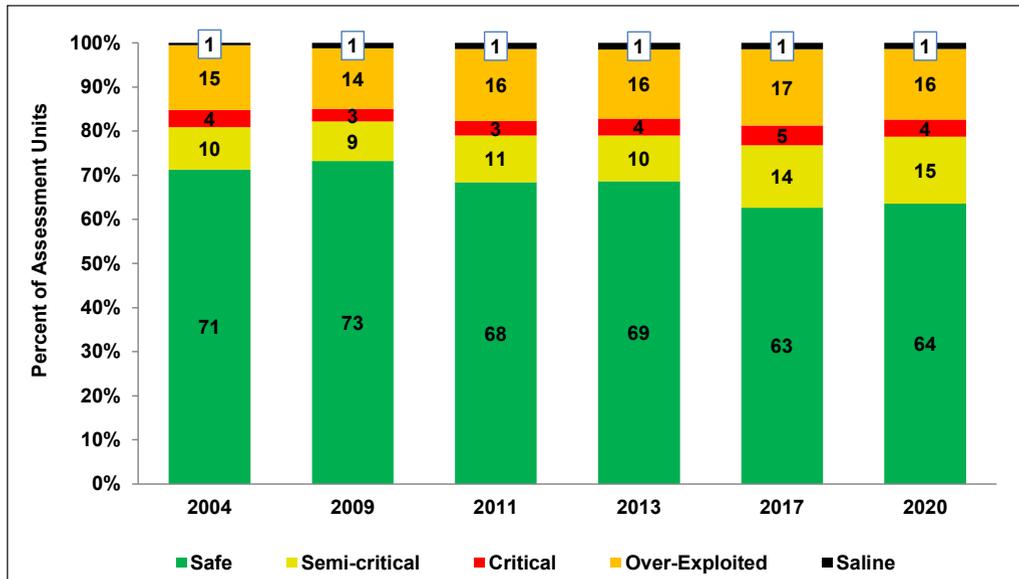
Source: National Compilation on Dynamic Ground Water Resources of India, 2020

6.27 The extent of ground water extraction varies across the country. The ground water assessment units (blocks/ taluks/ mandals/ tehsil/ firkas etc.) are categorized based on the Stage of Extraction (SoE) as 'Safe' if SoE < 70 per cent; 'Semi-critical' if SoE > 70 per cent and <= 90 per cent; 'Critical' if SoE >90 per cent and <=100 per cent and 'Over-exploited' if SoE> 100 per cent. Assessment unit in which the ground water resources are entirely saline, have been categorised as 'Saline'. Figure 18 shows the per cent of number of assessment units of India under different categories (Safe, Semi-critical, Critical, Over-exploited and Saline) during 2004-2020. During this period, units categorized as "safe", have declined from 2009 (73 per cent) to 2020 (64 per cent). "Semi-critical" units have increased from 9 per cent in 2009 to 15 per cent in 2020. The share of "Critical" units has remained in the range of 3-5 per cent during 2004-2020. The share of "Over-exploited" units, accounted for 14-17 per cent of total assessment units during 2004-20. In addition, approximately one per cent of assessment units have been categorized as "saline".

6.28 Figure 19 presents the categorization of ground water resource assessment units across India in 2020. It can be seen that over-exploitation of ground water resources, i.e. extraction exceeding the annually replenishable ground water recharge is concentrated in north-west and parts of southern India.

Figure 19: Categorization of Ground Water Resource Assessment units across India, 2020

Safe
GW extraction < 70%

Semi Critical
GW extration 70-90%

Critical
GW extration 90-100%

Over Exploited
GW extraction >
Annually replenishable

Saline

Hilly Areas

No Data
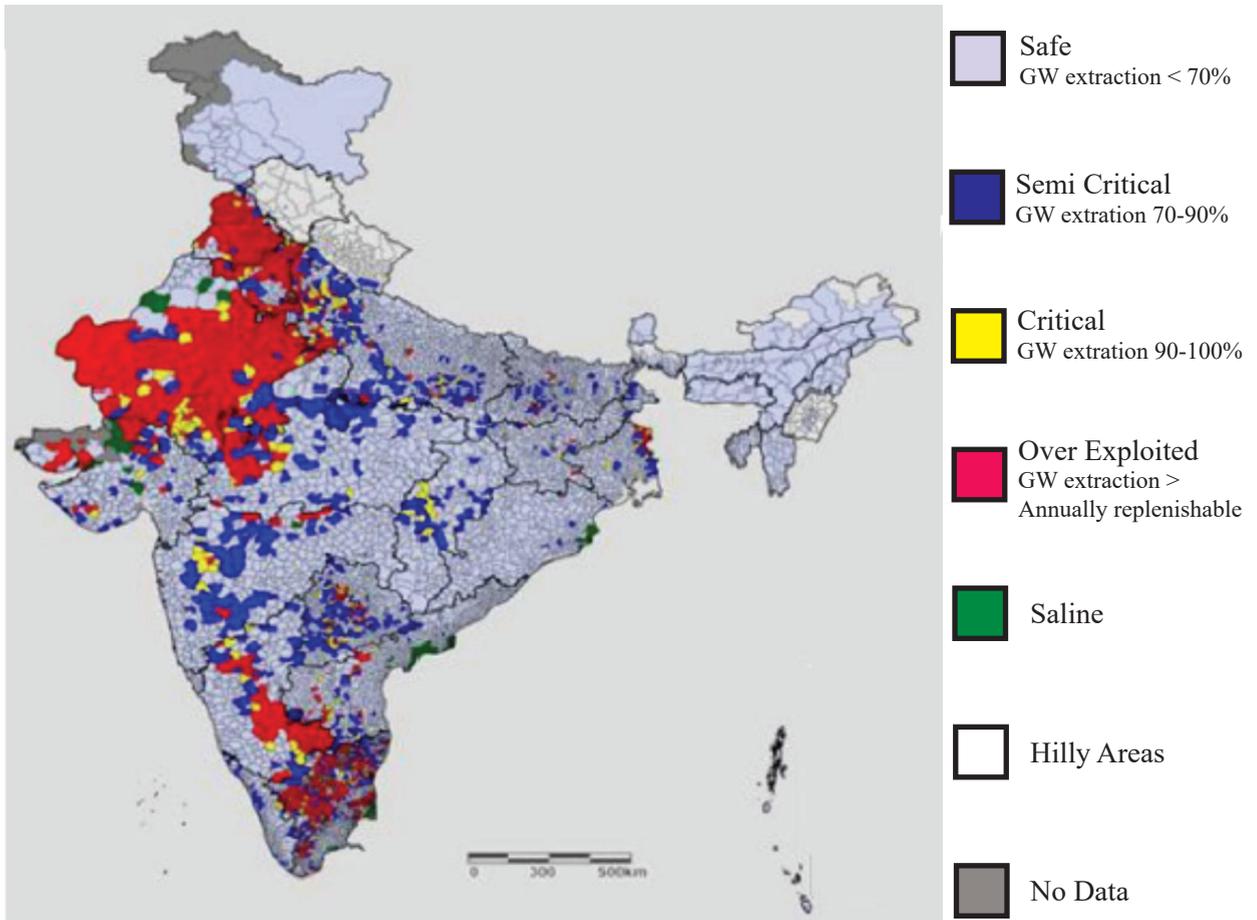
Source: National Compilation on Dynamic Ground Water Resources of India, 2020

Reservoirs

6.29 Reservoirs are an important source of water resources for the country. However, they are particularly prone to seasonality, and are greatly impacted by rainfall and temperature patterns.

Figure 20: Reservoir capacity and live storage (bcm)
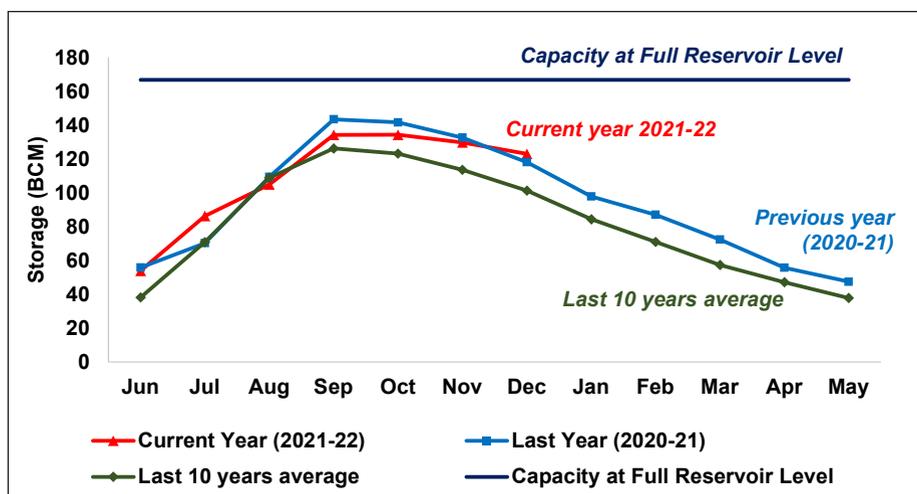
Source: India Water Resources Information System, Ministry of Jal Shakti

6.30 Figure 20 shows the capacity at full reservoir levels in 138 monitored reservoirs of India along with the live storage during June-December 2021, June 2020–May 2021, and the ten year average during the months of June – May. It may be seen that reservoir live storage is at its peak during monsoon months and lowest in summer months, requiring careful planning and coordination of storage, release and utilization of reservoirs. This is also reflected in Figure 21.

Figure 21: Reservoir fill (per cent of total capacity), 2021

20th June 2021

22nd August 2021

24th October 2021

19th December 2021

Reservoir fill (%)

■ > 90%   ■ 70% - 90%   ■ 50% - 70%   ■ < 50%
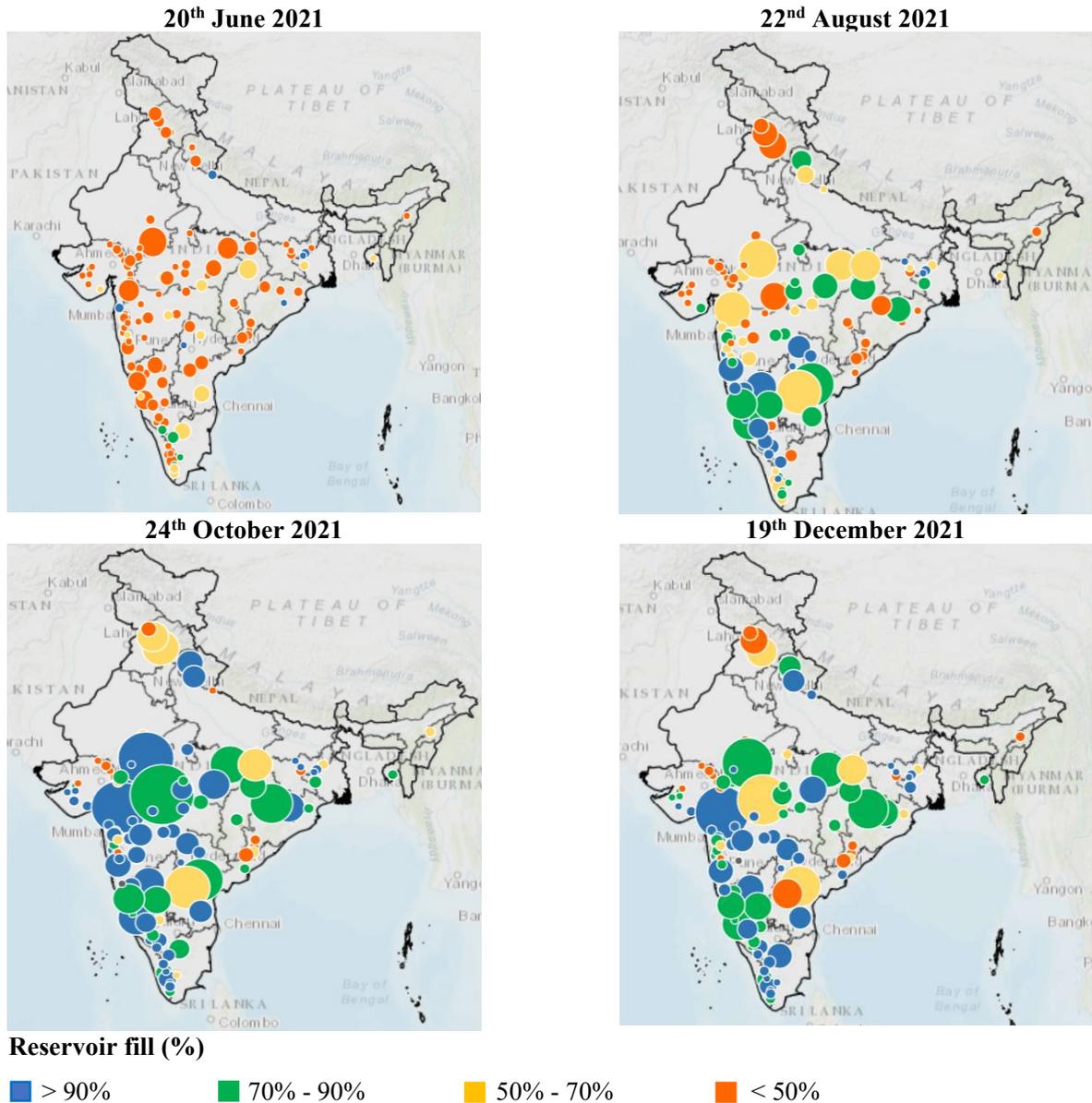
Source: India Water Resources Information System, Ministry of Jal Shakti

Rivers

6.31 India has several perennial and seasonal rivers. The Ganga River Basin is the largest river basin in India, covering more than a quarter of country's land area, hosting about 43 per cent of its population and contributing 28 per cent of India's water resources. In recognition of River Ganga's significant economic, environmental, cultural and religious value, the Government of

India declared River Ganga as the National River in 2008. Further, the Government of India launched the Namami Gange Mission in 2014 as an integrated and multi-sectoral mission for conservation of Ganga and its tributaries.

Namami Gange Mission

6.32 The Namami Gange Mission aims to protect, conserve and rejuvenate the Ganga River Basin. In 2015, the Cabinet approved the Mission for a period of five years (2015-2020) with a budget outlay of ₹ 20,000 crores. Subsequently, on 7th October 2016, under the Environment (Protection) Act, 1986 (29 of 1986), the National Mission for Clean Ganga (NMCG) was notified as an authority under Environment Protection Act, which is also the nodal agency responsible for monitoring and implementing the Namami Gange Mission. The activities undertaken as part of the Mission rest upon four pillars –Nirmal Ganga (Unpolluted Flow), Aviral Flow (Continuous Flow), Jan Ganga (People-River Connect) and Gyan Ganga (Research and Knowledge Management). As of December 2021, a total of 363 projects worth ₹ 30,841.53 crores have been sanctioned under the mission.

6.33 Figure 22 shows the total expenditure incurred under the Namami Gange Mission since 2014-15 to December 2021. Lower expenditure incurred in 2020-21 and 2021-22 needs to be viewed in the context of the COVID pandemic and recent changes in accounting norms.

Figure 22: Expenditure incurred under the Namami Gange Mission during 2014-22 (₹ Crores) as of December 2021
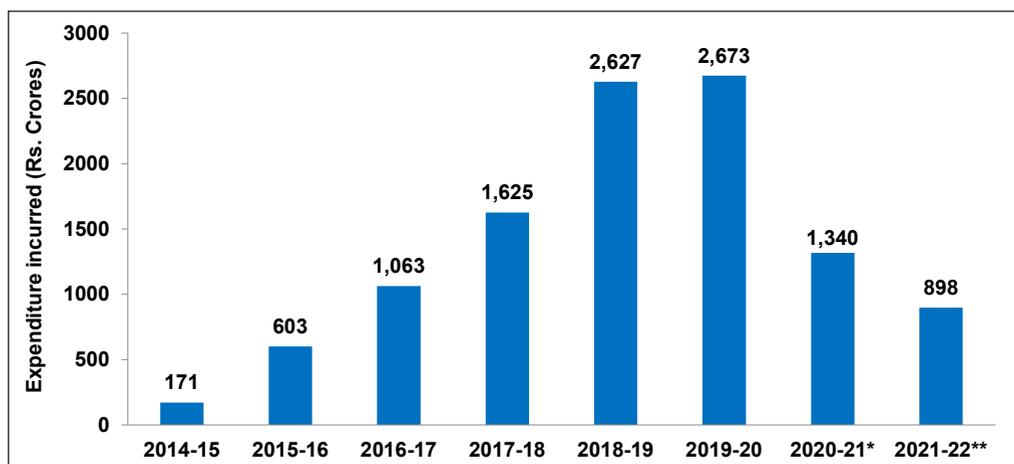
*Due to COVID 19 Pandemic
** The data in the graph is till December 2021
Source: National Mission for Clean Ganga (NMCG)

6.34 In addition, the Clean Ganga Fund (CGF) was established in 2014 with the objective of contributing to the national effort of improving the cleanliness of river Ganga with the contributions received from the residents of the country, NRIs/ PIO, corporates and organizations. As of 31st December 2021, a total of ₹ 561.58 crore has been received under the CGF.

6.35 Under the Nirmal Ganga (Unpolluted Flow) component of the mission, 160 sewerage projects have been sanctioned at a cost of ₹ 24,568 crores as of December 31, 2021 to create a cumulative treatment capacity of 5,024 MLD, reflecting a ten-fold increase from 463 MLD through 28 projects in 2014. Figure 23 shows the state-wise distribution of the sewerage

infrastructure projects created under the Namami Gange Mission since its inception, with the highest number of projects undertaken in Uttar Pradesh (43), followed by Bihar (29) and Uttarakhand (26).

Figure 23: Sewerage Infrastructure Projects created under the Namami Gange Mission as of December 31, 2021
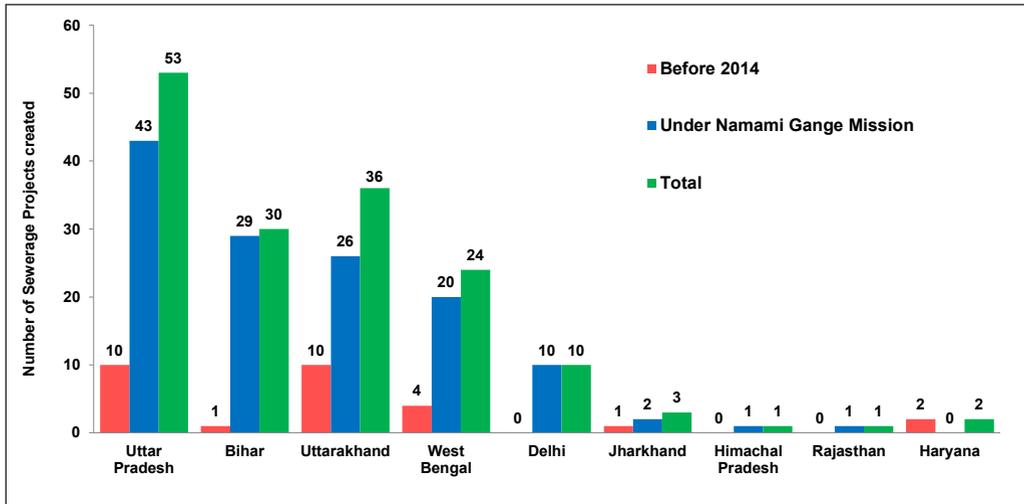
Source: National Mission for Clean Ganga (NMCG)

6.36 Further, Grossly Polluting Industries (GPIs) along River Ganga have been inventoried. Since 2015, sector specific charters for implementation of cleaner technology, upgradation of treatment facility and adaptation of waste minimization practices have been implemented in the major industrial sectors like pulp & paper, distilleries, sugar and textile by involving different stakeholders. These actions have resulted in significant reduction in wastewater discharge and pollution load. Figure 24 shows the improvement in compliance status of GPIs located in the Ganga main stem and its tributaries from 39 per cent in 2017 to 81 per cent in 2020 due to regular monitoring of these industries through annual inspections by independent technical institutes. Figure 25 shows the consequent reduction in effluent discharge from 349.13 MLD in 2017 to 280.20 MLD in 2020.

Figure 24: Compliance Status of Grossly Polluting Industries along Ganga (2017-20)
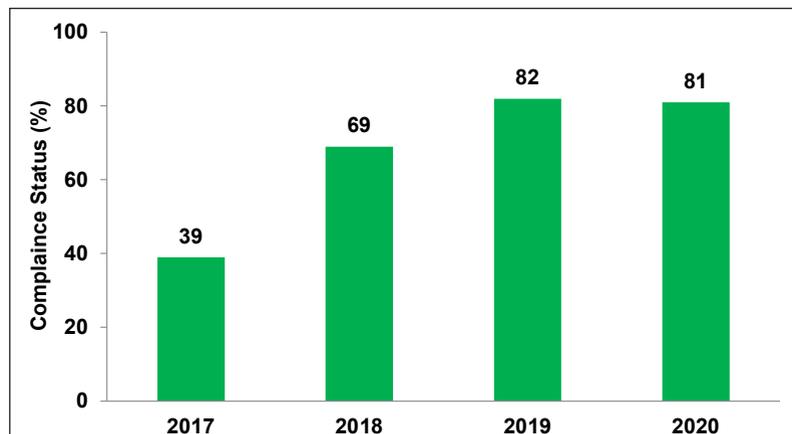
Source: National Mission for Clean Ganga (NMCG)

Figure 25: Change in Effluent Discharge along Ganga main stem and tributaries (2017-20)
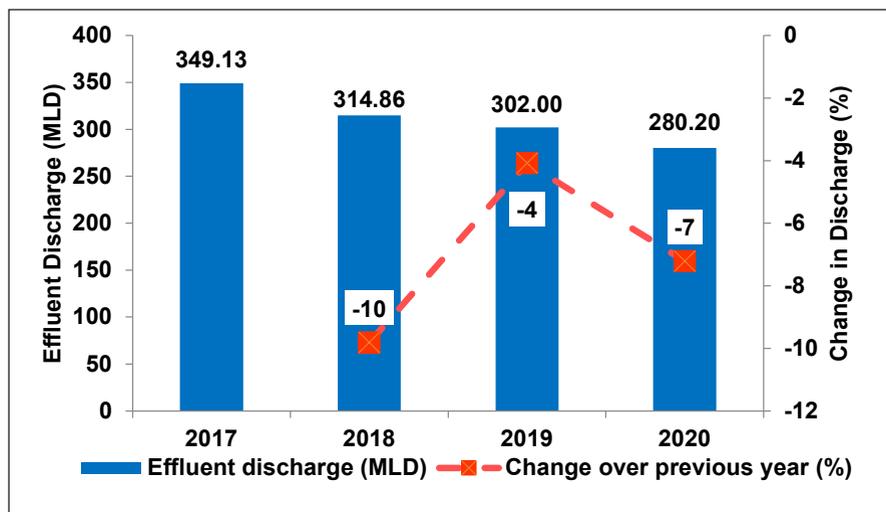
6.37 To ensure Aviral Flow (Continuous Flow) of the Ganga, a historical ecological flow notification mandating the minimum flow of river Ganga was released in 2016, recognizing the right of the river over its own water. Other steps in this direction include afforestation of 29,000 Ha; first of its kind river bio-diversity assessment for the main stem Ganga river covering over 2,200 km; identification of 279 wetlands for conservation; and preparation of integrated management plan for 118 wetlands.

6.38 The Jan Ganga (People-River Connect) component acknowledges the critical importance of strengthening the people-river connection in achieving the mission objectives. Ganga Quest 2021 got an enthusiastic response of over 1 million participants from 113 countries. Ganga Utsav 2021 was celebrated for the first time as a river festival extending beyond Ganga basin cities. The River City Alliance was launched in November 2021, as a platform for river cities in India to ideate, discuss, and exchange information for the sustainable management of urban rivers.

6.39 Finally, under the Gyan Ganga (Research and Knowledge Management) component, the Ganga Knowledge Centre was set up to create a state-of-the-art center to support the NMCG and create a comprehensive knowledge base on Ganga. In addition, the Centre for Ganga Management & Study was set up at IIT Kanpur for long term basin studies and technology development.

Air

6.40 Air pollution is one of the biggest global environmental challenges. The Government of India launched the National Clean Air Programme (NCAP) in 2019 to tackle the air pollution problem in a comprehensive manner, with a target to achieve 20-30 per cent reduction in particulate matter (PM) concentrations by 2024 across the country keeping 2017 as the base year for the comparison of concentration. The NCAP is implemented in 132 cities, of which 124 cities have been identified based on non-conformity with national ambient air quality standards for five consecutive years. This includes 34 million plus cities / urban agglomerations identified

by the Fifteenth Finance Commission (XV-FC). In addition, NCAP also covers eight other million plus cities, which fall under XV-FC grant for receiving performance based grant for air quality improvement. Figure 26 shows the funds released under the NCAP in 2019-20 and 2020-21. In 2019-20, the highest funds were released to Uttar Pradesh, followed by Maharashtra and Madhya Pradesh while in 2020-21, the highest funds were released to Andhra Pradesh, Punjab and West Bengal.

Figure 26: Funds released under the National Clean Air Programme (₹ Crores)
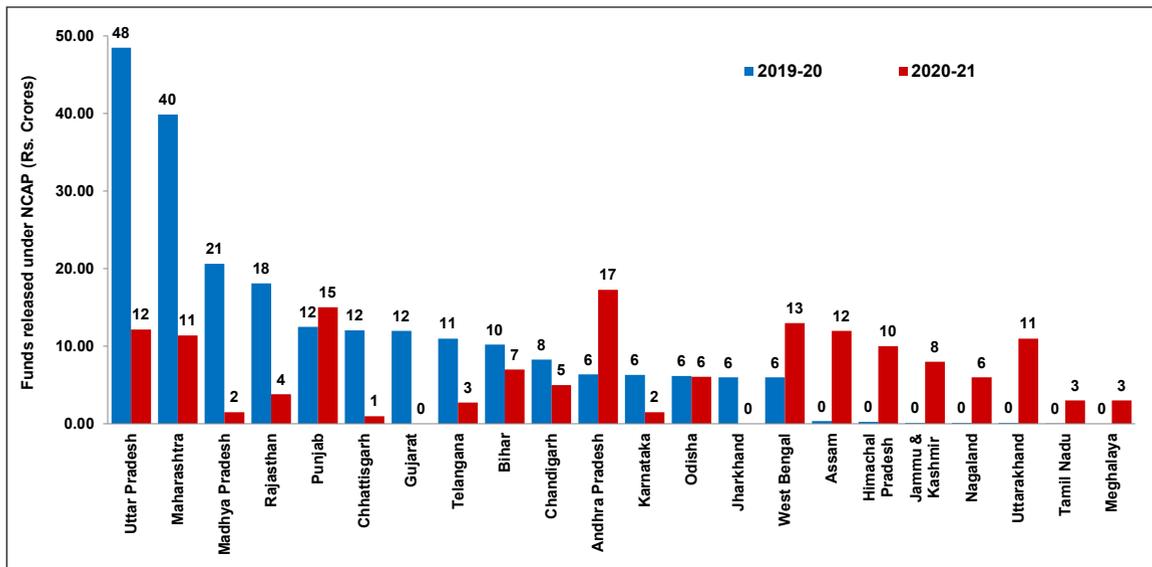
Source: Ministry of Environment, Forest and Climate Change

6.41 Several steps are being taken to control and minimize air pollution from various sources in the country, which inter alia include:

  i. **Vehicular Emission:** India has leap frogged from BS-IV to BS-VI norms for fuel and vehicles since April, 2020. Metro rail networks for public transport have been enhanced and more cities have been covered. Cleaner/alternate fuels like CNG, LPG and ethanol blending in petrol have been introduced. Government has approved Phase-II of FAME Scheme with an outlay of ₹ 10,000 Crore for a period of five years commencing from 1st April 2019. Out of total budgetary support, about 86 per cent of fund has been allocated for demand incentive so as to create demand for electric vehicles in the country. This phase aims to generate demand by way of supporting 7,090 e-buses, 5 lakh e-3 wheelers, 55,000 e-4 wheeler passenger cars (including strong hybrid) and 10 lakh e-2 wheelers. Permit requirement for electric vehicles has been removed.

  ii. **Industrial Emission:** Stringent emission norms for coal based thermal power plants have been introduced. There is ban on use of imported pet coke in the country since July 2018, with exception for permitted processes. Online continuous emission monitoring devices have been installed in highly polluting industries. Brick kilns have been shifted to zig-zag technology to reduce pollution.

  iii. **Air Pollution due to dust and burning of waste:** Six waste management rules covering solid waste, plastic waste, e-waste, bio-medical waste, construction and demolition

waste and hazardous waste have been notified. Waste processing plants have been set up. Extended producer responsibility for plastic and e-waste management has been introduced. Burning of biomass/garbage has been banned.

iv. **Monitoring of Ambient Air Quality:** Air quality monitoring network of manual as well as continuous monitoring stations, under programmes such as National Air Monitoring Programme, have been expanded. Pilot projects have been initiated to assess alternate ambient monitoring technologies such as low-cost sensors and satellite-based monitoring. Air Quality Early Warning System, which provides alerts for taking timely actions, is being implemented in Delhi, Kanpur and Lucknow.

6.42 As a result of these initiatives, 96 cities showed a decreasing trend of PM10 concentration in 2020-21 as compared to 2019-20. The number of cities within the prescribed National Ambient Air Quality Standard (PM10 less than 60 µg/m3) also increased from 18 in 2019-20 to 27 in 2020-21. However, air pollution remains a major concern, with 36 cities showing an increasing trend in PM10 concentration in 2020-2021 as compared to 2019-2020.

6.43 In addition to the above measures, some key measures being taken for reducing air pollution in Delhi / NCR are as follows:

i. A Commission on Air Quality Management in NCR and Adjoining Areas was promulgated vide ordinance dated 13th July 2021 for better co-ordination, research, identification and resolution of problems surrounding the air quality index.

ii. To control emissions from stubble burning, under Central Government 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', agricultural machines and equipment for in-situ crop residue management are promoted with 50 per cent subsidy to the individual farmers and 80 per cent subsidy for establishment of custom hiring centres.

iii. All diesel vehicles older than 10 years and all petrol vehicles older than 15 years have been banned in Delhi and NCR.

iv. Expressways & Highways have been operationalized to divert non-destined traffic away from Delhi.

v. Shifting industries to clean fuel and installation of Online Monitoring of Industrial Emission & Effluent systems in red category industries in Delhi-NCR is in progress.

6.44 As a result of these interventions, there has been an improvement in air quality index for Delhi since 2016 as seen in Table 2. The number of 'Good', 'Satisfactory' and 'Moderate' days increased to 197 in 2021 as against 108 in 2016, and number of 'Poor', 'Very Poor' and 'Severe' days decreased to 168 in 2021 against 246 in 2016. The lower number of 'Good', 'Satisfactory' and 'Moderate' days and higher number of 'Poor', 'Very Poor' and 'Severe' days in 2021 as compared to 2020 must be viewed in the context of the 2020 COVID-19 lockdowns.

Table 2: Average Annual Air Quality Index, Delhi (2016-2021)

Year (no. of days) / Category	2016 (354)	2017 (365)	2018 (365)	2019 (365)	2020 (366)	2021 (365)	2016	2017	2018	2019	2020	2021
Good (0–50)	0	2	0	2	5	1						
Satisfactory (51–100)	25	45	53	59	95	72	108	152	159	182	227	197
Moderate (101–200)	83	105	106	121	127	124						
Poor (201–300)	120	115	113	103	75	80						
Very Poor (301–400)	101	89	73	56	49	64	246	213	206	183	139	168
Severe (>401)	25	9	20	24	15	24						

Source: Ministry of Environment, Forest and Climate Change

6.45 In addition, Continuous Ambient Air Quality Monitoring Stations (CAAQMS) data for Delhi reveals that annual concentration of PM has decreased gradually since 2016. Delhi achieved approximately 22 per cent reduction in PM2.5 and 27 per cent reduction in PM10 in 2021 as compared to 2016.

6.46 Figure 27 shows the average monthly air quality (PM2.5) for Delhi during 2017-21. In 2021, nine months registered an improvement over 2017, with the largest improvements seen in October (54 per cent), May (50 per cent) and September (48 per cent). In 2021, average monthly air quality in Delhi declined in January (17 per cent), February (15 per cent) and March (one per cent) as compared to corresponding months in 2017, indicating an area of concern.

Figure 27: Average Monthly CAAQMs of Delhi (2017-2021) (PM2.5 in µg/m3)
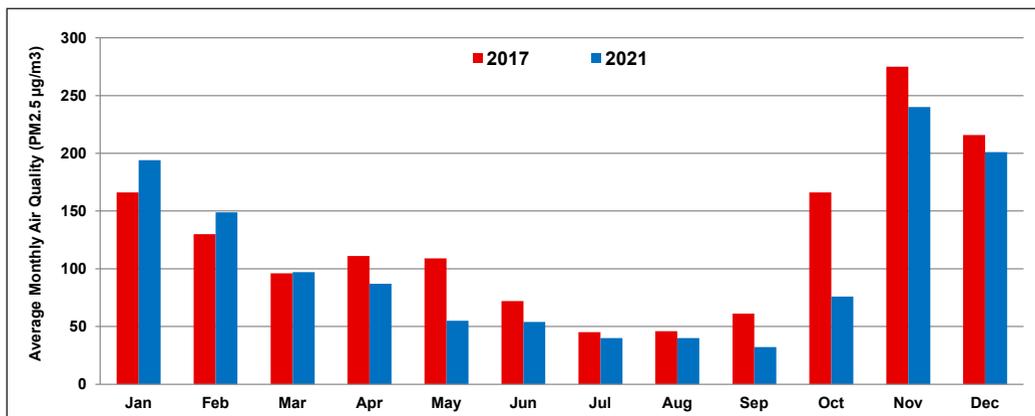
Source: Ministry of Environment, Forest and Climate Change

6.47 Figure 28 shows the average monthly air quality (PM10) for Delhi during 2017-21. In 2021, nine months registered an improvement over 2017, with the largest improvements seen in September (66 per cent), October (49 per cent) and May (48 per cent). In 2021, average monthly air quality in Delhi declined in January (five per cent), February (seven per cent) and March (four per cent) as compared to corresponding months in 2017, indicating an area of concern.

Figure 28: Average Monthly CAAQMs of Delhi (2017-2021) (PM10 in μg/m3)
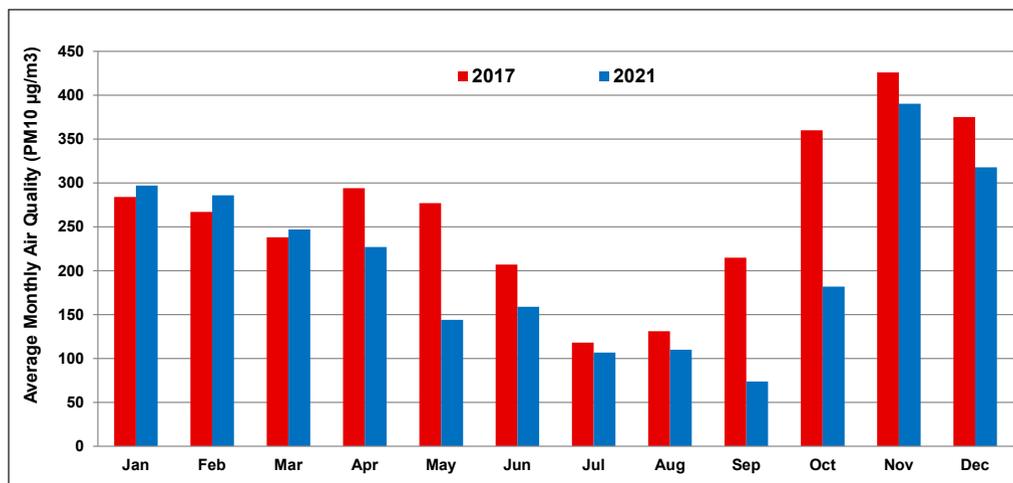
Source: Ministry of Environment, Forest and Climate Change

CLIMATE CHANGE

6.48 India launched the National Action Plan on Climate Change (NAPCC) in 2008, establishing eight National Missions to advance action on the country's climate priorities. The major developments under the NAPCC are presented in Table 3.

Table 3: National Missions under NAPCC

Missions	Major Objectives/ Target	Progress
1. **National Solar Mission (NSM)**	Achieve 100 GW of solar power in seven years starting from 2014-15	As of 31st December 2021, solar power capacity of 49.35 GW has been installed in the country.
2. **National Mission for Enhanced Energy Efficiency (NMEEE)**	- To achieve growth with ecological sustainability - Mandating reduction in energy consumption in large energy consuming industries - Financing for PPP to reduce energy consumption through demand-side management programs in the municipal, buildings and agricultural sectors - Energy incentives, including reduced taxes on energy-efficient appliances	The Perform Achieve and Trade (PAT) Scheme was initiated in March 2012 - Implementation of PAT Cycle I (2012-2015) resulted in annual energy savings of 8.67 Million Tonne of Oil Equivalent (MTOE) from 8 sectors. Emission reduction of 31 million tonnes of CO2 was achieved. - Under PAT Cycle II (2016-17 to 2018-19), annual energy savings of 14.08 MTOE was achieved from 11 sectors. Emission

			- reduction of 66.01 million tonnes of CO_2 was achieved. - PAT Cycle III (2017-18 to 2019-20) concluded on 31st March 2020. Results of this cycle are awaited. - Currently, PAT Cycle IV is under implementation. Energy savings of approximately 26 MTOE are expected to be achieved.
3.	**National Mission for a Green India (GIM)**	Improved ecosystem services by increasing forest/tree cover by 5 m ha and improving quality of forest cover on another 5 m ha (a total of 10 m ha).	- A sum of ₹ 455.75 crore has been released to 14 states and one UT during 2015-16 to 2020-21. - Afforestation activities were taken up over an area of 1,17,757 ha. - Alternative fuel energy devices have been distributed to 33,099 households.
4.	**National Mission on Sustainable Habitat (NMSH)**	- Development of sustainable habitat standards. - Promoting energy efficiency as a core component of urban planning by extending the existing Energy Conservation Building Code - Strengthening enforcement of automotive fuel economy standards - Using pricing measures to encourage the purchase of efficient vehicles and incentives for the use of public transportation	- NMSH 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 has been made mandatory for commercial buildings having connected load of 100 KW or above. - 702 km of conventional metro is operational in the country. Additional 1,016 km of metro and regional rapid transit system is under construction in 27 cities.

		- Under Smart Cities Mission, Climate Smart Cities Assessment Framework 2019 has been launched to provide clear roadmap to combat climate change through mitigation and adaptation measures. - Urban Swachh Bharat Mission 2.0 will be implemented with a total financial allocation of ₹ 1,41,678 crores over a period of 5 years from 2021-2026.
5. **National Water Mission (NWM)**	- Focuses on monitoring of ground water, aquifer mapping, capacity building, water quality monitoring and other baseline studies. - Promoting citizen and state action for water conservation, augmentation, and preservation. - Focusing attention on overexploited areas. - Promoting basin-level integrated water resources management.	- The National Institute of Hydrology is the nodal agency to get the State Specific Action Plan (SSAP) for the water sector for 19 selected states. Five States have completed the first phase of SSAP. - 15640 ground water observation wells are being monitored by Central Ground Water Board.
6. **National Mission for Sustainable Agriculture**	Enhancing food security by making agriculture more productive, sustainable, remunerative, and climate resilient	- The mission has resulted in the formation of National Innovations on Climate Resilient Agriculture, a network project of the Indian Council of Agricultural Research. - Key targets for FY 2021-2025 include covering 20 lakh hectare of area under organic farming, 87 lakh hectare under precision irrigation, 2.10 lakh hectare

			under System for Rice Intensification, 6 lakh hectare under diversification to less water consuming crop, 1.19 lakh hectare additional area under plantation in arable land.
7.	**National Mission for Sustaining Himalayan Ecosystems**	- To continuously assess the health status of the Himalayan Ecosystem - Enable policy bodies in their policy formulation functions - Establish new centres relevant to climate change in existing institutions in Himalayan States - Regional cooperation with neighbouring countries in Glaciology	- Centre for Glaciology has been established at Wadia Institute of Himalayan Geology - State climate change centres have been set up in 12 Himalayan states - State climate change cells have been established in 11 out of 12 Himalayan states - 40 capacity building training programmes have been conducted and 40,000 people have been trained. Glaciologists have been trained under Indo-Swiss Capacity Building Programme in glaciology - an Inter-University Consortium of 4 universities on Himalayan Cryosphere and Climate Change has been formed - Glacial lake outburst floods R&D studies for vulnerability assessment have been conducted for Sikkim
8.	**National Mission on Strategic Knowledge for Climate Change (NMSKCC)**	- To gain better understanding of climate science and formation of knowledge networks among existing knowledge institutions engaged in research and development (R&D)	- The mission has created and strengthened 11 Centres of Excellence for climate change. - State Climate Change Cells have been established

- Development of national capacity for modelling the regional impact of climate change on different ecological zones within the country.	in 11 out of 12 Himalayan States and in 11 non-Himalayan States. - 6 lead institutions now conduct training on climate change science, impacts and adaptation under its human capacity building programme. - Revised mission document aims to establish 20 centres of excellence, state climate change cells in all states/UTs, develop major R&D programmes, human capacity building programmes, national level network programmes and international cooperation

Source: Ministry of Environment, Forest and Climate Change and Ministry of Power

6.49 Climate Change Action program (CCAP) is a central sector scheme, initially launched in 2014, with a total outlay of ₹ 290 crores for duration of five years. The scheme has now been extended upto 2025-26, and consists of eight broad sub-components including the National Action Plan on Climate Change (NAPCC) coordination, State Action Plan on Climate Change (SAPCC), National Institute on Climate Change Studies & Actions, National Carbonaceous Aerosols Programme (NCAP), Long Term Ecological Observations (LTEO), International negotiations and capacity building.

6.50 India's climate actions, especially the adaptation efforts are largely financed domestically. The National Adaptation Fund on Climate Change (NAFCC) was launched in 2015, and 30 projects with a total allocation of ₹ 847.5 crores have been sanctioned from 2015-19 (Figure 29). The projects focus on climate sensitive sectors such as agriculture, water, forestry as well as the coastal and Himalayan ecosystem, and are being implemented to enhance the adaptive capacity of the most vulnerable sections of our population and ecosystems.

Figure 29: Projects sanctioned under the National Adaptation Fund on Climate Change (NAFCC)
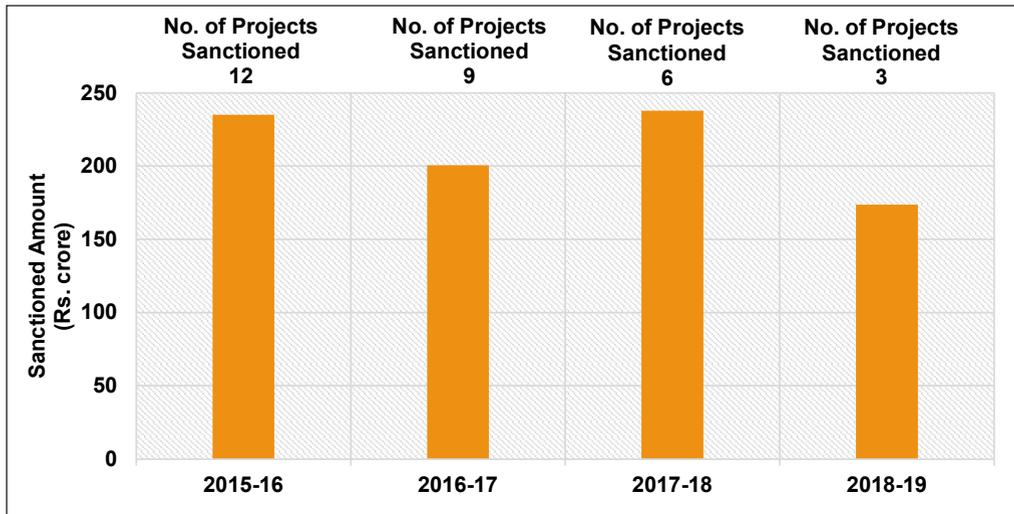
Note: No new projects have been sanctioned after 2018-19
Source: Ministry of Environment, Forest and Climate Change

6.51 Of the 30 sanctioned projects under NAFCC, two projects – in Haryana and one regional project (covering Haryana, Punjab, Rajasthan and Uttar Pradesh) – have closed down. Figure 30 shows the cost of the 28 projects being implemented under the NAFCC across 26 states (of which Tamil Nadu has two projects) and one multi-state project (covering Maharashtra, Rajasthan and Telangana).

Figure 30: Cost of Projects being implemented under the National Adaptation Fund on Climate Change (NAFCC)
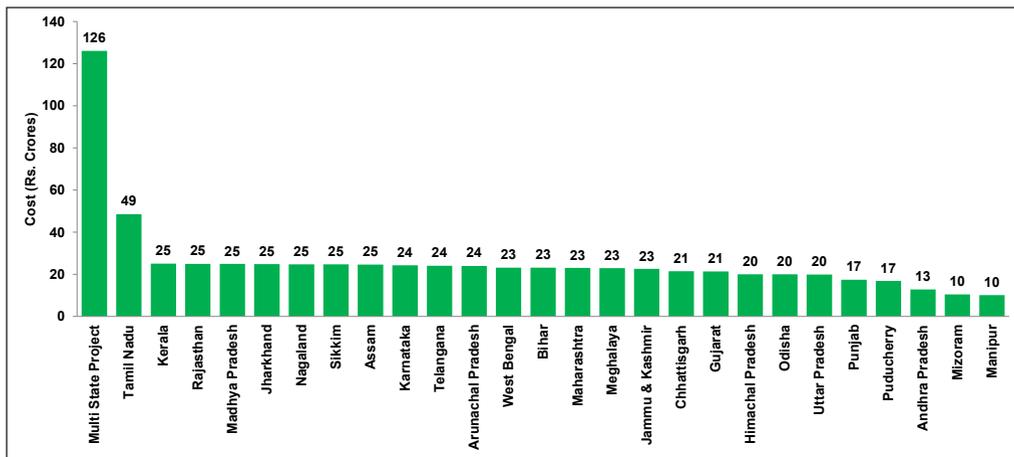
Note: All states above have 1 project under implementation, except Tamil Nadu, which has two projects under implementation. In addition, the multi-state project covers Maharashtra, Rajasthan and Telangana
Source: Ministry of Environment, Forest and Climate Change

Box 2: Major Initiatives and Achievements

India has announced the National Hydrogen Mission for generating hydrogen from green energy sources. Through technological advancements, hydrogen is being blended with CNG for use as transportation fuel as well as an industrial input to refineries.

On June 5, 2021, the Hon'ble Prime Minister announced 20 per cent ethanol blending in petrol by 2025. The ambitious target, which brings forward the blending target from 2030 to 2025, is a key element of the economy-wide energy transformation. As of September 2021, the country has already reached 8.5 per cent ethanol blending and is on track to achieve the 20 per cent target by 2025. Considerable benefits can accrue to the country by ethanol blending, such as saving USD 4 billion foreign exchange per year in imports, enhancing energy security, lowering carbon emissions, improving air quality, promoting productive use of damaged food grains and waste, increasing farmers' incomes, creating employment and investment opportunities. The Government is expecting an investment of up to USD 5,541 million to help India achieve its ethanol blending target of 10 per cent by 2022 and 20 per cent by 2025.

Indian Railways has set a target of Net Zero Carbon Emission by 2030, primarily through sourcing its energy requirements through renewable energy sources. Major initiatives undertaken for reduction of carbon emissions include 100 per cent electrification of its network by December 2023, use of three phase technology for regenerative braking, "head on generation" technology eliminating the need for separate diesel fuelled power cars, use of renewable energy source (133.26 MW solar and 103 MW wind installed capacity), provisioning of LED lights at all railway installations, and creation of additional carbon sink by afforestation. Figure below shows the expected CO_2 emission reduction by Indian Railways through use of renewable energy.

Expected CO2 emissions reduction by Indian Railways through use of renewable energy
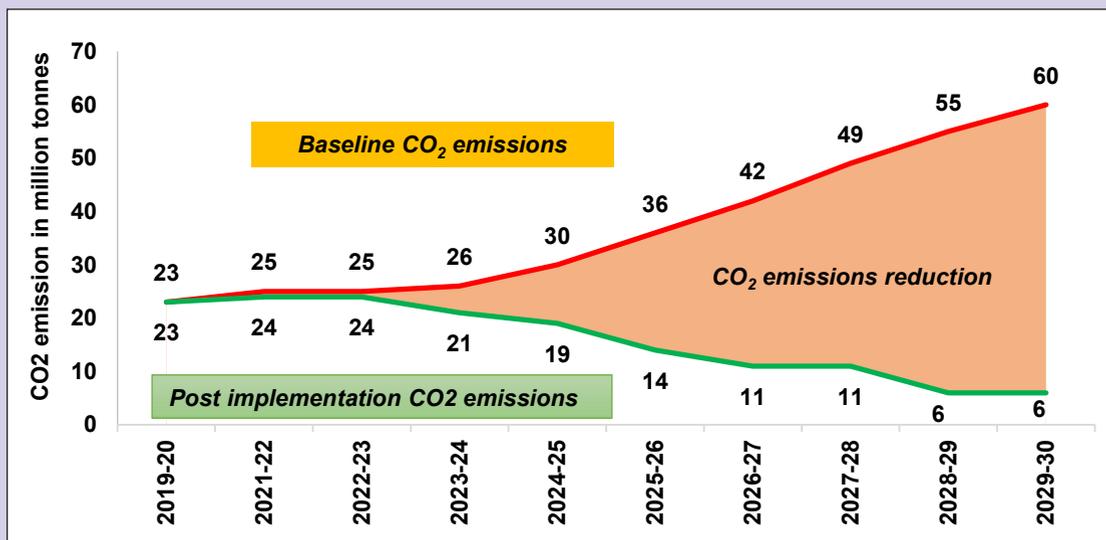
Source: Ministry of Railways

India has launched the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme to provide energy and water security, de-dieselise the farm sector and generate additional income for farmers by producing solar power. The scheme aims to add 30.8 GW of solar capacity with central financial support of over ₹ 34,000 Crore. It has three components – (a) installation of

10,000 MW of decentralized grid connected solar power plants each of capacity up to 2 MW, (b) setting up of 20 lakh standalone solar powered agriculture pumps, and (c) solarisation of 15 Lakh existing grid-connected agriculture pumps. RBI has included these components under Priority Sector Lending Guidelines for easing availability of finance. As of 31st December, 2021 over 77000 stand-alone solar pumps, 25.25 MW capacity solar power plants and over 1026 pumps were solarised under individual pump solarisation variant. Implementation of feeder level solarisation variant under component C which was introduced in December 2020 has also started in a number of states.

To facilitate large scale grid connected solar power projects, a scheme for "Development of Solar Parks and Ultra Mega Solar Power Projects" is under implementation with a target capacity of 40 GW capacity by March 2024. So far, 50 solar parks have been sanctioned with a combined capacity of 33.82 GW in 14 states. Solar power projects of an aggregate capacity of around 9.2 GW have already been commissioned in these parks.

Roof Top Solar programme Phase-II for accelerated deployment of solar roof top systems, with a target of 40 GW installed capacity by December 2022, is also under implementation. The scheme provides for financial assistance for upto 4 GW of solar roof top capacity to residential sector and there is a provision to incentivise the distribution companies for incremental achievement over the previous year. So far, a cumulative 5.87 GW solar roof top projects have been set up in the country.

A scheme for setting up 12 GW Grid-Connected Solar PV Power Projects by government entities (including Central Public Sector Undertakings) is under implementation. Viability Gap Funding support is provided under this scheme. Under this scheme, Government has so far sanctioned around 8.2 GW of projects.

Phase-III of the Off-Grid Solar PV Applications Programme for Solar Street Lights, Solar Study Lamps and Solar Power Packs was available till 31.03.2021. Till December 2021 over 1.45 lakh solar street lights were installed, 9.14 lakh solar study lamps were distributed and about 2.5 MW solar power packs were set-up as reported by State Nodal agencies.

Government of India has notified the offshore Wind Energy Policy to harness the potential of offshore wind energy along India's coastline. Ministry of New and Renewable Energy is developing strategy and roadmap for installation of offshore wind projects off the coast of Gujarat and Tamil Nadu. The Ministry has notified the wind solar hybrid policy, providing a framework for promotion of large grid connected wind-solar PV hybrid projects for optimal and efficient utilization of transmission infrastructure and land, reducing the variability in renewable power generation and achieving better grid stability. As of 31st December 2021, capacity of around 4.25 GW of wind-solar hybrid have been awarded, out of which 0.2 GW is already commissioned and additional capacity of 1.2 GW wind-solar hybrid projects are at various stages of bidding.

Major decisions at the COP26 Climate Summit, Glasgow

6.52 The 26th Session of the Conference of the Parties (COP 26) to the UNFCCC was held under the UK Presidency in Glasgow from 31st October – 13th November 2021. The 16th Session of the Conference of Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP16), 3rd Session of Conference of the Parties serving as the Meeting of Parties to Paris Agreement (CMA3), Sessions 52-55 of the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI) were also held in conjunction

with COP26. These sessions were held after a hiatus of one year in 2020 in view of the global COVID-19 pandemic.

6.53 The COP26 adopted outcomes on all pending issues of the "Paris Rule Book", which is the procedures for implementation of the Paris Agreement, including market mechanisms, transparency, and common timeframes for NDCs. India sought for the just transition for the developing countries with adequate time frame so that the green economy benefits are shared with all.

6.54 The "Glasgow Climate Pact" emphasizes adaptation, mitigation, finance, technology transfer, capacity-building, loss and damage. The decision urges the developed country Parties to fully deliver on the USD 100 billion mobilization goal urgently and through till 2025, and emphasizes the importance of transparency in the implementation of their pledges. It urges developed countries to at least double adaptation finance to developing countries from 2019 levels by 2025. Further, it emphasises the need to significantly increase financial support to developing countries, welcomed initiation of structured deliberations on a new collective quantified goal on climate finance, and looked forward to the ad-hoc work program established under the Paris Agreement from 2022 to 2024 towards this goal. In addition, the Standing Committee on Finance (which is a technical committee under UNFCCC) has now been mandated to work towards arriving at definitions of climate finance.

6.55 COP26 also welcomed the launch of a comprehensive two-year Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation. The Glasgow Dialogue between Parties, relevant organisations and stakeholders on loss and damage was established to explore the ways to fund loss and damage due to climate change. It also decided to convene an annual high-level ministerial round table on pre-2030 ambition, beginning at the fourth session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.

India's NDC and its voluntary commitment on enhanced climate action.

6.56 India's commitments made under the United Nations Framework Convention on Climate Change (UNFCCC) and its Paris Agreement, reflect the principles of equity, common but differentiated responsibilities and respective capabilities in the light of national circumstances. India's climate vision is also integrally linked to India's vision of development that foregrounds the goals of poverty eradication and guaranteeing basic well-being as an immediate necessity to meet the challenge of global warming.

6.57 India submitted its Nationally Determined Contribution (NDC) under the Paris Agreement on a "best effort basis" keeping its developmental imperatives in mind. India committed to (i) reduce the emission intensity of GDP by 33 to 35 per cent by 2030 as compared to 2005 level; (ii) create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030; and (iii) achieve about 40 per cent cumulative electric power installed capacity from non-fossil fuel energy resources by 2030. Against these targets, India's third Biennial Update Reports (BUR) submitted to the UNFCCC in 2021 reports that during 2005-2016, the country had reduced emission intensity of its GDP by 24 per cent. According to the India State of Forest Report 2021 released in January 2022, the total carbon stock in the country's forests is estimated to be 7,204 million tonnes, and the carbon stock in forest has

increased by 79.4 million tonnes as compared to the last assessment of 2019. According to the Central Electricity Authority, as on 31st December 2021, the share of non-fossil sources in installed capacity of electricity generation was 40.20 per cent.

6.58 The Hon'ble Prime Minister of India, as a part of the national statement delivered at the 26th Conference of the Parties (COP 26) in Glasgow in November 2021, announced ambitious targets to be achieved by 2030 to enable further reduction in emissions.

6.59 In order to coordinate India's response on climate change, an institutional framework of a high-level inter-ministerial Apex Committee for the Implementation of Paris Agreement (AIPA) has been created. The Committee reflects India's whole-of-government approach towards climate action. The purpose of AIPA is to generate a coordinated response on climate change and ensure that India is on track towards meeting its obligations under the Paris Agreement. Year 2021 marks the beginning of the implementation phase of the Paris Agreement and constitution of AIPA is central to strengthening the institutional arrangements for implementation and monitoring of climate actions.

FINANCE FOR SUSTAINABLE DEVELOPMENT

Dealing with Financial Risks associated with Climate Change

6.60 Climate change-related financial risks pose both micro and macro prudential concerns. In May 2021, the Reserve Bank of India (RBI) set up a new unit–'Sustainable Finance Group' (SFG) within its Department of Regulation to effectively counter these risks, and for leading the regulatory initiatives in the areas of sustainable finance and climate risk. The SFG is co-ordinating with, and participating in issues relating to sustainable finance or climate risk, with the international standard setting / co-operation bodies, other central banks, other financial sector regulators and the Government of India. The group would also be instrumental in suggesting strategies and evolving a regulatory framework, including appropriate climate-related disclosures, which could be prescribed for banks and other regulated entities to propagate sustainable practices and mitigate climate-related risks in the Indian context.

6.61 To assess the progress of its regulated entities in managing climate risk, RBI is preparing a consultative discussion paper covering, inter alia, (i) governance, (ii) strategy, (iii) risk management, and (iv) disclosure. The discussion paper will sensitize regulated entities to incorporate climate-related and environmental risks in their business strategies, governance and risk management frameworks. In line with the international best practices, banks will be guided to adopt a forward-looking, comprehensive, and strategic approach to climate-related risks.

Augmenting Finance for Sustainable Development

6.62 In January 2021, a Task Force on Sustainable Finance has been set up by the Department of Economic Affairs, Ministry of Finance, Government of India. The Terms of Reference of the Task Force include defining the framework for sustainable finance in India, establishing the pillars for a sustainable finance roadmap, suggesting draft taxonomy of sustainable activities and a framework of risk assessment by the financial sector.

6.63 India is actively contributing to the global efforts towards green finance. RBI joined the Central Banks and Supervisors Network for Greening the Financial System (NGFS) as a member on April 23rd, 2021 and has begun participating in the work streams of the NGFS. On November 3, 2021, RBI published a 'Statement of Commitment to Support Greening India's Financial System - NGFS' and committed to:

i. Exploring how climate scenario exercises can be used to identify vulnerabilities in RBI supervised entities' balance sheets, business models and gaps in their capabilities for measuring and managing climate-related financial risks

ii. lntegrating climate-related risks into financial stability monitoring

iii. Building awareness about climate-related risks among regulated financial institutions and spreading knowledge about issues relating to climate change and methods to deal with them accordingly.

6.64 The liberalised External Commercial Borrowings (ECB) norms of RBI have enabled the Indian renewable energy companies and other firms to tap the ECB route for raising finance through green bonds and sustainable bonds, reflecting the growing attractiveness of this route for raising finance.

6.65 India is also a part of several bilateral and global sustainable finance initiatives. RBI is a member of a Task Force on Climate-related Financial Risks set up by the Basel Committee on Banking Supervision, and the International Platform on Sustainable Finance. The latter is a forum of public authorities from 17 countries, which is working on Environmental, Social and Governance (ESG) Disclosures and a Sustainable Finance Taxonomy. In October 2021, RBI has also been featured in the first Annual Report on Sustainable Financial Regulations and Central Bank Activities published by the World Wide Fund for Nature.

Investing in Resilience for Sustainable Development

6.66 There has been an increasing recognition that ESG issues can put the performance of companies at risk. In this regard, SEBI has been one of the early adopters of sustainability reporting for listed entities and requires mandatory ESG related disclosures as part of the Business Responsibility Report (BRR), for the top 100 listed entities (by market capitalisation) since 2012. The above requirement of filing BRR was progressively extended to the top 500 entities (from financial year 2016-17) and later to the top 1000 listed entities (from the financial year 2019-20). SEBI in February 2017, had encouraged the top 500 listed entities to adopt the framework of Integrated Reporting, issued by the International Integrated Reporting Council, on a voluntary basis.

6.67 In May 2021, SEBI issued new sustainability reporting requirements as per the Business Responsibility and Sustainability Report (BRSR) which shall replace the existing BRR to bring in greater transparency through disclosure of ESG-related information and by enabling market participants to identify and assess sustainability-related risks and opportunities. The BRSR is more outcome oriented and is focussed on having granular and quantifiable metrics, seeking disclosures from listed entities on their performance against the nine principles of the 'National Guidelines on Responsible Business Conduct'. The disclosures under each of these principles

are segregated into essential (mandatory) and leadership (voluntary) indicators. The BRSR shall be applicable to the top 1000 listed entities (by market capitalisation) on a mandatory basis from FY 2022–23; however, entities can choose to adopt it on a voluntary basis from FY 2021–22.

INDIA'S INITIATIVES AT THE INTERNATIONAL STAGE

Lifestyle for Environment (LIFE)

6.68 In November 2021, the Hon'ble Prime Minister proposed a One-Word Movement in the context of climate: LIFE - Lifestyle for Environment, at the COP 26 in Glasgow. This movement calls for coming together with collective participation, to take lifestyle for environment forward as a campaign and as a mass movement for environmentally conscious life style in a manner that revolutionizes many sectors and diverse areas such as fishing, agriculture, wellness, dietary choices, packaging, housing, hospitality, tourism, clothing, fashion, water management and energy.

International Solar Alliance (ISA)

6.69 In November 2021, the Hon'ble Prime Minister launched the joint Green Grids Initiative-One Sun One World One Grid (GGI –OSOWOG) at the World Leaders' Summit in Glasgow. It aims to create a globally inter-connected green grid, building upon existing regional grid infrastructure, which will enable solar energy generation in regions with high potential and its evacuation to demand centres. A joint GGI-OSOWOG Secretariat is being planned to be established at the ISA Secretariat to mobilize political support and render technical support for the initiative.

6.70 ISA has attained a Permanent Observer Status at the UN General Assembly. It has signed a Memorandum of Understanding with UNFCCC at COP 26 to support ISA membership in developing a roadmap for, and implementing, their respective NDCs under the Paris Agreement.

6.71 ISA is mandated to facilitate mobilization of USD 1 trillion in solar investments by 2030 for massive scale-up of solar energy deployment. The Strategic Plan of the ISA for 2021-2026 identifies three key global issues – Energy Access, Energy Security, and Energy Transition. In this regard, ISA has launched eight thematic programmes to address the above issues and an overarching programme to facilitate mobilization of affordable finance for large-scale deployment of solar energy across ISA membership. ISA supports its membership across four pillars encompassing programmatic support, capacity building and ecosystem readiness, risk mitigation instruments, and analytics and advocacy.

Coalition for Disaster Resilient Infrastructure

6.72 India's call for promoting disaster resilience of infrastructure through the Coalition for Disaster Resilient Infrastructure (CDRI) has been receiving global attention. Since CDRI's launch in September 2019, its membership has expanded to 28 countries and seven multilateral organizations, with several member countries committing to provide technical assistance and financial resources. In addition to India's seed funding of USD 70 million, the United Kingdom, United States and the Netherlands have pledged GBP 1 million, USD 9.2 million and 100,000 Euro respectively for CDRI's programmes and projects.

6.73 In March 2021, the Hon'ble Prime Ministers of India, UK, Italy and Fiji launched the third International Conference on Disaster Resilient Infrastructure (ICDRI), which discussed key global issues around resilience of critical infrastructure sectors such as power, telecommunications and health as well as urban infrastructure systems and disaster risk financing.

6.74 In November 2021, the Hon'ble Prime Ministers of India, UK, Australia, Fiji, Jamaica and Mauritius launched the Infrastructure for Resilient Island States (IRIS). This is a dedicated initiative for Small Island Developing States (SIDS) that provides quality technical and financial services to make SIDS infrastructure resilient to climate change and disaster events. India has pledged USD 10 million, while Australia and the UK have pledged AUD 10 million GBP 7.3 million respectively for the IRIS initiative.

6.75 Further, CDRI has launched two other initiatives. CDRI's Global Flagship Report on Disaster and Climate Resilient Infrastructure aims to engage and focus global attention on the critical and multi-faceted challenges posed to disaster and climate-resilient infrastructure. DRI Connect is a "network of networks" enabling stakeholder access to knowledge resources and collaborative opportunities with their peers and other actors. These initiatives are in addition to CDRI's ongoing programmes on enhancing the power sector's resilience in Odisha and the global study on disaster resilience of airports.

Leadership Group for Industry Transition (LeadIT Group)

6.76 LeadIT was launched by India and Sweden, with the support of the World Economic Forum at the UN Climate Action Summit in New York in September 2019, as one of the nine action tracks identified by the UN Secretary-General to boost climate ambitions and actions to implement the Paris Agreement. In November 2021, the Joint Ministerial Statement released at the Leadership Summit called countries and companies to come out with roadmaps for deep reductions in emissions across all heavy industries and value chains in the coming decade.

CONCLUSION

6.77 India's performance on the NITI Aayog SDG India Index has improved from an overall score of 60 in 2019-20 to 66 in 2020-21. India has also been making significant strides in increasing its forest area, ranking third globally in net gain in forest area during the decade (2010-20). Much of India's increase in forest cover during 2011-21 is attributed to enhancement in very dense forest cover, which rose by approximately 20 per cent during the period. Open forest cover also improved by seven per cent during the period. Going forward, there is need to further improve forest and tree cover. Social forestry could also play a significant role in this regard.

6.78 States/UTs need to improve management of its ground water resources through improving its recharge and by stemming its over-exploitation, and to prevent the critical and semi-critical assessment units from further worsening.

6.79 There is a greater thrust on climate action following the announcement of India's target of becoming Net Zero by 2070. Climate finance will remain critical to successful climate action by developing countries, including India.

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