

Demand for Grants 2023-24 Analysis

Environment, Forests and Climate Change

The Ministry of Environment, Forests and Climate Change is responsible for the planning, promotion, co-ordination of, and overseeing the implementation of India’s environmental and forestry policies and programs.

One of the key environmental issues faced by countries including India is climate change. In its effort to combat climate change, India has updated its Nationally Determined Contribution (NDC) in line with the targets set at COP26 to transition to renewable energy sources. While India sets such targets, one of the issues is availability of adequate finance. Domestic sources of finance may not be enough to meet such targets and there is need to explore other sources of finance. Further, since climate change is a cross cutting issue across sectors, there may be a need to formulate mechanisms that enable coordination among various entities. Other issues that the Ministry faces include pollution in cities, decline in forest cover in some states, and density of forest cover.

In this backdrop, this note looks at the 2023-24 budgetary allocation of the Ministry, its finances over the years, and key policy issues.

Budget Speech 2023-24 highlights¹

- A Green Credit Programme will be notified under the Environment (Protection) Act, 1986 to incentivise environmentally sustainable and responsive actions by companies, individuals, and local bodies. Further, it will also mobilise additional resources for such actions.
- Mangrove Initiative for Shoreline Habitats and Tangible Incomes (MISHTI) will be launched for mangrove plantation along the coastline and on salt pan lands.

Overview of Finances

In 2023-24, the Ministry of Environment, Forests and Climate Change has been allocated Rs 3,079 crore, a 24% increase over the revised estimates of 2022-23. This comprises of Rs 2,934 crore for revenue expenditure (95%) and Rs 145 crore for capital expenditure (5%). At the 2022-23 revised stage, capital expenditure was estimated at Rs 73 crore, a 37% decrease over the budget estimates. In 2023-24, allocation towards capital expenditure has doubled as compared to 2022-23 revised estimates. This is mainly due to an increase of Rs 45 crore for capital expenditure for Botanical Survey of India.

Table 1: 2023-24 Budgetary Allocation for Ministry of Environment, Forests and Climate Change

	21-22 Actuals	22-23 BE	22-23 RE	23-24 BE	% change from 22- 23 RE to 23-24 BE
Revenue	2,402	2,915	2,405	2,934	22%
Capital	30	115	73	145	100%
Total	2,433	3,030	2,478	3,079	24%

Note: BE- Budget Estimates; RE- Revised Estimates.

Sources: Demand for Grants 2023-24, Demand No. 28, Ministry of Environment, Forests and Climate Change; PRS.

Table 2: Key Allocations to the Ministry of Environment, Forests and Climate Change

	21-22 Actuals	22-23 RE	23-24 BE	% change (RE to BE)	
Establishment Expenditure of the Centre		524	641	903	41%
Environment, Forestry and Wildlife		657	549	759	38%
Pollution Control		407	600	756	26%
Autonomous Bodies		315	308	309	0%
Statutory and Regulatory Bodies		172	151	159	6%
Environmental Knowledge and Capacity Building		115	87	93	7%
National Coastal Mission		28	4	13	213%
Others		215	139	87	
Total	2,433	2,478	3,079	24%	

Note: BE- Budget Estimates; RE- Revised Estimates;

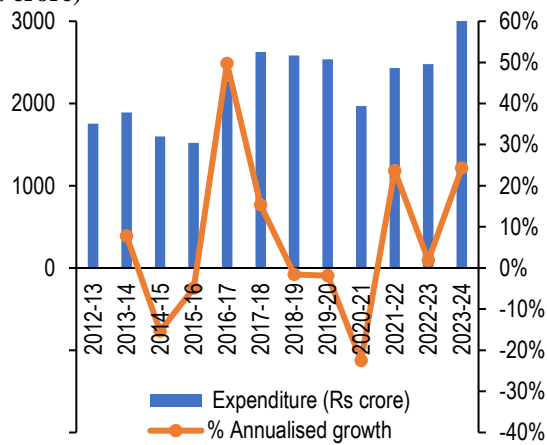
Environment, Forestry and Wildlife includes National Mission for a Green India; Autonomous Bodies include Indian Council of Forestry Research and Education and Wildlife Institute of India; Statutory and Regulatory Bodies include Central Pollution Control Board, Commission for Air Quality Management; Others include Environment Education, Awareness, Research and Skill Development.

Sources: Demand for Grants 2023-24, Demand No. 28, Ministry of Environment, Forests and Climate Change; PRS.

Key budgetary allocation of the Ministry in 2023-24 include: (i) Establishment Expenditure of the Centre (29%) which includes expenditure towards National Green Tribunal, Botanical Survey of India, and Forest Survey of India, (ii) Environment, Forestry and Wildlife (25%) that includes Green India Mission, and Project Tiger, and (iii) 25% towards Pollution Control.

Over the last 10 years, allocation to the Ministry has seen a compounded annual growth rate of 5%. In 2020-21, the Ministry saw a decline of 22% in allocation over the last year. This may be due to reprioritisation of other sectors due to COVID-19.

Figure 1: Budgetary allocation over the years (in Rs crore)

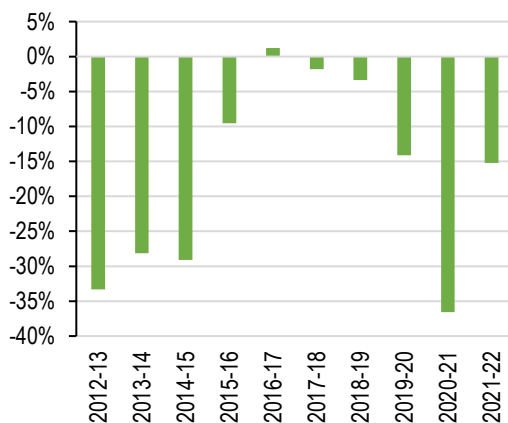


Note: Figures for 2022-23 and 2023-24 are Revised Estimates and Budget Estimates respectively.
Sources: Demand for Grants (2012-13 to 2023-24), Ministry of Environment, Forests and Climate Change; PRS.

Underutilisation of funds

Over the years (barring a few), the Ministry has not been able to utilise the funds allocated to it (See Figure 2). In the past, reasons cited by the Ministry (2016) for underutilisation of funds are administrative and procedural delays.² The Standing Committee on Science and Technology, Environment and Forests (2016) noted that this shows lack of planning and foresightedness on part of the Ministry.² Such underutilisation of funds may also affect progress of schemes and programs.

Figure 2: Utilisation of funds by the Ministry



Sources: Demand for Grants (2012-13 to 2023-24), Ministry of Environment, Forests and Climate Change; PRS.

Issues to Consider

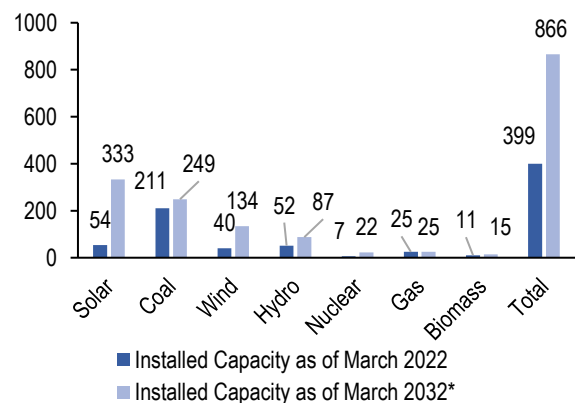
Financing Climate Change efforts

Climate change presents multiple challenges to countries across the globe including India. It refers to a change of climate which is attributed directly or indirectly to human activities that alter the composition of the global atmosphere.³ In August 2021, the Intergovernmental Panel on Climate Change (IPCC) estimated that a 1.5°C increase in temperature as compared to pre-industrial levels (1850-1900) may happen by 2040.⁴ This could lead to a reduction of the snow cover, increase in heat waves, extreme precipitation, intensification of tropical cyclones, and increase in sea levels.

India has set certain targets relating to energy transition and achieving net zero emissions. For instance, at COP26 in November 2021, India set a target for achieving net zero emissions by 2070, and increasing the share of renewable energy in India’s energy mix to 50% by 2030.⁵

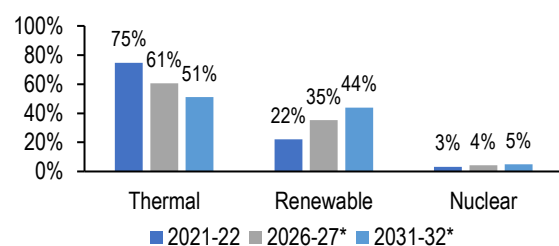
As per Central Electricity Authority, India will target to add a total of 472 GW of installed capacity during 2022-32.⁶ Almost 80% of this would be from two sources – solar (279 GW) and wind (94 GW). These targets are aligned with India’s pledge at COP26 to have 500 GW of non-fossil generation capacity by 2030. These will require investments of about Rs 32 lakh crore.

Figure 3: Installed capacity as of March 2022 vis-a-vis March 2032*



Note: *2031-32 numbers are projections by Central Electricity Authority
Sources: Central Electricity Authority; PRS.

Figure 4: Share in total electricity generation



Note: *2026-27 and 2031-32 numbers are projections by Central Electricity Authority.
Sources: Central Electricity Authority; PRS.

Exploring various sources of finances

According to the Ministry of Finance (2020), the overall cost required for India to adapt to climate change by 2030 is expected to be around Rs 86 lakh crore (at 2012 base price).⁷ Currently, there is a huge gap between the required and actual investment for renewable energy capacity addition.⁸ Against the required annual investment of Rs 1.5-2 lakh crore, the actual annual investment in the last few years was Rs 75,000 crore.

Currently India is relying on domestic sources to implement adaptation and mitigation action for climate change.⁹ Investments in the sector have been affected as the banking sector has a reluctant attitude towards financing renewable energy projects.⁸ This may happen in projects like solar rooftop schemes which is for small consumers and also banks do not have adequate information about such schemes. Further, lending capacity of public sector institutions in the sector has been low due to low capital base. Some suggestions to increase financing has been exploring the possibility of prescribing banks and financial institutions to invest a certain percentage of their investments in renewable energy through a Renewable Finance Obligation (similar to a Renewable Purchase Obligation).⁸ Renewable Purchase Obligation requires electricity distribution companies to purchase a minimum proportion of electricity from renewable sources.

Need of financing from developed nations has also been emphasised by several expert bodies and international forums.¹⁰ The Glasgow Conference Pact at COP26 (2021) noted that developed countries failed to meet their commitment of providing USD 100 billion (over Rs 7.5 lakh crore) per year by 2020 to developing nations to tackle climate change. At COP27, India submitted its Long-Term Low Emission Development Strategy to the United Nations Framework Convention on Climate Change (UNFCCC).^{11,12} Under the Strategy, India noted that provision of climate finance by developed countries will play a significant role in helping developing nations tackle climate change. Such funds need to come in the form of grants and concessional loans. Expert bodies have also suggested exploring other sources of finance such as green bonds.¹³ Several countries such as UK, France, Germany, USA, and China have resorted to green bonds to raise funds.

In November 2022, the Ministry of Finance issued the framework for sovereign green bonds.¹⁴ Green bonds are used to raise funds for investment in environmentally sustainable and climate-suitable projects.¹⁵ The proceeds raised from issuing green bonds will be used to finance/refinance expenditure for eligible green projects. Eligible category of projects includes renewable energy (solar/wind/biomass/hydropower), clean transportation, climate change adaptation, and pollution prevention and control.

According to the Ministry of Finance (2023) sovereign green bonds worth Rs 8,000 crore have been raised in the first tranche under the framework.¹⁶ Further, bonds worth Rs 16,000 crore have been proposed to be issued in 2023-24 for green infrastructure projects. RBI (2021) had noted some concerns with green bonds in India.¹⁷ Despite being relatively secured; green bonds have high cost which may be due to factors like higher risk perception and lack of data and information related to green bonds in India. These concerns may be addressed with the framework for sovereign green issued by the Ministry of Finance.

The Energy Conservation (Amendment) Bill, 2022

The Energy Conservation (Amendment) Bill, 2022 was passed by Parliament on December 12, 2022.¹⁸ The Bill amends the Energy Conservation Act, 2001 to introduce concepts such as mandated use of non-fossil sources and carbon credit trading to ensure faster decarbonisation of the Indian economy.¹⁹ The Bill empowers the central government to specify a carbon credit trading scheme. Carbon credit implies a tradeable permit to produce a specified amount of carbon dioxide or other greenhouse emissions. The central government or any authorised agency may issue carbon credit certificates to entities registered and compliant with the scheme. The entities will be entitled to trade the certificates. Any other person may also purchase a carbon credit certificate on a voluntary basis.

Ensuring a just transition

India's climate change commitments require it to transition from fossil fuels to renewable energy sources. In light of such commitments, the principle of 'just transition' has been emphasised upon by various international commitments. At COP27, countries noted that climate action should be implemented in a manner that is just and inclusive and minimises social and economic impacts.¹⁰ The International Labour Organisation defines a just transition as a transition that involves maximising social and economic opportunities of climate action, while minimising and managing challenges that arise.²⁰

India's Nationally Determined Contribution includes increase cumulative electric power installed capacity from non-fossil sources to 50% by 2030.²¹ However, India has a large fleet of coal power plants that provide cheap electricity as compared to renewable sources.²² As India transitions towards renewable energy sources of energy, coal will be phased out. Phasing out existing coal capacity may have some challenges. Decommissioning coal plants may have some consequences such as job losses and environmental harms such as emissions from demolition, discharge of waste (metal scrap, oil sludge etc).²³ In July 2021, Central Pollution Control Board released draft Guidelines for decommissioning coal plants.²⁴ These Guidelines seek to address such issues by requiring coal companies to undertake an Environmental Impact Assessment before

decommissioning and clean up the site after decommissioning. Further, companies should dismantle the plant to the extent that it can be repurposed for some other use.

Fragmented Environment Regulation

Apart from availability of adequate financing another issue is the presence of a regulatory framework that enables a smooth transition. Currently, environment regulation in India is fragmented and there is lack of a unified authority for coordination among different sectors.²⁵

Environment regulation in India is broadly covered by six key laws which includes Environment (Protection) Act, 1986, Indian Forest Act, 1927, and Water (Prevention and Control of Pollution) Act, 1974.^{26,27,28} The Environment (Protection) Act, 1986 broadly regulates all issues related to environment conservation. In 2014, a High-Level Committee (Chair: Mr. TSR Subramanian) recommended introducing the Environment Law (Management) Act providing for National and State Environmental Management Authority to evaluate project clearance, using technology and expertise, in a time bound manner.²⁹ The Central and State Pollution Control Boards would be subsumed under these Authorities.

NITI Aayog (2015) noted that one of the key problems in the development of renewable energy in India is the lack of a comprehensive national framework for renewable energy in either legislation or policy.³⁰ It recommended creating a national framework. The framework should include a mechanism to measure progress on targets. Further, it recommended that the framework should have a sunset provision that would allow regular opportunity to update the framework due to evolving issues related to renewable energy.

UK's Climate Change Committee

UK's Climate Change Committee is an independent, statutory body established under the Climate Change Act, 2008.³¹ Key functions of the Committee include: (i) reporting to the Parliament on progress made under reducing greenhouse gas emissions, (ii) conducting independent research into climate change, and (iii) providing advice for setting budgets to mitigate impacts of climate change. The government and national authorities may request for specific advice from the Committee on ad-hoc basis.

Apart from the current framework being fragmented, there have been issues related to weak implementation of various existing Acts and Rules. For instance, the Comptroller and Auditor General of India (CAG) (2016) noted some issues with carrying out the Environment Impact Assessment (EIA). EIA is a planning tool to integrate environmental concerns into development related projects from the initial stage of planning.³² The CAG (2016) observed that there are delays in the process of Environment Clearance (including

holding public consultations and granting of Environment Clearance by the Ministry).³³

National Action Plan on Climate Change

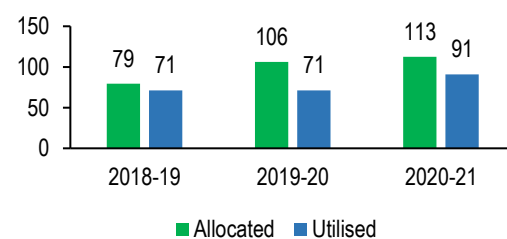
The National Action Plan on Climate Change (NAPCP) was launched in June 2008 to deal with issues related to climate change. The NAPCP has eight missions: (i) the National Solar Mission, (ii) National Mission on Enhanced Energy Efficiency, (iii) National Water Mission, (iv) the National Mission for Green India, (v) National Mission on Sustainable Habitat, (vi) National Mission for Sustainable Agriculture, (vii) National Mission for Sustaining the Himalayan Ecosystem, and (viii) National Mission on Strategic Knowledge for Climate Change.

NITI Aayog in its report on Strategy for New India (2018) recommended that all eight national missions under the NAPCP should be revised in light of new scientific information and technological advances.³⁴ Further, new national missions on wind energy, waste-to-energy, and coastal areas should be developed.

Forest Cover

National Mission for a Green India is one of the eight Missions under the NAPCP.³⁵ It seeks to protect, restore, and enhance India's forest cover. In 2023-24, the Mission has been allocated Rs 220 crore, an increase of 3% over 2022-23 revised estimates. The Mission has seen a 41% reduction in allocation at the 2022-23 revised stage (Rs 214 crore) as compared to the budget estimates (Rs 362 crore). Under the Mission, funds are released to states and these funds have not been utilised by states (See Figure 5). See Table 10 in the Annexure for state wise details on fund utilisation.

Figure 5: Fund utilisation by states (as per utilisation certificates submitted by states) in Rs crore



Sources: Unstarred Question No. 5206, Lok Sabha, Ministry of Environment, Forest and Climate Change, April 4, 2022; PRS.

Allocation for Green India Mission: The Standing Committee on Science and Technology, Environment and Forests (2022) noted a vast difference between the budgetary allocation demanded by the Ministry and the amount allocated in 2022-23.³⁶ The Ministry had proposed Rs 646 crore but it was allocated Rs 317 crore, a shortfall of 51%. The Committee noted that the reduction in allocation may have an impact on the outcomes of the Mission. Further, the Ministry highlighted that around 60% of the allocation of the Mission goes for rural wage employment. The Mission converges with the Mahatma Gandhi National Rural Employment Guarantee Scheme.³⁷ The Committee expressed concerns about the

impact that the reduced allocation might have on such wages. It recommended that the Ministry must be provided the requisite allocation for Green India Mission at the 2022-23 revised stage. At the 2022-23 revised stage, the Mission has been allocated Rs 188 crore, which is a 41% decline over 2022-23 budget estimates (See Table 3).

Table 3: Allocation for Green India Mission (in Rs crore)

21-22 Actuals	2022-23 BE	2022-23 RE	2023-24 BE	% change from 22-23 RE to 23-24 BE
219	318	188	169	-10%

Note: BE- Budget Estimates; RE- Revised Estimates.
Sources: Demand for Grants 2023-24, Demand No. 28, Ministry of Environment, Forests and Climate Change; PRS.

Declining forest cover in North Eastern states:

According to the India State of Forest Report 2021, India's total forest cover is 7,13,789 sq. km.³⁸ The forest cover in India has seen a net increase of 1,540 sq. km from 2019 to 2021. States that have seen an increase in forest cover from 2019 to 2021 include Andhra Pradesh, Telangana, Odisha, and Karnataka. North Eastern states that saw major loss of forest cover include Arunachal Pradesh, Manipur, Nagaland, and Mizoram.³⁸ Such loss may be attributed to shifting cultivation, felling of trees, and developmental activities.³⁸

Composition of forest cover: When measuring the forest cover, three types of forest are covered – very dense, moderately dense, and open forest. These forests are classified based upon the tree canopy density.

Table 4: Classification of forest

Type of Forest	Lands with tree canopy density
Very Dense	70% and above
Moderately Dense	40% and above
Open Forest	10% and above but less than 40%

Sources: India State of Forest Report 2021, Ministry of Environment, Forest, and Climate Change; PRS.

The net increase in forest cover from 2019 to 2021 is primarily on account of an increase of 2,621 sq. km in open forest cover. During the same period, very dense forest cover has increased by 501 sq. km and moderately dense forest cover has decreased by 1,582 sq. km.

Table 5: Forest Cover in India (in sq. km)

	2019	2021	Change	Share in Total Forest Cover (2021)
Very Dense	99,278	99,779	501	14%
Moderately Dense	3,08,472	3,06,890	-1,582	43%
Open	3,04,499	3,07,120	2,621	43%
Total	7,12,249	7,13,789	1,540	

Sources: India State of Forest Report 2021, Ministry of Environment, Forest, and Climate Change; PRS.

COP15, Convention on Biological Diversity

The 15th meeting of the Conference of Parties (COP15) to the Convention on Biological Diversity (CBD) was held from 7-19 December 2022 in Montreal, Canada.³⁹ CBD recognises sovereign rights over biological resources and permits countries to regulate access to these resources as per their national legislation.⁴⁰ India became a signatory to CBD in 1994.⁴¹ The Union Minister for Environment, Forest and Climate Change while addressing the meeting emphasised the need of adequate funding to meet targets for conserving biodiversity.³⁹

In light of India's commitments under CBD, it had passed the Biological Diversity Act, 2002. The Act regulates access to biological resources and associated traditional knowledge. The Biological Diversity (Amendment) Bill, 2021 was introduced in Lok Sabha in December 2021 and subsequently referred to a Joint Parliamentary Committee.⁴² The Bill amends the Act to: (i) encourage the Indian system of medicine and cultivation of wild medicinal plants, (ii) facilitate fast-tracking of processes for research, patent application, and transfer of research results, and (iii) decriminalise offences. Key observations and recommendations of the Committee include: (i) making the penalty structure proportionate to gains obtained by entities, and the size of the company, and (ii) defining the term 'codified traditional knowledge' under the Bill.⁴³

Air and Water Pollution

Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCB) are responsible to regulate matters related to air and water pollution. In 2023-24, CPCB has been allocated Rs 105 crore, an increase of 5% over 2022-23 revised estimates (Rs 100 crore). There has been a reduction of 9% in 2023-24 allocation when compared to 2021-22 actuals (Rs 116 crore).

In 2023-24, Control of Pollution has been allocated Rs 756 crore, an increase of 26% over revised estimates of 2022-23 (Rs 600 crore). Under Control of Pollution, the Ministry provides financial assistance to pollution control boards/committees, and funding to the National Clean Air Programme (NCAP) launched in 2019. NCAP outlines the strategy for reducing air pollution levels at the city and regional level.

The Economic Survey (2021-22) noted that NCAP is implemented in 132 cities, of which 124 cities were non-attainment cities.⁴⁴ Under the Programme, cities that exceed the National Ambient Air Quality Standards (NAAQS) for pollution for five consecutive years are identified as non-attainment cities. These standards prescribe the permissible limits for pollutants. CPCB notifies the NAAQS for PM₁₀ and PM_{2.5}. PM_{2.5} is particulate matter with a size of less than 2.5 micrometres, and is produced primarily by combustion from fuel and coal. PM₁₀ is particulate matter with a size less than 10 micrometres, and is released through mechanical processes such as construction activities, road dust, and wind. Cities should keep their PM levels within these thresholds to ensure air quality. The WHO also prescribes such standards for PM levels. India has a higher

limit for acceptable levels of air pollutants than WHO standards.

Table 6: Air Quality Standards

	Time Weighted Average	WHO	NAAQS
PM10 µg/m ³	Annual	15	60
	24 Hours	45	100
PM2.5 µg/m ³	Annual	5	40
	24 Hours	15	60

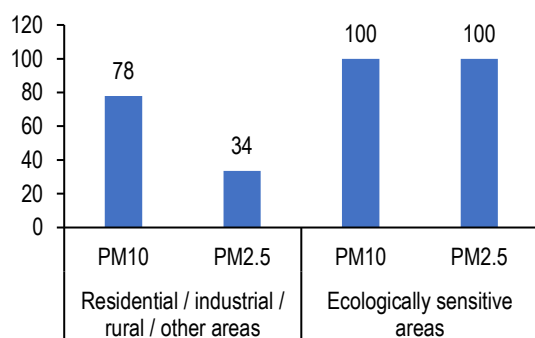
Note: µg-microgram; NAAQS- National Ambient Air Quality Standards; WHO- World Health Organisation.

Sources: Central Pollution Control Board, World Health Organisation; PRS.

Exceeding these standards leads to undesirable levels of air pollution in the environment and can have adverse impacts on human health. Emissions come from different sectors involving human activities such as transport, industries, and agriculture (See Table 12 in the Annexure for sources of pollution in Delhi).^{45,46} Particulate matter released from such emissions can lodge deep inside lungs, leading to respiratory or pulmonary diseases.

Cities exceeding air quality standards: In 2020, the India State-level Disease Burden Initiative, a collaborative initiative led by the Indian Council of Medical Research (ICMR) noted that 18% of total deaths in 2019 can be attributed to increasing air pollution.⁴⁷ Between 2013 and 2017, 981 casualties were recorded in Delhi due to acute respiratory infection, caused by air pollution.⁴⁸ In 2019, 251 cities (out of 321 cities where data was available) and 40 cities (out of 117) exceeded the NAAQS standards for PM₁₀ and PM_{2.5} levels respectively.⁴⁹ These cities include Delhi, Ahmedabad, Ahmedabad, and Jaipur.

Figure 6: Number of cities exceeding the NAAQS (annual average concentration) in %



Note: For calculating the %, cities with inadequate and no data were excluded.

Sources: National Ambient Air Quality Standards Status and Trends 2019, Central Pollution Control Board, Ministry of Environment, Forest & Climate Change; PRS.

Polluted water bodies: River and other water bodies are polluted mainly due to discharge of untreated or partially treated sewage from cities/towns and industries.⁵⁰ CPCB along with pollution

control boards/committees monitors the water quality of water bodies. CPCB (2022) identified 311 polluted stretches on 279 rivers in terms of biochemical oxygen demand, which is an indicator of organic pollution. The CAG (2012) highlighted certain issues with water pollution regulation in India such as inadequate penalty provisions under the Water (Prevention and Control of Pollution) Act, 1974 and absence of legislation on restoration of water bodies.⁵¹

Including provisions for air and water pollution in the Environment Protection Act: Currently air and water pollution are regulated by the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981.^{52,53} A High-Level Committee (2014) recommended inducting relevant provisions of the Water (Prevention and Control of Pollution) Act, 1974, and Air (Prevention and Control of Pollution) Act, 1981 in the Environmental (Protection) Act, 1986, and repealing these two Acts to avoid multiplicity of laws.²⁹

Underutilisation of funds for National Coastal Mission

IPCC (2022) noted that coastal risks will increase due to rising sea levels impacting ecosystems, infrastructure, and livelihoods at the coast.⁵⁴ In India, the National Coastal Mission seeks to address the impact of climate change on coastal and marine ecosystems through adaption and mitigation measures. The Mission has been allocated Rs 13 crore, an increase of 213% over 2022-23 revised estimates (Rs 4 crore). The Standing Committee on Science and Technology, Environment, Forests, and Climate Change (2022) observed that the budgetary allocation for the National Coastal Mission was drastically reduced from Rs 200 crore in 2021-22 budget estimates to Rs 101 crore at the revised stage. Further, the Committee highlighted the underutilisation of funds in 2021-22 and the Ministry cited several reasons for it. These include delay in implementing activities by states and COVID-19 disruptions.

Table 7: Budgetary allocation to National Coastal Mission (in Rs crore)

Year	BE	RE	Actuals	Utilisation (in %)
2017-18	5	0	0	-100%
2018-19	165	130	130	-21%
2019-20	95	95	91	-4%
2020-21	103	68	68	-34%
2021-22	200	101	28	-86%
2022-23	195	4	-	-
2023-24	13			

Note: BE- Budget Estimates; RE- Revised Estimates.

Sources: Demand for Grants (2017-18 and 2023-24), Ministry of Environment, Forest and Climate Change; PRS.

Investment in R&D on Environmental

The Draft Science and Tech Policy (2020) noted that science, technology and innovation can help in addressing challenges related to climate change, energy, and environment (such as energy transition, air pollution).⁵⁵ The Policy recognised such sectors as critical and recommended encouraging research in these areas. For instance, the National Green Hydrogen Mission, incentivises R&D to increase affordability, storage, transportation, and utilisation of green hydrogen.⁵⁶ Current methods of large-scale hydrogen production have high carbon emissions. Green hydrogen addresses this issue by using solar or wind energy to produce hydrogen. Currently India's investment in research in environment and energy remains low when compared to other areas.

Table 8: National research expenditure by areas (2017-18)

Sector	% Share
Health	18.6
Defence	17.1
Agriculture, Forestry and Fishing	12.6
Industrial Production and Technology	9.8
Exploration and Exploitation of Space	8.8
Transport, Telecommunication and other Infrastructure	8.7
Energy	7.3
Environment	0.5
Others	16.54

Sources: Research and Development Statistics 2019-20; Ministry of Science and Technology; PRS.

Annexure**Table 9: Key climate change negotiations**

Negotiation	Highlights
1992: UN Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> Established that any multilateral agreement must be in accordance with the larger principle of common but differentiated responsibilities and capabilities i.e., developed and developing countries may be treated differently on the basis of their historic responsibilities and national circumstances. Developed countries committed to stabilise emissions to 1990 levels by 2000.
1997: Kyoto Protocol	<ul style="list-style-type: none"> 37 developed countries committed to reduce emissions by an average of 5% from the 1990 levels by 2008-2012.
2009: Copenhagen Summit	<ul style="list-style-type: none"> 141 countries including USA, China, and India agreed on a non-binding recognition of the need to limit global temperature rise to no more than 2°C above 1900s levels. Developed countries agreed to provide developing countries USD 100 billion a year, by 2020, to help them cope with climate change.
2014: Lima Conference	<ul style="list-style-type: none"> All parties decided that they can determine their contributions toward addressing climate change, and will submit their contributions by 2015. These contributions, called Intended Nationally Determined Contributions will become the foundation for the new agreement on climate change.
2015: Paris Conference	<ul style="list-style-type: none"> Paris Agreement, 2015 was adopted which aims to limit the increase in the global average temperature to a level between 1.5°C to 2°C above pre-industrial levels by 2030. Creates two kinds of review mechanisms for tracking progress made with regard to climate change commitments, and financial obligations. These are: (i) transparency arrangements (such as biennial reports), and (ii) global stocktake, every five years from 2023 onwards.
2021: Glasgow Conference	<ul style="list-style-type: none"> Glasgow Climate Pact aims to: (i) urge developed nations to provide financial support to developing nations for tackling climate change, (ii) reduce non-CO₂ greenhouse gas emissions including methane by 2030, (iii) accelerate development of clean power generation including phasing down of coal power, and (iv) phase out inefficient fossil fuel subsidies while providing support to the poor (refers to gradual removal of subsidies which lead to overuse of such fuels).
2022: Sharm el-Sheikh	<ul style="list-style-type: none"> Key features of the Sharm el-Sheikh Implementation Plan include: (i) recognising the importance science for effective climate action and policymaking, (ii) accelerating the development and deployment of technologies for energy transition, and (iii) creating a loss and damage fund for developing nations to tackle effects of climate change.

Sources: United Nations Framework Convention on Climate Change (UNFCCC); PRS.

Table 10: Year wise and State wise funds allocated and utilised as per utilisation certificates furnished by the states under Green India Mission (in Rs crore)

States	2018-19			2019-20			2020-21		
	Allocated	Utilised	%	Allocated	Utilised	%	Allocated	Utilised	%
Andhra Pradesh	3	-	-	-	-	-	-	3	-
Chhattisgarh	5	5	100%	5	5	100%	2	1	79%
Himachal Pradesh	-	-	-	-	-	-	17	-	-
Jammu and Kashmir	-	-	-	-	-	-	26	-	-
Karnataka	2	2	112%	2	2	100%	2	2	100%
Kerala	-	-	-	16	-	-	-	1	-
Manipur	5	5	100%	4	4	97%	7	7	100%
Mizoram	22	22	100%	18	18	100%	3	3	100%
Odisha	5	5	100%	14	11	75%	26	19	71%
Punjab	0	-	-	3	-	-	-	4	-
Uttarakhand	-	11	-	-	9	-	28	25	89%
Madhya Pradesh	24	10	40%	31	20	64%	-	25	-
Maharashtra	10	8	74%	-	-	-	-	-	-
Sikkim	3	3	100%	3	3	98%	2	2	95%
West Bengal	-	-	-	9	-	-	-	-	-
Total	79	71	90%	106	71	67%	113	91	81%

Sources: Unstarred Question No. 5206, Lok Sabha, Ministry of Environment, Forest and Climate Change, April 4, 2022; PRS.

Table 11: India's forest cover (in sq. km)

State/ UT	Forest cover (2019)	Forest cover (2021)	Change in forest cover
Andhra Pradesh	29,137	29,784	647
Arunachal Pradesh	66,688	66,431	-257
Assam	28,327	28,312	-15
Bihar	7,306	7,381	75
Chhattisgarh	55,611	55,717	106
Goa	2,237	2,244	7
Gujarat	14,857	14,926	69
Haryana	1,602	1,603	1
Himachal Pradesh	15,434	15,443	9
Jharkhand	23,611	23,721	110
Karnataka	38,575	38,730	155
Kerala	21,144	21,253	109
Madhya Pradesh	77,482	77,493	11
Maharashtra	50,778	50,798	20
Manipur	16,847	16,598	-249
Meghalaya	17,119	17,046	-73
Mizoram	18,006	17,820	-186
Nagaland	12,486	12,251	-235
Odisha	51,619	52,156	537
Punjab	1,849	1,847	-2
Rajasthan	16,630	16,655	25
Sikkim	3,342	3,341	-1
Tamil Nadu	26,364	26,419	55
Telangana	20,582	21,214	632
Tripura	7,726	7,722	-4
Uttar Pradesh	14,806	14,818	12
Uttarakhand	24,303	24,305	2
West Bengal	16,902	16,832	-70
Andaman and Nicobar Islands	6,743	6,744	1
Chandigarh	22	23	1
Dadra and Nagar Haveli and Daman and Diu	228	228	0
Delhi	195	195	-0
Jammu and Kashmir	21,358	21,387	29
Ladakh	2,254	2,272	18
Lakshadweep	27	27	-
Puducherry	52	53	1
India	7,12,249	7,13,789	1,540

Sources: India State of Forest Report, 2021; PRS.

Table 12: Contribution of different sources to the PM10 and PM2.5 levels in Delhi in 2018 (in %)

Source	PM ₁₀		PM _{2.5}	
	Winter	Summer	Winter	Summer
Residential	9%	8%	10%	8%
Agriculture Burning	4%	7%	4%	7%
Industries	27%	22%	30%	22%
Dust (soil, road and construction)	25%	42%	17%	38%
Transport	24%	15%	28%	17%
Others	10%	7%	11%	8%

Note: Others include crematoria, airport, restaurants, incinerators, and landfills.

Sources: Unstarred Question No. 5, Lok Sabha, Ministry of Environment, Forest and Climate Change, June 21, 2019; PRS.

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