

## Overview of EnviStats Vol I Environment Statistics

Environment as per The Environment (Protection) Act, 1986 includes water, air and land and the interrelationship which exists among and between air, water and land and human beings, other living creatures, plants, micro-organism and property. In recent years, with global economic development, protection of environment has become a common concern, world-wide. India has provided for protection and improvement of the environment in its Constitution. The chapter on fundamental duties of the Indian Constitution clearly imposes duty on every citizen to protect environment. Article 51-A (g), says that "It shall be duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures." Article 48 -A of the constitution says that "the state shall endeavor to protect and improve the environment and to safeguard the forests and wild life of the country". These provisions are implemented through environment protection laws of the country. The Environment Protection Act, 1986 empowers the Central Government to protect and improve the environment and prevent, control and abate environmental pollution.

2. Initiatives of the GoI in this direction are assessed and monitored through environment statistics. The ultimate goal of environment statistics is to deliver top-notch statistical information that enhances our understanding of the environment, aids evidence-based policy- and decision-making, and provides pertinent information to the general public and specific user groups. It furnishes data on the current state of environmental conditions, alterations in these conditions over time, the quality and accessibility of environmental resources, and the effects of both natural occurrences and human activities on the environment. Additionally, they offer insights into the societal and economic measures taken to prevent or reduce these impacts and restore the capacity of the environment to provide necessary services for human well-being and survival.

3. Environment statistics cover a wide range of topics, including air and water quality, waste generation and disposal, biodiversity and land use, greenhouse gas emissions, and energy consumption. These data are collected by various organizations, including government agencies, international organizations, and non-governmental organizations, utilizing various methodologies. To ensure proper development, coordination, and organization of environment statistics, a suitable framework is necessary.

4. The Framework for the Development of Environment Statistics (FDES) 2013 is a versatile and all-encompassing conceptual and statistical framework designed to guide the collection and compilation of environment statistics. It serves as an organizing structure that consolidates data from different sources and subject areas, addressing the pertinent environmental issues and aspects that are relevant for analysis, policy- and decision-making purposes.

5. The FDES 2013 has a structure that enables connections to be established with economic and social domains. It is intended to be compatible with various frameworks and

systems, both statistical and analytical, including the System of Environmental-Economic Accounting (SEEA), the Driving force-Pressure-State-Impact-Response (DPSIR) framework, Sustainable Development Goals (SDGs), and the sustainable development indicator (SDI) frameworks. When feasible, existing statistical classifications are used as the basis for the FDES. Therefore, the FDES facilitates the integration of data within environment statistics and between economic and social statistics. It outlines six components for the development of environment statistics, each of which covers a different aspect of the environment.

The Basic Set of Environment Statistics as given in FDES-2013 contains three tiers of indicators as given below:

- a. Tier 1 is the Core Set of Environment Statistics (with 100 indicators) which are of high priority and relevance to most countries and have a sound methodological foundation.
- b. Tier 2 includes environment statistics that are of priority and relevance to most countries but need more investment in time, resource or methodological development.
- c. Tier 3 includes environment statistics which are either of less priority or require significant methodological development.

Tier 1 is referred to as 'Core Set of Environment Statistics' which countries are being recommended to consider producing in short term.

6. India has a well-established system for collecting and disseminating environment statistics. A brief background on the compilation of environment statistics in India is given below:

- i. This Division had earlier been bringing out two regular statistical publications on environment. The first one was the annual publication "**Compendium of Environment Statistics – India**" based on the 1984 version of FDES. Sixteen issues of the publication had been brought out by this office, broadly covering sectors like Bio-diversity, Atmosphere, Water, Land & Soil and Human Settlement. **The last publication was released in March 2017.**
- ii. The second publication was "**Statistics related to Climate Change**" based on the Driving Force – Pressure – State – Impact – Response (DPSIR) framework. The framework for climate change adopted in India included the causal factors, the sectors affected by climate change and the indicators related to mitigation and adaptation. **This biennial publication was released first in 2013, followed by a second issue in 2015.**
- iii. With the release of FDES 2013 by United Nations, it was decided to merge the above mentioned two publications namely "Compendium of Environment Statistics – India" and "Statistics Related to Climate Change" and in its place, release an annual publication "EnviStats – India" based on FDES 2013.

Based on the information available in the previous two publications and that made available by the source agencies, the new publication “EnviStats-India” was brought out by this Division in March, 2018. Data used to produce environment statistics are not only compiled by many different collection techniques, but also by many different institutions. Types of sources include:

- a) Statistical surveys (e.g., censuses or sample surveys of population, housing, agriculture, enterprises, households, employment and different aspects of environment management);
- b) Administrative records of government and non-government agencies responsible for natural resources, as well as other ministries and authorities;
- c) Remote sensing and thematic mapping (e.g., satellite imaging and mapping of land use and land cover, water bodies or forest cover);
- d) Monitoring systems (e.g., field-monitoring stations for water quality, air pollution or climate);
- e) Scientific research and special projects undertaken to fulfil domestic or international demand.

This publication has been divided into six sections following the six components of FDES and efforts have been made to cover as many aspects of environment prescribed in FDES as possible. For the first time in the series of the publication, an attempt has been made to give “HIGHLIGHTS” on the basis of analysis of the available data. Component-wise details and highlights of some aspects covered under each component are given in the succeeding sections. Data are separately annexed as Statements.

## **Component 1: Environmental Conditions and Quality**

1.1 Component 1 comprises data on the physical, biological, and chemical traits of the environment, as well as their temporal transformations. These fundamental background factors are closely connected and influence the composition, size, condition, and wellbeing of ecosystems. Although some of these natural elements change gradually due to natural or anthropogenic factors, others may exhibit sudden and profound impacts. It is crucial to note that modifications in environmental conditions and quality occur as a result of both natural and human activities that accumulate over time. Therefore, linking these changes to individual actions or occurrences is not a simple undertaking.

- 1.2 Component 1 contains three subcomponents:
- i. Subcomponent 1.1: Physical Conditions;
  - ii. Subcomponent 1.2: Land Cover, Ecosystems and Biodiversity; and
  - iii. Subcomponent 1.3: Environmental Quality.

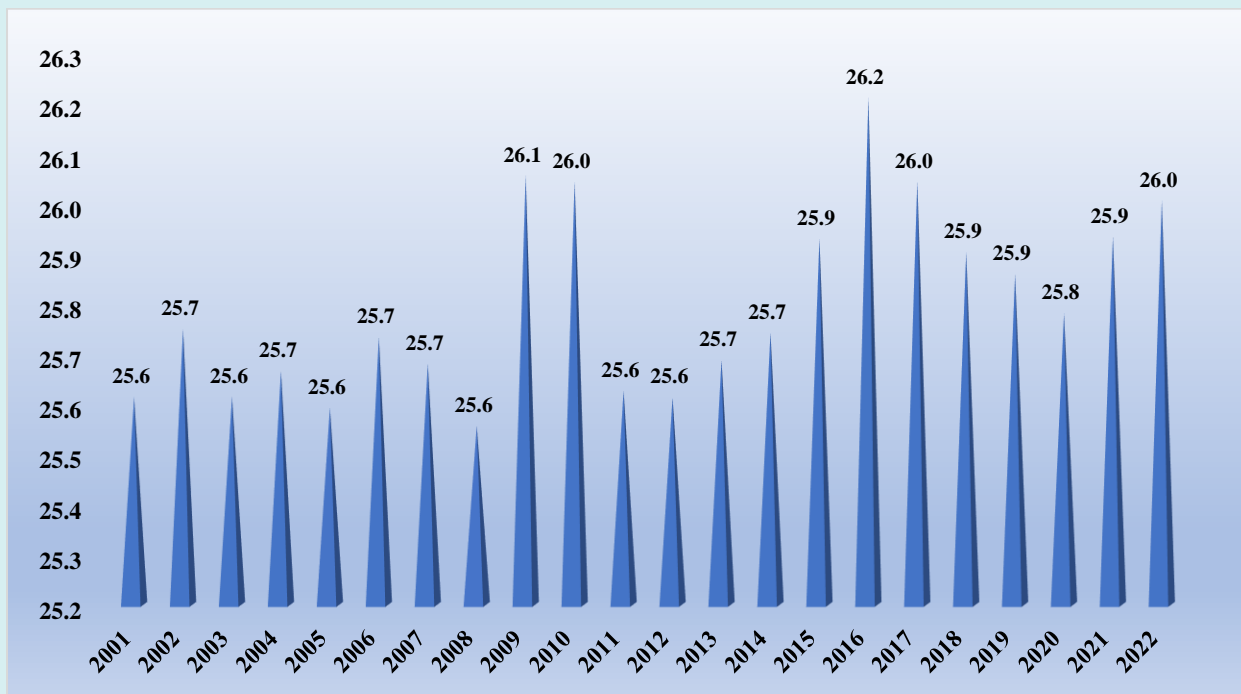
Statements on Component 1: Environmental Conditions and Quality are numbered 1.01 to 1.36. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

	FDES	EnviStats Vol.I
Tier I	32	23
Tier II	58	29
Tier III	51	6

## HIGHLIGHTS

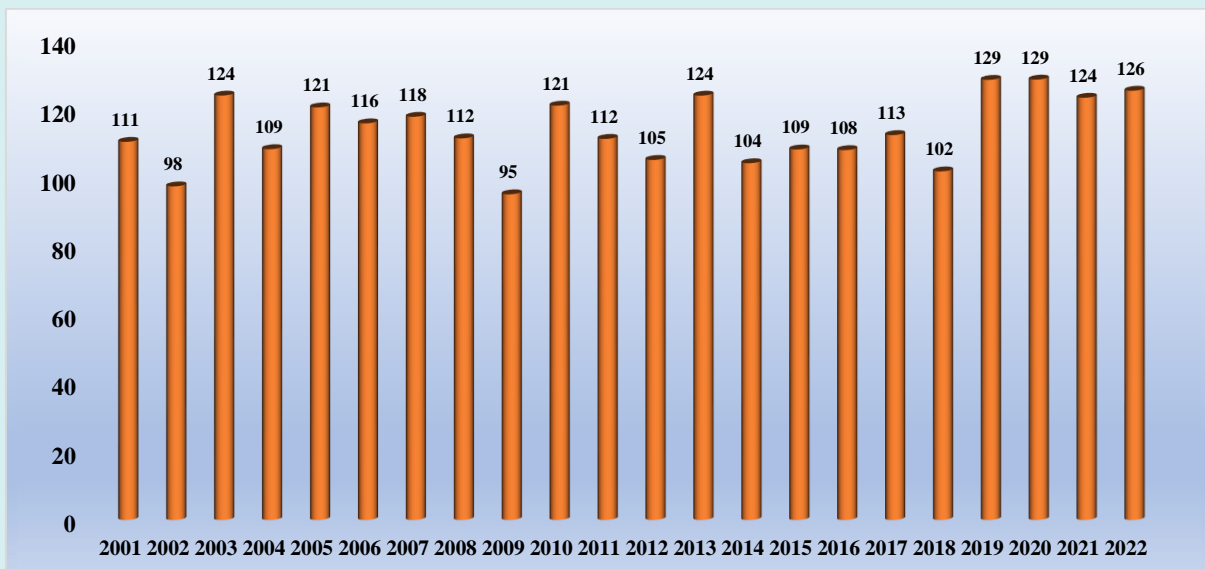
- The Earth’s climate has been changing and this change brings about changes in the temperature and rainfall distribution worldwide. In recent years the potential impacts of climatic change and variability have received a lot of attention. However, these changes are not uniform all over the world but vary from place to place. It is observed that the annual and seasonal viz., January-February, March-May, June-September and October-December mean temperatures for the year 2022 are 26, 20.6, 28.7, 28.4 and 23.8, respectively (**Statement 1.01**). The trend of annual mean temperature from 2001-2022 is depicted in Fig. 1.1.

**Fig. 1.1: Trend of Annual Mean Temperature: 2001-2022**



- In 2022, the annual rainfall measured in India was 1,257 millimeters compared to last year when 1236 millimeters of rainfall was recorded. However, the year 2020 experienced 1,290 millimeters of rainfall, indicating a wavering trend. Trend of annual rainfall from 2001 to 2022 is shown in Fig. 1.2 (**Statement 1.03**).

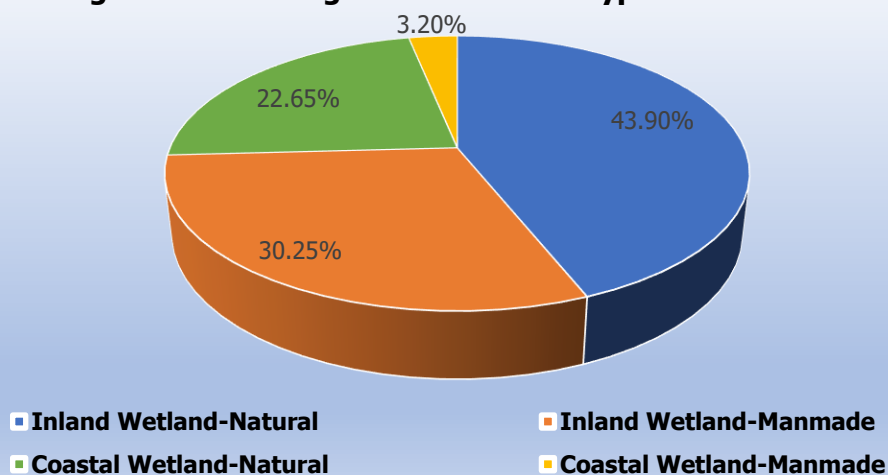
**Fig. 1.2: Annual Rainfall (in cm): 2001-2022**



- Wetlands are amongst the most productive ecosystems on the Earth and provide many important services to human society. India has a wealth of wetland ecosystems that support diverse and unique habitats. They have been categorized in to four groups by adding up column 1-6 (Inland Wetland-Natural), 7-11 (Inland Wetland-Man-made), 12-18(Coastal Wetland-Natural) and 19-20(Coastal Wetland-Man-made) from **Statement 1.04 (a)**.

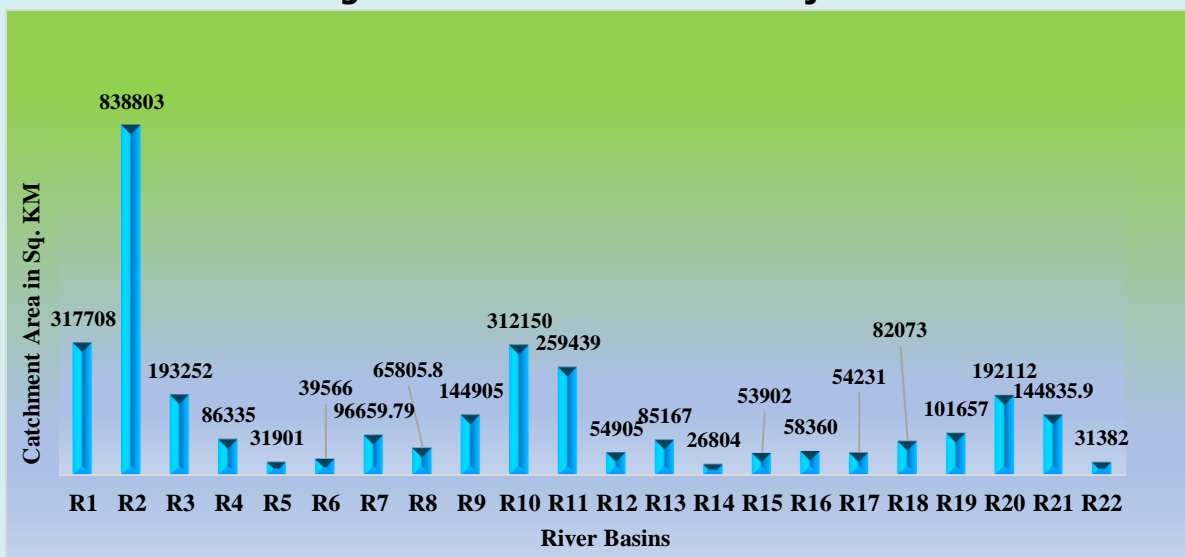
S.No.	Category	Area (in Ha)
1.	Inland Wetland-Natural	7015718
2.	Inland Wetland-Man-made	4834232
3.	Coastal Wetland-Natural	3620451
4.	Coastal Wetland-Man-made	511115

**Fig. 1.3: Percentage Distribution of type of wetlands**



- As per Abstract on Water Sector- 2021, the major river basin is Gangotri which has the largest catchment area 838803 Sq. Km followed by Indus within India having catchment area 317708 Sq. Km and Godavari with catchment area 312150 Sq. Km. (**Statement 1.06**). The catchment area of the major river basins is shown in Fig. 1.4.

**Fig. 1.4: Catchment Area of Major River Basins**

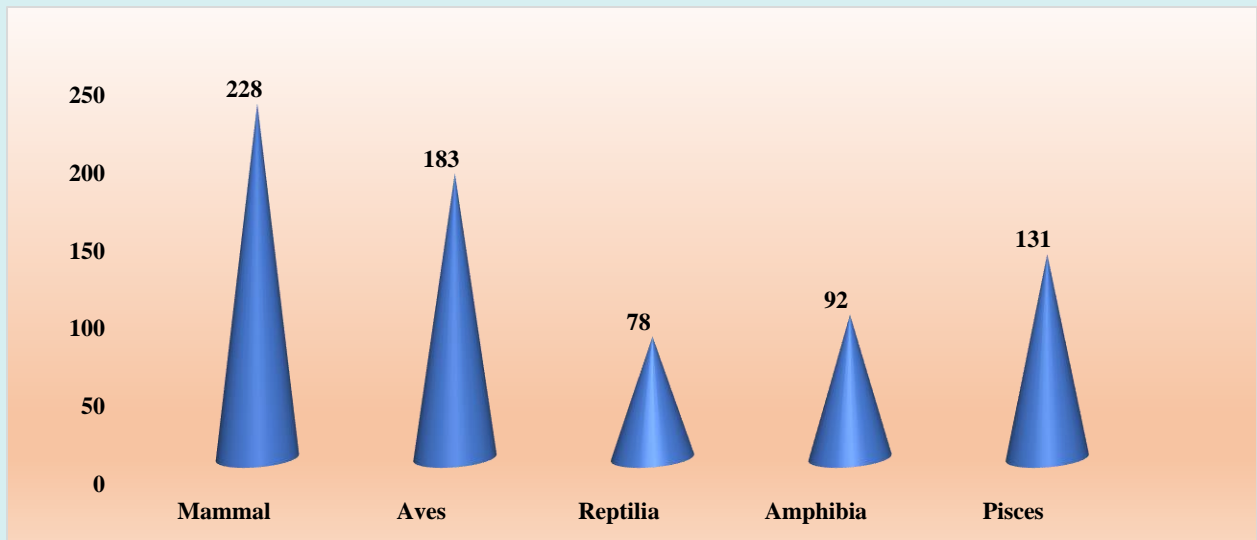


<b>R1</b>	<b>Indus (within India)</b>	<b>R12</b>	<b>Pennar</b>
<b>R2</b>	Ganga	R13	Cauvery
<b>R3</b>	Brahmaputra	R14	Subarnarekha
<b>R4</b>	Barak & other rivers flowing into Meghna like Gomti, Muhari, Fenny etc.	R15	Brahmani-Baitarani
<b>R5</b>	Sabarmati	R16	West flowing rivers from Tapi to Tadri
<b>R6</b>	Mahi	R17	West flowing rivers from Tadri to Kanyakumari
<b>R7</b>	Narmada	R18	East flowing rivers between Mahanadi and Pennar
<b>R8</b>	Tapi	R19	East flowing rivers between Pennar and Kanyakumari
<b>R9</b>	Mahanadi	R20	West flowing rivers of Kutch & Saurashtra including Luni
<b>R10</b>	Godavari	R21	Area of inland drainage in Rajasthan Desert
<b>R11</b>	Krishna	R22	Minor rivers draining into Myanmar and Bangladesh

- Inland Water resources of the country are classified as rivers and canals; reservoirs; tanks & ponds; beels, oxbow lakes, derelict water; and brackish water. Water bodies other than rivers and canals cover an area of 8.6 M.Ha with eleven states having more than 80% of the total area. Reservoirs have maximum area (2.8 M.Ha.) followed by Tanks and ponds (2.4 M.Ha.). Length of Rivers and Canals is 280751 Kms with Uttar Pradesh accounting for the highest percent (14) of the total length of rivers and canals in the country. Other states following Uttar Pradesh are Jammu & Kashmir, Maharashtra, Odisha and Bihar. The total area of inland water resources is, thus, unevenly distributed (**Statement 1.07**).

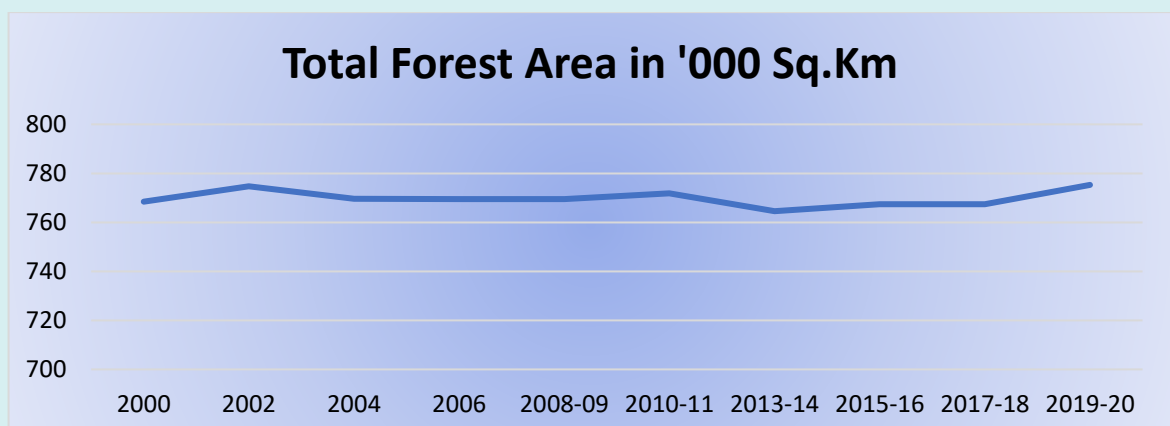
- India has 106 National Parks covering an area of 44403 sq. km and 567 wild life sanctuaries with an area of 122565 sq. km, both together accounting for 5% of the total geographic area of the country (**Statement 1.13**).

**Fig. 1.5: Number of rare and threatened species in vertebrates**

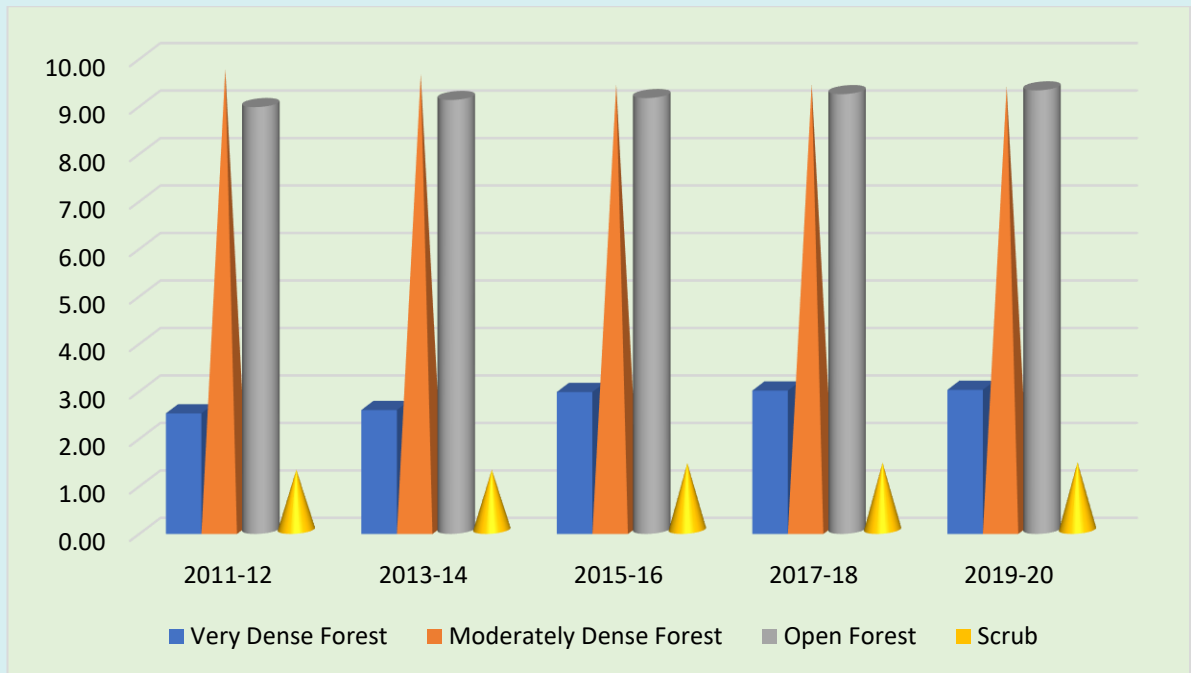


- The terms 'Forest Cover' and 'Forest Area' are the two most commonly used terms to describe the extent of the forest. Both the terms, 'Forest Cover' and 'Forest Area' denote extent of the forests with different meanings. The term 'Forest Cover' is used to define the expanse of forest resources in a region primarily based on the tree canopy density, while the term 'Forest Area' (Recorded Forest Area as per FSI) is used to denote the areas having legal standing, i.e., recorded as forests in government records or maintained as forests. Fig. 1.6 depicts the trend of forest area in '000 square kilometers in India over the years (**Statement 1.21**). Fig. 1.7 shows the percentage of different forest cover classes out of total geographical area in India over the years and Fig 1.8 shows distribution of forest cover classes as a percentage of total geographical area for 2019-20.

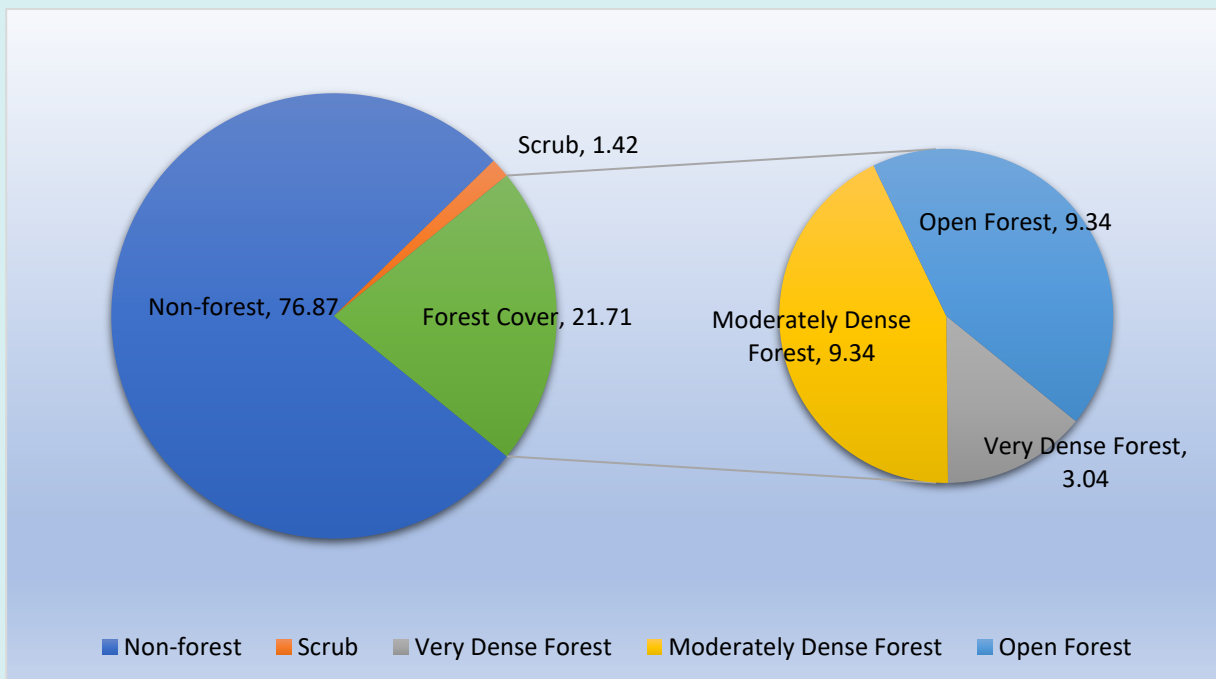
**Fig. 1.6: Total Forest Area in India (in '000 Sq.Km.)**



**Fig. 1.7: Percentage of forest cover area India under various forest classes**



**Fig. 1.8: Forest Cover in India under Various Forest Classes (%) in 2019-20**



➤ In India, mangroves are found on the east and west coasts of the mainland and on the Islands of Andaman and Nicobar and Lakshadweep. Mangrove Forests host rich biodiversity and have ecological and environmental significance. Fig. 1.9 depicts state-wise area of Mangrove Cover in square Kilometers for 2021. Sunderban,

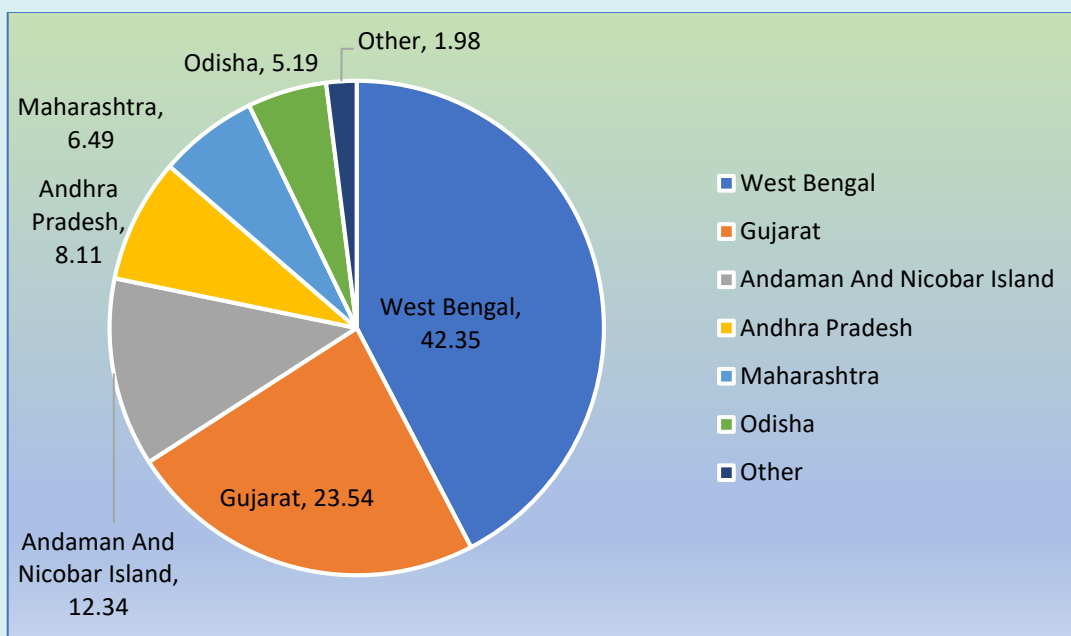


located in the northern Bay of Bengal is the world's largest single patch of Mangrove Forests. Fig1.10 shows the state-wise extent of Mangrove Cover as percentage of total mangrove cover of 2021 where 'Other' is inclusive of percentage mangrove cover of states/UTs of Tamil Nadu, Goa, Karnataka, Kerala, Daman & Diu and Puducherry.

**Fig. 1.9: State-wise Mangrove Cover (Sq.Km.), 2021**



**Fig.1.10 : State wise percentage of Mangrove Cover, 2021**



- Particulate matter is a complex mixture of suspended solid & liquid particles in semi equilibrium with surrounding gases. Particulate matter with size less than or equal to 10µm are denoted as PM10. The major constituents are organic and elemental carbon, metals/elements like silicon, magnesium, iron, ions like sulphates, nitrates, ammonium etc. It can settle in the bronchi and lungs and cause health problems.

Under the National Air Quality Monitoring Programme, there are 222 monitoring stations/locations (67% ) where level of PM10 is found to be exceeding the annual National Ambient Air Quality Standards (NAAQS) level of 60 µg/m<sup>3</sup> for the year 2021(**Statement 1.28**).

## **Component 2: Environmental Resources and their Use**

2.1 Environmental resources are crucial inputs for both production and consumption, as they play a vital role in providing shelter, food, healthcare, infrastructure, transportation, communication, defence, and other essential aspects of human activity. Therefore, policymakers require reliable statistics that document the availability and quality of these resources over time to make informed decisions. Such data is necessary to prevent shortages or restrictions on usage, ensure the availability of these resources for emerging applications, determine import dependency and other risks, and enable their continued use over time. Moreover, to ensure sustainable management of current and future environmental resource use by the human subsystem, it is essential to have data on their availability and usage.

2.2 Data on the most critical human activities associated with the utilization of environmental resources can assist in identifying potential policy interventions. Component 2 encompasses activities that involve the direct extraction, abstraction, harvesting, or restructuring of individual environmental resources, which have broader environmental impacts beyond their immediate use.

2.3 Component 2 contains six subcomponents that correspond to the main categories of Environmental resources:

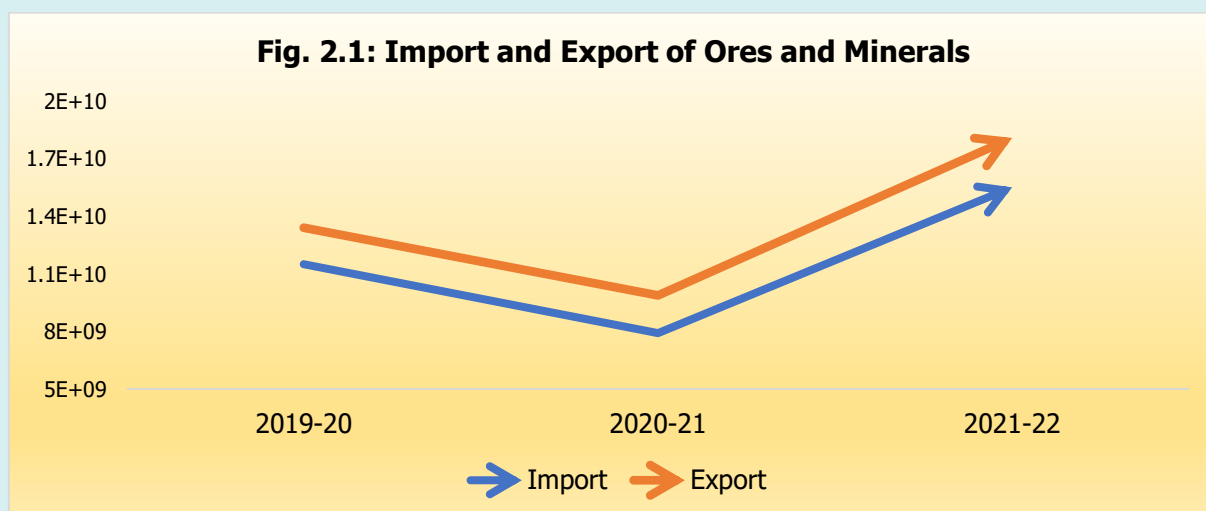
- i. Subcomponent 2.1: Mineral Resources;
- ii. Subcomponent 2.2: Energy Resources;
- iii. Subcomponent 2.3: Land;
- iv. Subcomponent 2.4: Soil Resources;
- v. Subcomponent 2.5: Biological Resources; and
- vi. Subcomponent 2.6: Water Resources.

Statements on Component 2: Environmental Resources and their Use are numbered 2.01 to 2.45. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

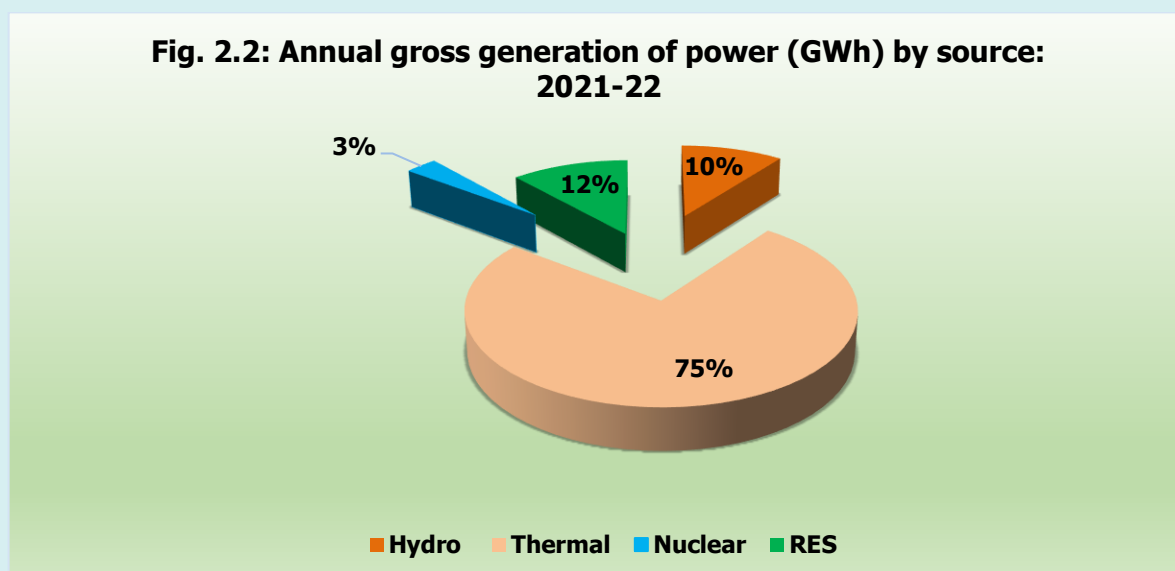
	FDES	EnviStats Vol.I
Tier I	30	25
Tier II	51	21
Tier III	43	5

## HIGHLIGHTS

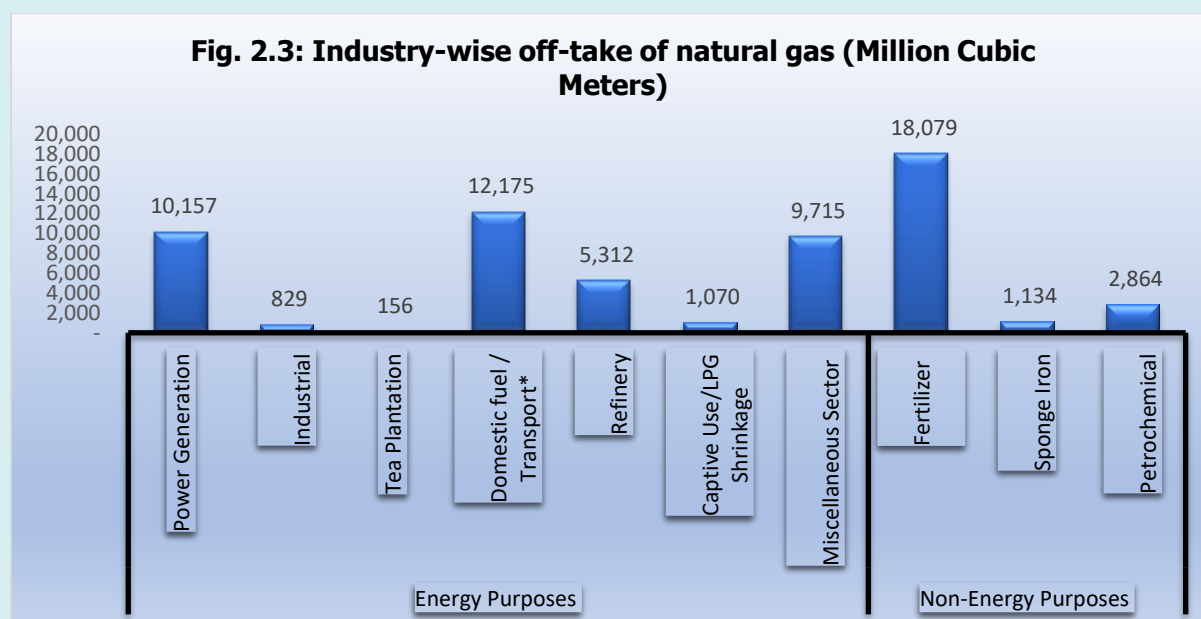
- As per **Statement 2.01**, out of the stock of 70 minerals reported, 34 are showing positive trend in comparison to 2015 with respect to the parameter “remaining resources”. However, 33 are showing a decreasing trend in comparison to 2015 in this regard.
- Import & Export of ores and minerals for the period 2019-20 to 2021-22 is given in the figure 2.1:



- In India, power is generated from conventional (Thermal, Nuclear & Hydro) and renewable sources (Wind, Solar, Biomass etc.). The gross power generation was 1,484,463 GWh in 2021–22, representing 8.1% annual growth over 2020–2021. Major production of power is achieved through thermal power plant. (**Statement 2.15**).



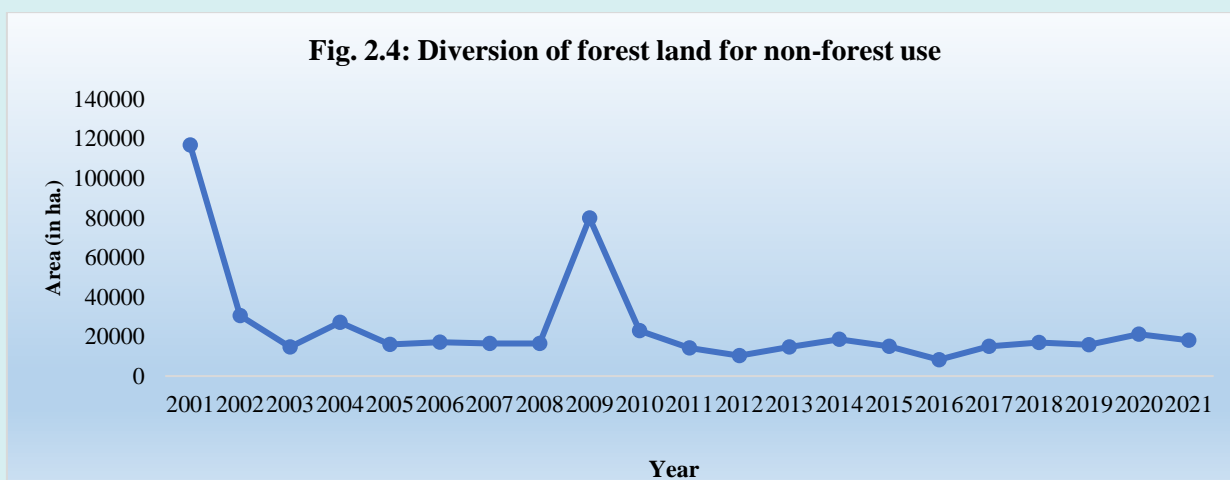
- The maximum use of Natural Gas during 2021-22 is in fertilizers industry followed by domestic fuel/transport distribution network and power generation. Industry wise off-take of natural gas shows that natural gas has been used both for Energy (64.1%) and Non-energy (35.9%) purposes. **(Statement 2.17).**



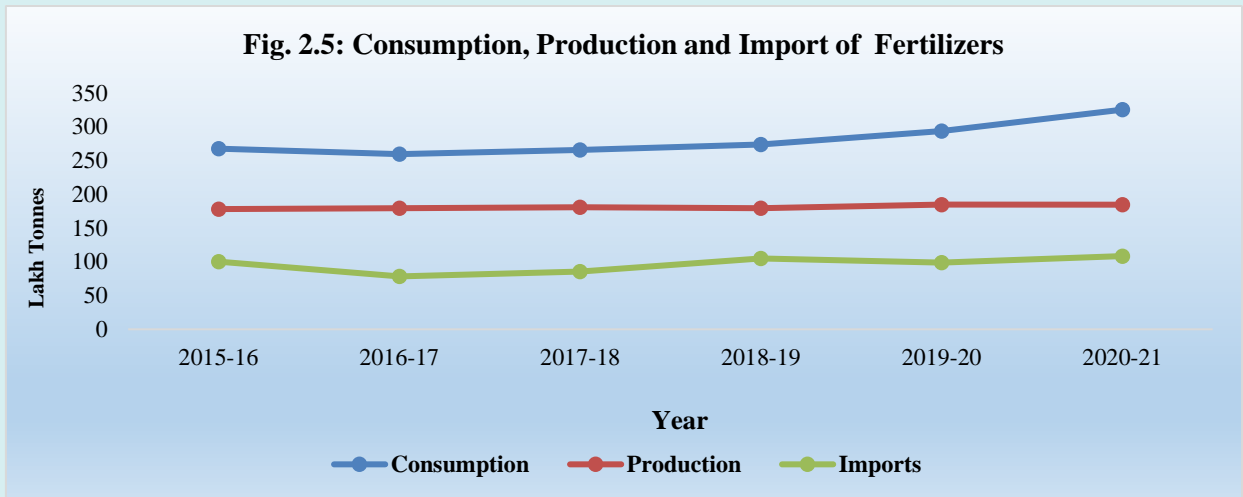
- Out of the estimated potential of Renewable Power in the country, Solar and Wind Power hold share of 96.89%. Though, the power generated from waste to energy is 2556 MW which is the lowest among all other sources, still it is important because it can be a valuable tool in managing waste, reducing greenhouse gas emissions, and producing energy. **(Statement 2.19).**
- Organic products are grown under a system of agriculture without the use of chemical fertilizers and pesticides with an environmentally and socially responsible approach. This is a method of farming that works at grass root level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality which has resistance to diseases. India is bestowed with lot of potential to produce all varieties of organic products due to its various agro climatic conditions. Total area under organic certification process is 9119865.91 ha during 2021-22. Among the states, Chhattisgarh has the largest area covered under organic certification followed by Madhya Pradesh, Maharashtra, Rajasthan, Gujarat, Himachal Pradesh, Odisha, Uttar Pradesh and Uttarakhand. **(Statement 2.24)**
- During 2020-21, production of chemical fertilizers (N+P+K) in India was 184.54 Lakh Tonnes while 4.29 Lakh Tonnes of organic manure was produced during the same period which is meager 2.32% of chemical fertilizers. To encourage the consumption and hence the production of organic manure, Government of India has been promoting Organic farming in the country through dedicated scheme namely

Paramparagat Krishi Vikas Yojana (PKVY) since 2015-16. The scheme stresses on end to end support to organic farmers i.e. from production to certification and marketing. Post-harvest management support including processing, packing, marketing is made integral part of these schemes to encourage organic farmers. **(Statement 2.33(a) & 2.29)**

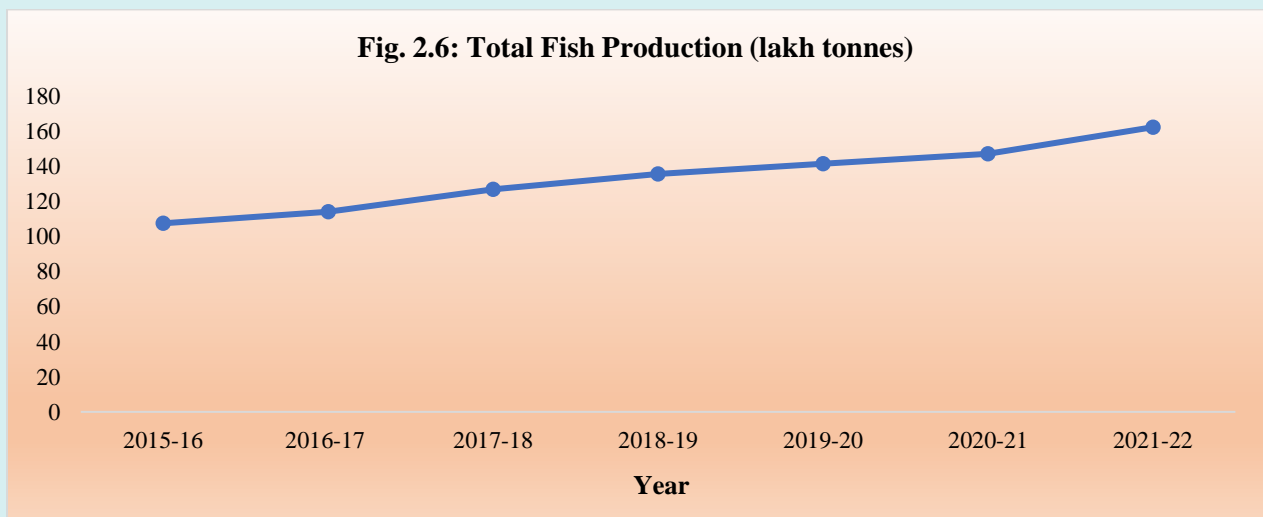
- As per para 3.1(i) of the Guidelines issued under the Forest (Conservation) Act, 1980 (FC Act) Compensatory Afforestation is one of the most important conditions stipulated by the Central Government while approving proposals for de-reservation or diversion of forest land for non-forest uses. During 2021, 18131 ha of forest land was diverted for non-forest use **(Statement 2.25)**. However, 25220 ha of area was afforested also during 2020-21. **(Statement 6.06)**. Year-wise diversion of forest land for non-forest use is given in Fig. 2.4.



- As per 4<sup>th</sup> Advance Estimates for 2021-22, total production of cereals in the country is 288 Million Tonnes. Total pulses production during 2021-22 is 27.7 Million Tonnes. It has also been observed that the total production of oilseeds is 37.7 Million Tonnes in 2021-22. Total production of cotton is 31.2 Million bales in 2021-22 and the production of sugarcane is 431.8 Million Tonnes during the same period. **(Statement 2.27 (b))**.
- As per **Statement 2.33 (a)**, consumption of total fertilizer nutrient (N+P+K) during 2020-21 is 325.36 Lakh Tonnes while Fertilizer production is 184.54 Lakh Tonnes during the same period. However, import of fertilizers is 108.46 Lakh Tonnes during 2020-21. Trend of consumption, production and import of fertilizers is depicted in Fig. 2.5.



- The meat production in India consists mainly of cattle, buffalo, sheep, goat, pig and poultry. In the year 2020-21, Poultry consisted 51% of all the meat production, whereas Pig consisted of 4% and Sheep consisted of 10% of the total meat production. **(Statement 2.37)**
- There has been a substantial increase in the fish production in India. The total fish production in India increased from 107.6 lakh tonnes in 2015-16 to 162.48 lakh tonnes in 2021-22 **(Statement 2.39(a))**.



### Component 3: Residuals

3.1 The statistics in Component 3 are closely linked to the physical flow accounts found in the SEEA-CF, which outline the flows from the economy to the environment and provide relevant terms and definitions. This component comprises data on the quantity and properties of residuals that arise from human production and consumption processes, their management, and their eventual release into the environment. Residuals refer to solid, liquid, and gaseous materials, as well as energy, that establishments and households

discard, discharge, or emit during the production, consumption, or accumulation processes. These residuals may be directly released into the environment or collected, treated, recycled, or reused. The FDES focuses on the primary categories of residuals, such as emissions of substances to air, water, or soil, wastewater and waste, and the release of residuals.

3.2 Emissions, wastewater, waste, and residuals that result from the use of chemicals can have varying impacts and effects on both human and ecosystem health. Their absorption or persistence and concentration will differ depending on their nature, scale, and the local environmental dynamics, such as wind and currents, as well as the characteristics of land, air, and water masses. In some cases, these substances may be released or disposed of without any treatment. However, there is an increasing trend towards treating emissions to minimize pollutants before they are released into the environment. This component also covers the treatment and management processes, as well as the associated infrastructure.

3.3 Component 3 contains four subcomponents:

- i. Subcomponent 3.1: Emissions to Air;
- ii. Subcomponent 3.2: Generation and Management of Wastewater;
- iii. Subcomponent 3.3: Generation and Management of Waste; and
- iv. Subcomponent 3.4: Release of Chemical Substances.

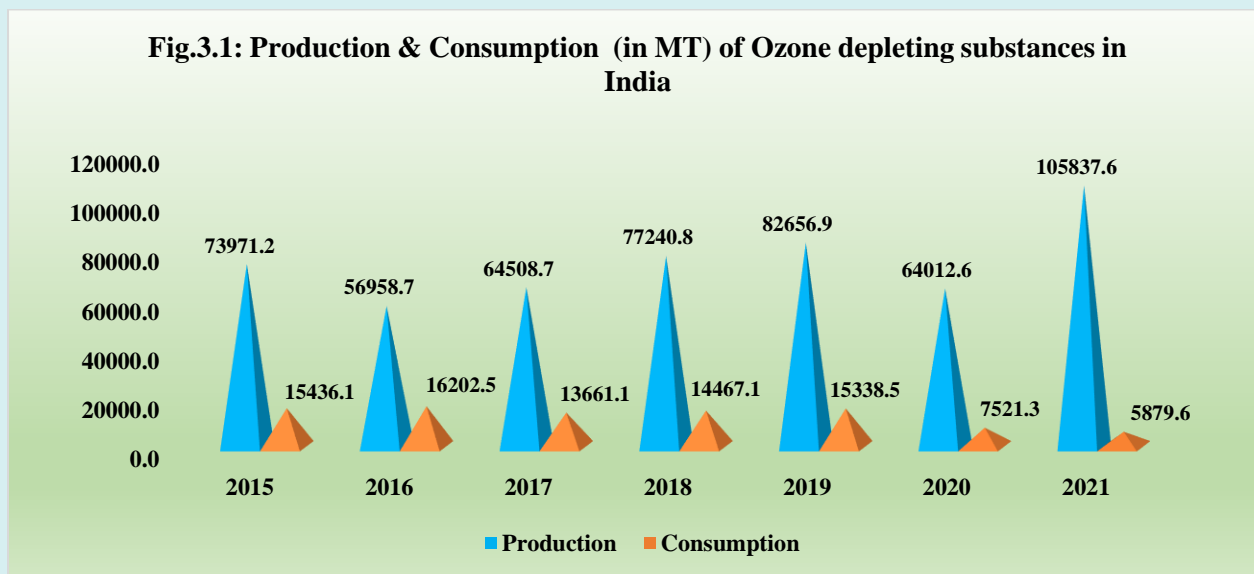
Statements on Component 3: **Residuals** are numbered 3.01 to 3.16. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

	FDES	EnviStats Vol.I
Tier I	19	13
Tier II	34	21
Tier III	5	0

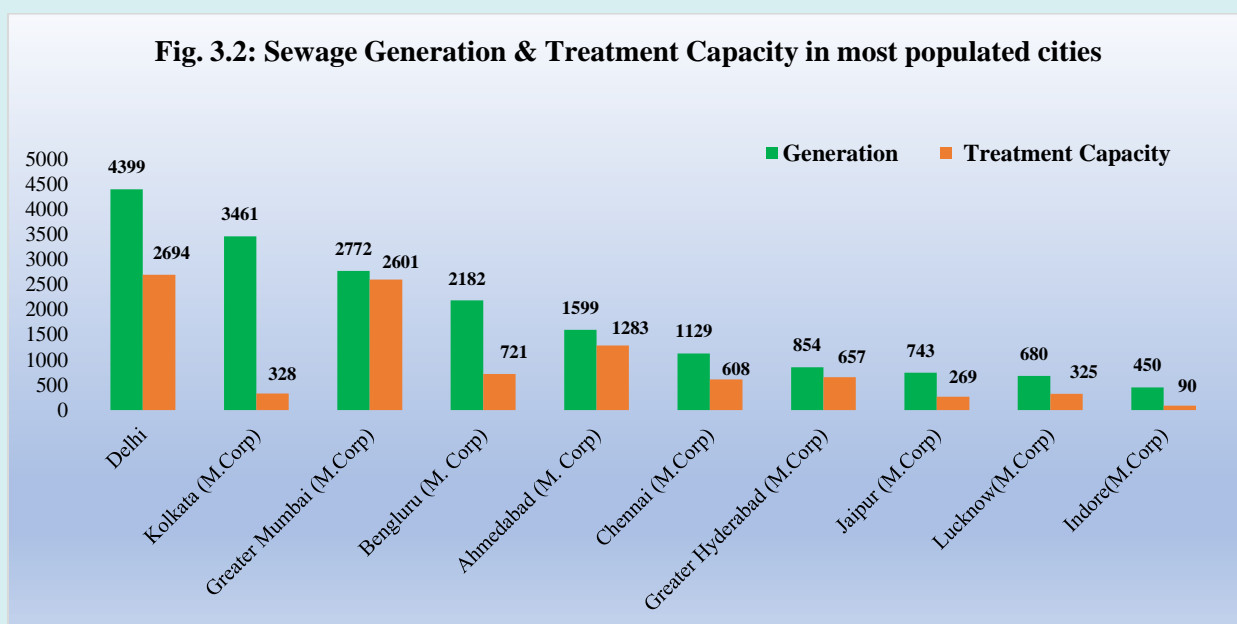
## HIGHLIGHTS

- Ozone depletion occurs when the natural balance between the production and destruction of stratospheric ozone is shifted towards destruction. Ozone acts as a shield to protect the Earth's surface by absorbing harmful UV-B and UV-C radiation. If this ozone is depleted, then more UV rays will reach the earth surface. Exposure to higher doses of UV- B radiations will have effects on human health and impact on flora and fauna of terrestrial as well as aquatic eco-systems. Included within the definition of Ozone Depleting Substances are the chlorofluorocarbons (CFC) and halons used respectively in older refrigeration and fire-fighting systems and portable equipment. ODS were also used as the blowing agent in some insulation foams. Hydrochlorofluorocarbons (HCFC) were introduced as an intermediate replacement for CFCs but are themselves still classed as ODS. As part of a world-wide movement, the production and use of all these materials is being phased out under the provisions of the Montreal Protocol. In India, the major producer of ODS is HCFC

followed by Carbon Tetrachloride. As regards consumption of ODS, only HCFC and Methyl Bromide are used. Methyl Bromide is used only for quarantine and pre-shipment applications. Total production and consumption of ozone depleting substances from 2015 to 2021 are given in the Fig. 3.1 (**Statement 3.02 & 3.03**).



- As per data of CPCB received in 2017, the sewage generation in most populated cities is 18,269 MLD whereas treatment capacity is only 9, 576 MLD. Delhi is at the top in sewage generation with 4399 MLD followed by Kolkata (M. Corp.) with 3461 MLD and Greater Mumbai (M. Corp.) having 2772 MLD while Indore (M. Corp.) is at bottom with 450 MLD. Delhi tops in treatment capacity also but Kolkata (M. Corp.) has very less sewage treatment capacity (328 MLD) as compared to sewage generation. (**Statement 3.05**).

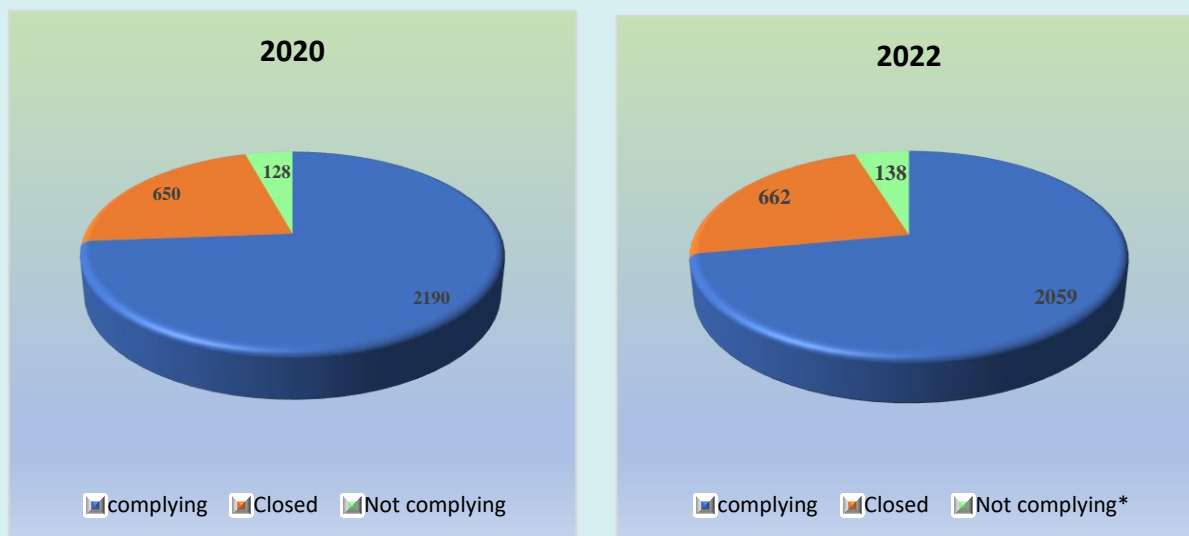


- In 2022, there were 2,859 Grossly Polluting Industries in the country discharging their effluents into rivers and lakes. Out of these, 2,059 industries comply with the standards

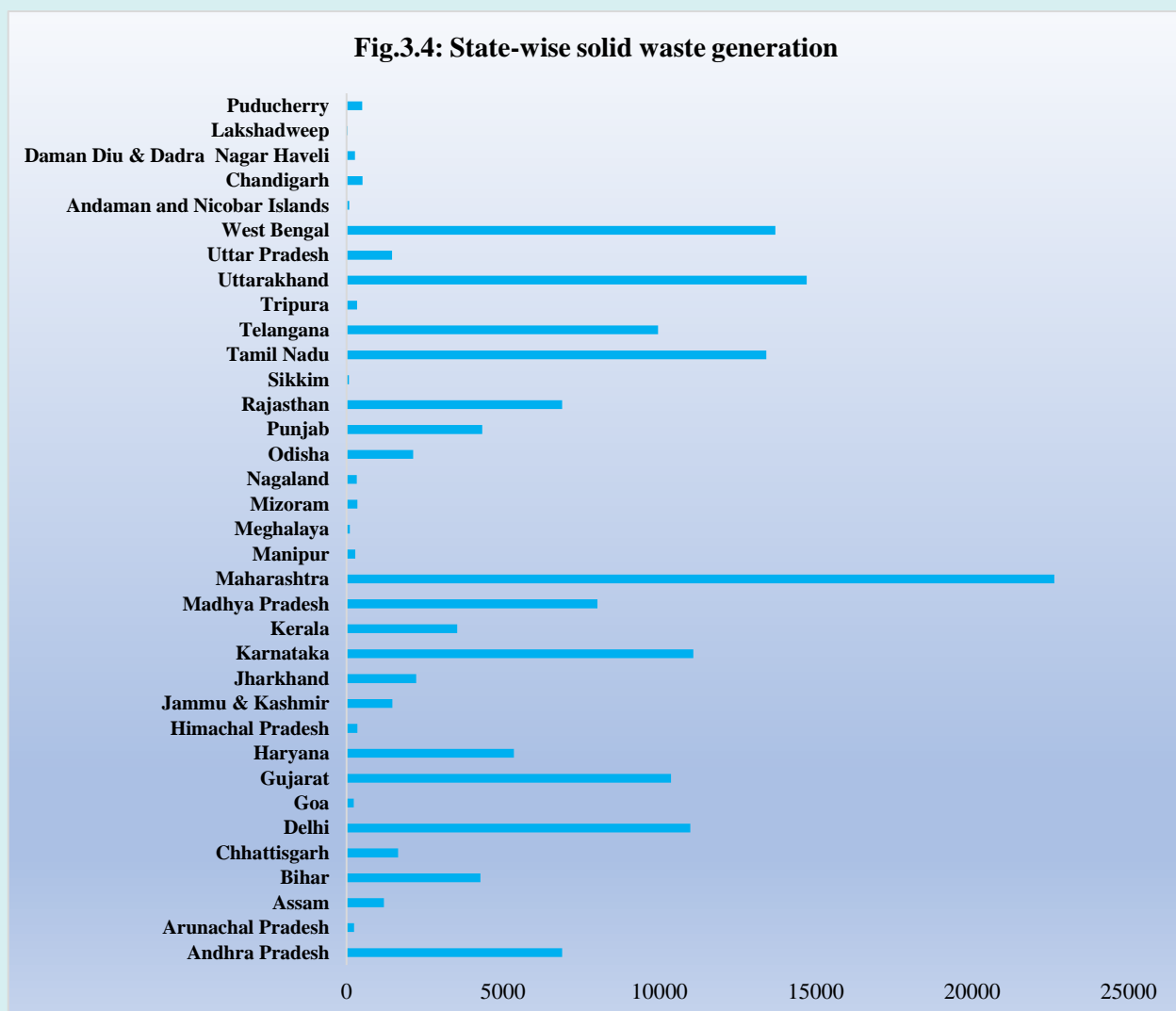


prescribed by CPCB. Among the States/UTs, Uttar Pradesh alone has over 1600 such industries. Other states with grossly polluting industries include Haryana (661), Arunachal Pradesh (97) and Bihar (84). (**Statement 3.07**).

**Fig.3.3: Grossly polluting industries discharging their effluents into rivers and lakes**

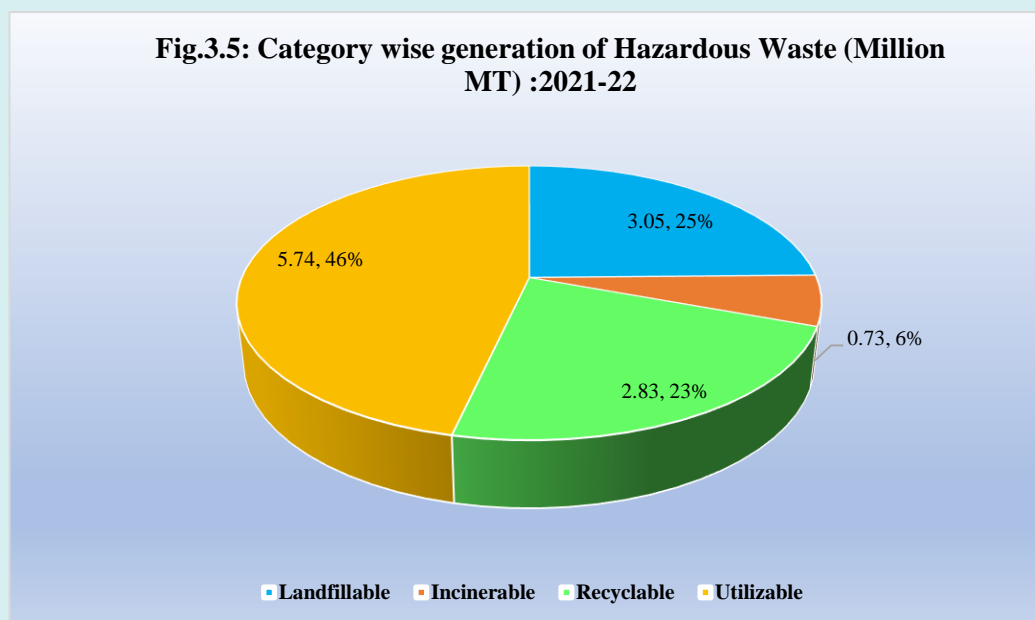


- As per **Statement 3.08**, total quantity of solid waste generated in the country during 2020-21, was 160038.9 tonnes per day (TPD) of which 152749.4 TPD of waste gets collected. Out of the total waste generated, 79956.3 TPD (50%) of waste is treated and 29427.2 TPD (18.4%) is landfilled. 50655.4 TPD which is 31.7% of the total waste generated remains un-accounted. State-wise solid waste generation is given in Fig. 3.4.



- Growing human needs and the complementing industrial development bring both desirable development as well as undesirable environmental consequences. Amongst the various environmental impacts caused by industrialization, disposal of solid wastes including the toxic and hazardous waste is of concern because of its deleterious effect on health and environment. Proper treatment and disposal of Hazardous waste (HW) is the need of the hour as industrial development is happening at a rapid phase. Improper disposal of waste poses a serious threat to the environment. The hazardous wastes may be categorized as recyclable when resource recovery is possible by reprocessing the waste, as incinerable when it is possible to incinerate the waste for energy recovery, and suitable for landfill when it cannot be either used for or is not suitable either for resource or for energy recovery, but for dumping only with or without any treatment. During 2021-22, about 12.35 Million MT HW was generated out of which, 5.74 Million MT (46%) is utilizable, 2.83 Million MT (23%) is recyclable, 3.05 Million MT (25%) is landfillable and 0.73 Million MT (6%) is incinerable (**Statement 3.12**). Category wise generation of hazardous waste is depicted in Fig. 3.5:

**Fig.3.5: Category wise generation of Hazardous Waste (Million MT) :2021-22**



## Component 4: Extreme Events and Disasters

4.1 Component 4 of the Framework for the Development of Environment Statistics 2013 (FDES 2013) is focused on Extreme Events and Disasters. This component provides essential statistics related to natural disasters and extreme weather events, such as earthquakes, hurricanes, droughts, floods, and wildfires. These events can have severe and long-lasting impacts on human health, ecosystems, and the economy. The statistics in this component can be used to develop policies and strategies to prevent, mitigate, and respond to these events effectively. The information covered in Component 4 includes the frequency, intensity, and impact of extreme events and disasters, the economic and social losses incurred, the number of people affected, and the extent of damage to infrastructure and the environment. The FDES 2013 Component 4 is an important resource for governments, businesses, and communities in developing effective strategies to reduce the risks associated with extreme events and disasters.

4.2 Component 4 contains the following two subcomponents:

- i. Subcomponent 4.1: Natural Extreme Events and Disasters; and
- ii. Subcomponent 4.2: Technological Disasters.

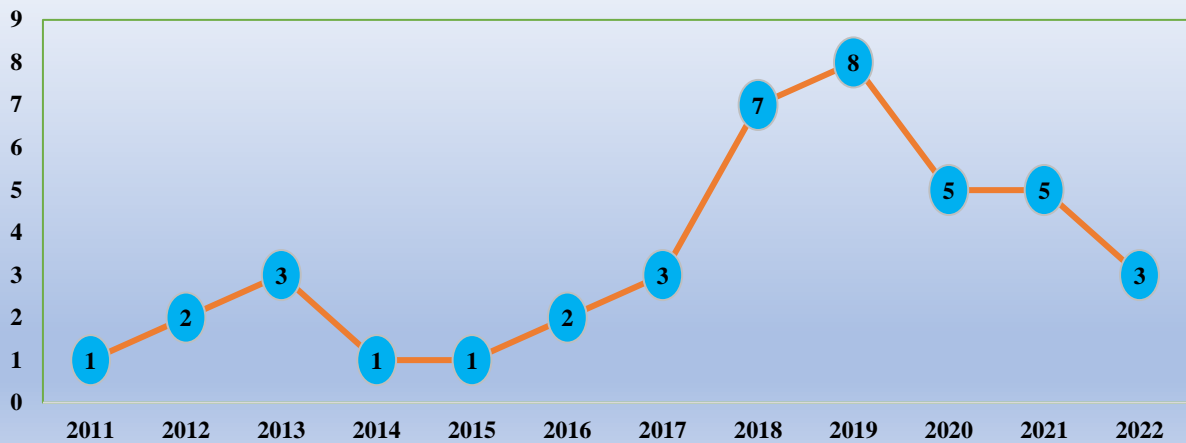
Statements on Component 4: **Extreme Events and Disasters** are numbered 4.01 to 4.09. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

	FDES	EnviStats Vol.I
Tier I	4	4
Tier II	11	3
Tier III	16	0

## HIGHLIGHTS

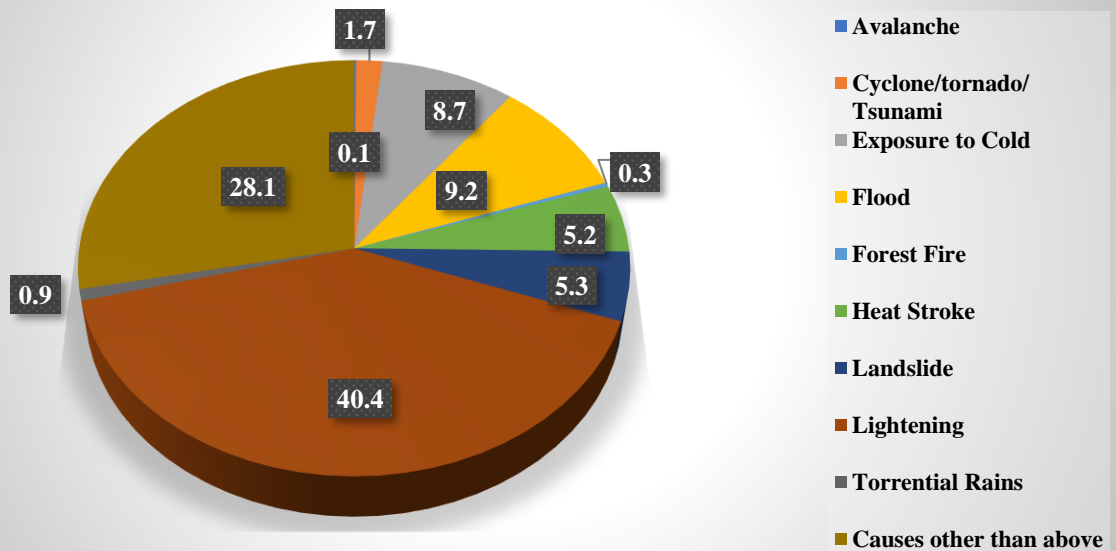
- As a result of climate change, global temperatures and the frequency and intensity of heatwaves are expected to rise. Abnormal temperature events can impose severe physiological stress on the human body as the body operates best within a fairly normal temperature range. There is a marked relationship between human mortality and thermal stress which exacerbates the top causes of death, including respiratory and cardiovascular diseases, diabetes mellitus and renal disease. They can also cause loss of health service delivery capacity, where power-shortages which often accompany heatwaves disrupt health facilities, transport, and water infrastructure.
- As per Indian Meteorological Department (IMD) a heatwave occurs if the maximum station temperature reaches at least 40 degrees Celsius in the plains and at least 30 degrees Celsius in hilly areas. The IMD further states that in coastal areas, heatwaves occur when the maximum temperature departure is 4.5 degrees Celsius or more from normal. In India Heat waves typically occur from March to June, and in some rare cases, even extend till July. Average heat wave is calculated by totalling the average number of heatwave days in states during the summer. In 2022, it has been observed that maximum number was reported in Rajasthan (26) followed by Punjab and Haryana (24 each), Jharkhand (18), and Delhi (17). Punjab and Haryana reported 12 times the number of heatwave days in 2022 compared to last year when these two states recorded only two heatwave days each. The data further revealed that three states, namely Assam, Himachal Pradesh, and Karnataka, did not report a single heatwave day all year. Notably, Assam and Himachal Pradesh have not reported a heatwave day since 2010. **(Statement 4.01)**
- The cold wave conditions signify a certain amount of fall of temperature at a given place with respect to normal climatological value. In India, the cold wave (CW) conditions are generally experienced during the period from November to March. Qualitatively, cold wave is a condition of air temperature which becomes fatal to human body when exposed. Quantitatively, it is defined based on the temperature thresholds over a region in terms of actual temperature or its departure from normal. In 2022, it has been observed that maximum number of cold wave days was reported in Haryana (9), followed by Madhya Pradesh (7), Telangana and Chhattisgarh (6 each), Jammu & Kashmir including Ladakh and Odisha (5 each), and Bihar, Delhi, Maharashtra and Uttar Pradesh (3 each) **(Statement 4.02)**.
- Number of cyclonic storms experienced by North Indian Ocean (NIO) increased substantially in 2018 which persisted in the subsequent year but again reduced to 3 in 2022. It has also been evident that cyclonic storms are formed mostly in the months of May, September, October, November and December. **(Statement 4.03)**

**Fig.4.1: Number of cyclonic storms formed over the North Indian Ocean; Year wise**



- Accidental deaths attributable to the forces of nature are those due to earthquakes, floods, lightning, and epidemics, to name a few. Lightning has always been the major cause of death. It accounted for 40.4 % of the total deaths in 2021. The other major causes of deaths are flood (9.2%) and exposure to cold (8.7%) followed by landslide (5.3%) and heat stroke (5.2%) **(Statement 4.08)**.

**Fig.4.2: Percentage distribution of deaths due to forces of nature: 2021**



## **Component 5: Human Settlements and Environmental Health**

5.1 Component 5 of the Framework for the Development of Environment Statistics 2013 (FDES 2013) focuses on Human Settlements and Environmental Health. This component provides information on the environmental conditions of human settlements, including access to basic services such as safe drinking water, sanitation, and waste management. It also includes statistics on the health impacts of environmental factors, such as air pollution, noise, and exposure to hazardous chemicals. The statistics provided in Component 5 are important for identifying areas that require intervention to improve environmental conditions and health outcomes. Additionally, this component highlights the relationship between human settlements and the environment, emphasizing the need for sustainable practices to maintain healthy living conditions. The FDES 2013 Component 5 is an essential resource for policymakers, urban planners, and public health professionals seeking to improve the environmental health of human settlements.

5.2 The human settlements and environmental health component contain statistics on the environment in which humans live and work, particularly with regard to their living conditions and environmental health. These statistics are important for the management and improvement of conditions related to human settlements, shelter conditions, safe water, sanitation, and health, particularly in the context of rapid urbanization, increasing pollution, environmental degradation, disasters, extreme events, and climate change.

5.3 The statistics compiled in this component may provide indicators helpful to achieve the following Sustainable Development Goals (SDGs): SDG 3 – to ensure healthy lives and promote well-being for all at all ages, SDG 6 – to ensure access to water and sanitation for all, and SDG 11– to make all cities inclusive, safe, resilient, and sustainable. Component 5 also contains statistics related to SDG 7 – to ensure access to affordable, reliable, sustainable, and modern energy for all, and SDG 13 – to combat climate change and its impact.

5.4 Component 5 contains two subcomponents:  
i. Subcomponent 5.1: Human Settlements; and  
ii. Subcomponent 5.2: Environmental Health.

5.5 Human settlements refer to the totality of the human community, whether people live in large cities, towns, or villages. They encompass the human population that resides in a settlement, the physical elements (e.g., shelter and infrastructure), services (e.g., water, sanitation, waste removal, energy, and transport), and the exposure of humans to potentially deleterious environmental conditions.

5.6 Environmental health focuses on how environmental factors and processes impact and change human health. It can be defined as an interdisciplinary field that focuses on analysing the relationship between public health and the environment.

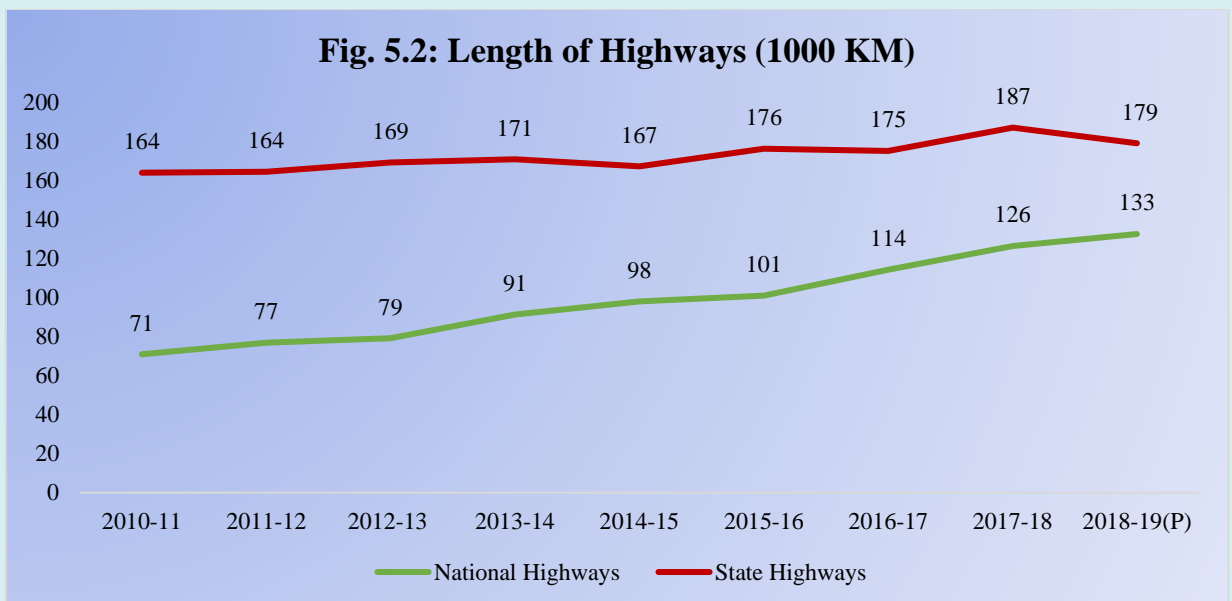
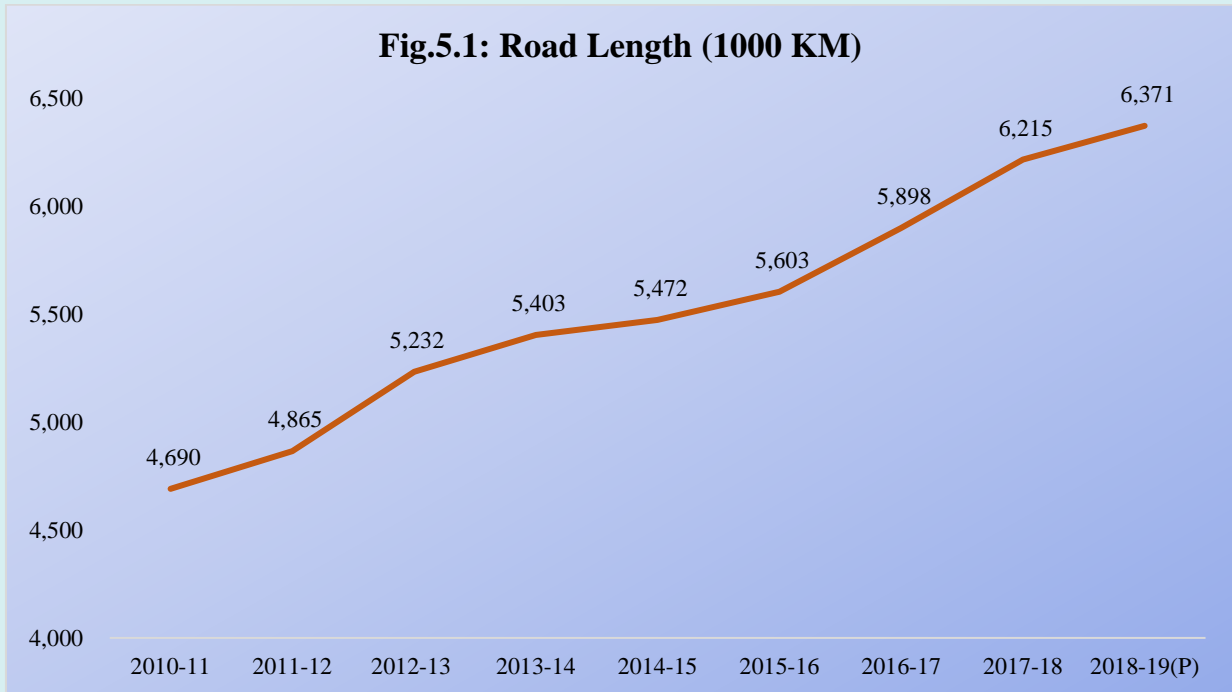
Statements on Component 5: **Human Settlements and Environmental Health** are numbered 5.01 to 5.28. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

	FDES	EnviStats Vol.I
Tier I	12	10
Tier II	22	10
Tier III	20	3

## HIGHLIGHTS

- Research at the global level has found out that two major factors impacting environment are population and consumption. Increasing population is expected to negatively affect the environmental resources such as land, water, mineral resources etc. As per the population projection (2011-36), the country's population has increased to 1379 million in 2022 from 1211 million in 2011 population census. **(Statement 5.02)**. It is projected to further grow to 1522.29 million by 2036.
- As per 2022 data, fisherfolk population in India's fishing villages is 37,74,577. West Bengal has the highest fisherfolk population per Km of coastal length. Out of total of 8,18,491 traditional fisherman families in India, 6,00,890 are below poverty line. In Daman and Diu, only 20 out of 3094 traditional fisherman families are below poverty line, while in Andhra Pradesh 1,50,669 out of 1,52,062 traditional fisherman families are below poverty line. **(Statement 5.03)**
- As per the National Family Health Survey (NFHS) Reports, the percentage of households with Piped water / Tap/ Public Tap/ Standpipe/Bottled Water as major source of drinking water has increased in rural areas from 25% in 1998-99 to 40.3 % in 2019-21. In case of urban areas, the percentage remains the same as 74.5% in both the years **(Statement 5.04)**.
- Absence of basic sanitation facilities can result in an unhealthy environment contaminated by human waste. Without proper sanitation facilities, waste from infected individuals can contaminate a community's land and water, increasing the risk of infection for other individuals. As per Multiple Indicator Survey, 2020-21, 85.1 percent of households have access to improved latrine and hand washing facilities with water, soap/detergent within the household premises. Among the persons who had reported access to latrine and hand washing facility, about 73.3 percent of the persons in the rural areas and about 81.4 percent of the persons in the urban areas had exclusive access to improved latrine and hand washing facilities with water and soap/detergent within the household premises. **(Statement 5.09)**

- While improving access by having a good road infrastructure is important for economic development, at the same time air pollution, traffic noise and impact on wildlife habitat is also to be considered from the environment aspect. Hence indicators on road length, number of vehicles etc are included in the FDES. As per the data maintained by the Ministry of Road Transport and Highways, the length of roads was 6371 thousand Kms in 2018-19, an increase of 36% from 2010-11 of which length of surfaced roads was 4690 thousand Kms. Number of registered vehicles also more than doubled in 2019-20 (326 million) compared to 2010-11(142 million) **(Statement 5.12).**

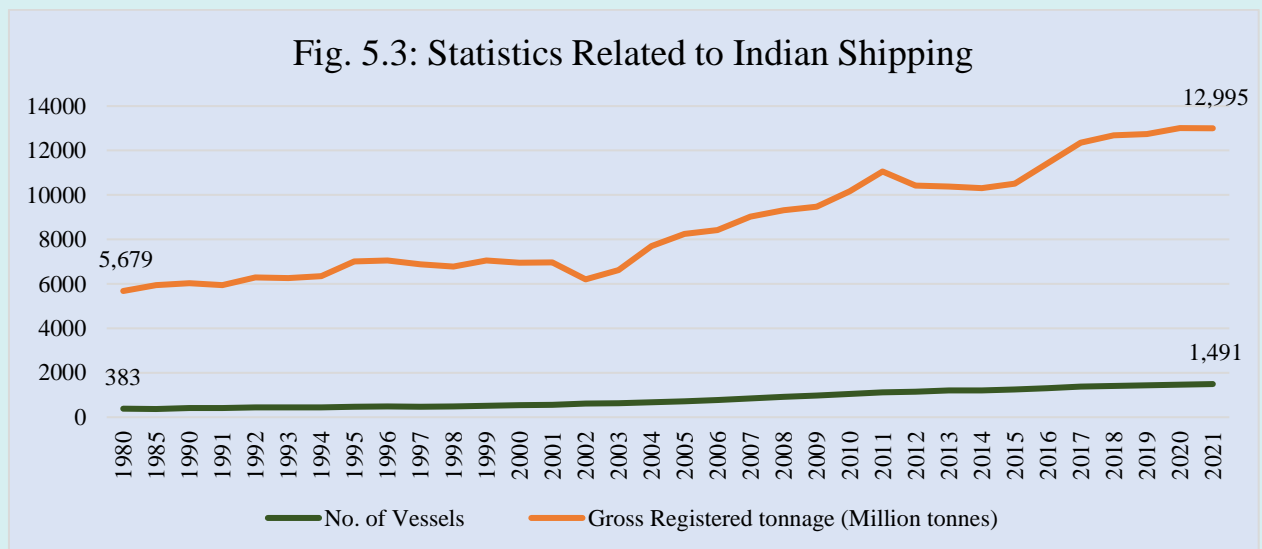


- Cargo movement through waterways is considered one of the cheapest mode of transportation internationally. They are fuel-efficient compared to other modes of transport, namely rail and road and are said to be environment friendly. However,

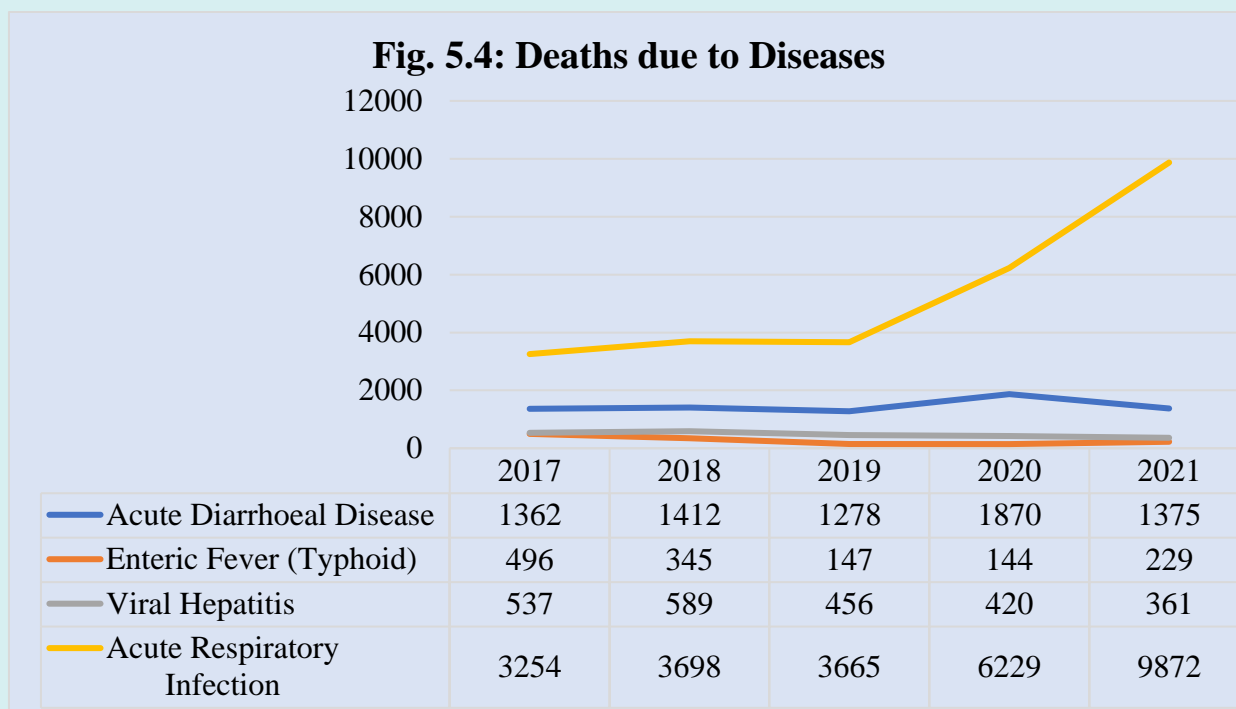


cargo movement through waterways is very low in India compared to the international scenario. The Government is taking steps to augment the capacity of waterways transportation in the country. In 2013-14, 322.63 lakh tonne of cargo was moved through waterways covering length of 24183 lakh Km which rose to 881.40 lakh tonne during 2020-21 across the waterways of length 44694 lakh Km. **(Statement 5.15)**

- In case of Indian shipping, from 2012 to 2021, number of vessels have increased from 1154 to 1491 with which the gross registered tonnage has gone strikingly up from 10417 metric tonnes to 12,995 metric tonnes. **(Statement 5.16)**



- Cholera is an acute diarrhoeal illness caused by infection of the intestine with *Vibrio cholerae* bacteria. People can get sick when they swallow food or water contaminated with cholera bacteria. So, absence of sanitation is the acute reason for the disease. According to data of National Health Profile, 2022, West Bengal had 603 cases of cholera out of 836 cases of the country. Other States still facing the cases of cholera are Delhi, Gujarat, Haryana, Jharkhand, Kerala, Meghalaya, Chandigarh, Ladakh and Puducherry. **(Statement 5.19)**



## Component 6: Environmental Protection, Management and Engagement

6.1 Component 6 of the Framework for the Development of Environment Statistics 2013 (FDES 2013) focuses on Environmental Protection, Management, and Engagement. This component aims to provide information on the various policies, programs, and initiatives implemented to manage and protect the environment. It includes statistics on the extent of environmental regulations and enforcement, as well as data on the allocation and use of financial resources for environmental protection. This component also includes statistics on the engagement of individuals, organizations, and communities in environmental initiatives, including participation in environmental decision-making processes and environmental education programs. The statistics provided in Component 6 can help identify areas where additional resources are needed to protect the environment and promote sustainability. The FDES 2013 Component 6 is an essential resource for policymakers, environmental advocates, and organizations seeking to monitor and improve environmental protection and management efforts.

6.2 In addition to providing essential information on environmental protection and management, Component 6 of the FDES 2013 also focuses on promoting public engagement and participation in environmental initiatives. The statistics provided in this component highlight the importance of involving individuals and communities in environmental decision-making and action. By promoting engagement and participation, policymakers can help to increase awareness of environmental issues and encourage individuals to take an active role in protecting the environment. Additionally, this component provides valuable information on the impact of environmental education and outreach programs, highlighting the importance of these initiatives in promoting

sustainable practices and behavior change. The FDES 2013 Component 6 plays a critical role in promoting environmental engagement and encouraging individuals and communities to take an active role in protecting the environment.

- 6.3 Component 6 is organized into four subcomponents:
- i. Subcomponent 6.1: Environmental Protection and Resource Management Expenditure;
  - ii. Subcomponent 6.2: Environmental Governance and Regulation;
  - iii. Subcomponent 6.3: Extreme Event Preparedness and Disaster Management; and
  - iv. Subcomponent 6.4: Environmental Information and Awareness.

6.4 Environmental degradation and climate change impact ecosystems and humans across the globe. Several policy reforms have been implemented globally to address environmental degradation and climate change. Actions required at the level of individuals, communities and institutions, despite their enormous potential, have received limited attention. Government of India is also implementing various schemes viz. National River Conservation Programme, Conservation of Natural Resources and Eco-Systems, Integrated Development of Wildlife Habitats, National Mission for a Green India. These schemes act as remedial measures for conservation of environment and sustainable development of various ecosystems. The umbrella Scheme on Conservation of Natural Resources and Eco-systems through its different sub-schemes formulated for protection of corals, mangroves, biosphere reserves, wetlands and lakes conserve the natural resources and these eco-systems of the country. Green India Mission contribute towards regeneration of degraded forests and their adjoining areas in the country. National River Conservation Program facilitates in improving water quality of polluted stretches of rivers by preventing pollution loads reaching the rivers through various pollution abatement works.

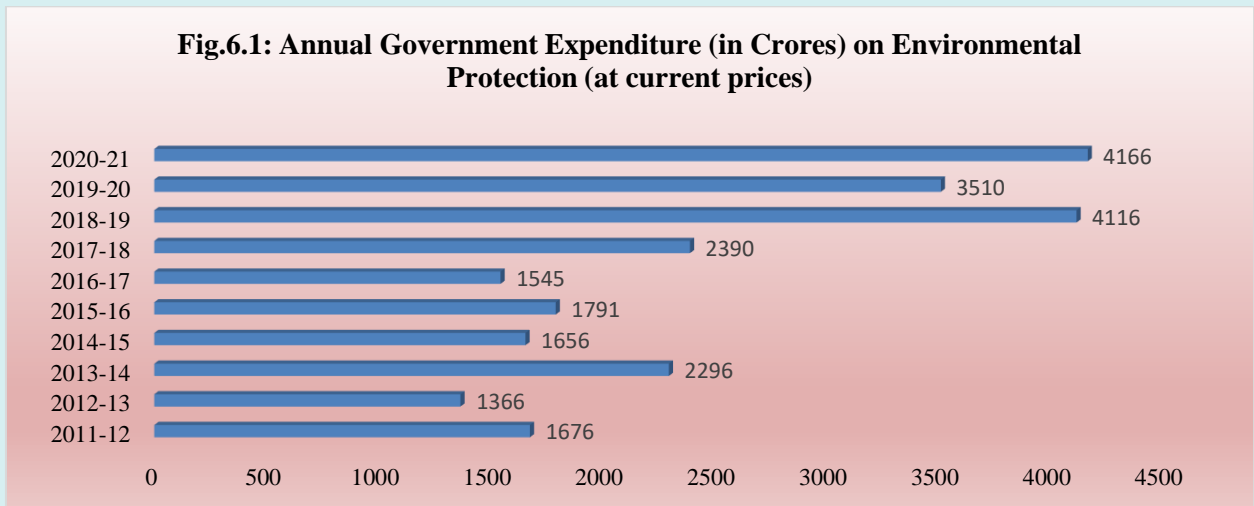
Statements on Component 6: **Environmental Protection, Management and Engagement** are numbered 6.01 to 6.14. Number of indicators included in EnviStats vis-à-vis FDES are given in the table below:

	FDES	EnviStats Vol.I
Tier I	3	1
Tier II	24	1
Tier III	23	2

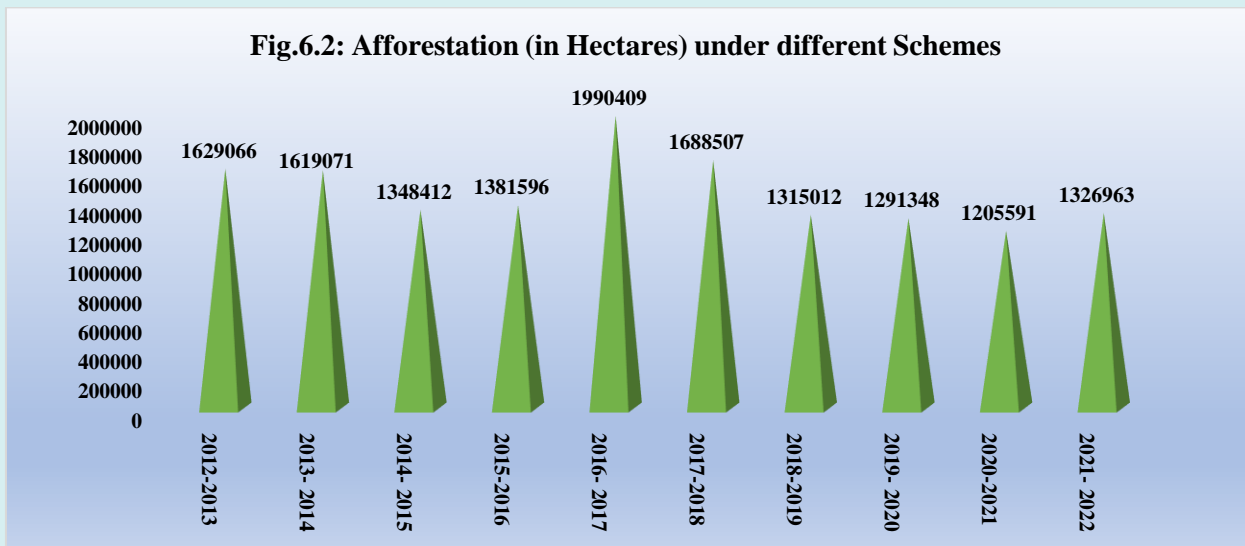
## HIGHLIGHTS

- As per **Statement 6.02**, the annual government expenditure on environment protection has increased from Rs. 1545 crore in 2016-17 to Rs. 2390 crore in 2017-18 and further, substantially increased to Rs. 4116 crore in 2018-19. However, in 2019-20, the annual government expenditure on environmental protection decreased to Rs.

3510 crore and further increased to Rs. 4166 crore in 2020-21. Year-wise trend of expenditure on environmental protection from 2011-12 to 2020-21 is depicted below.



- Targets for afforestation/tree plantation in the country under Item No.51 (a) (Area Covered under Public and Forest Lands) of Twenty Point Programme (TPP) is fixed by Ministry of Environment, Forests and Climate Change (MoEF & CC) annually to States/UTs. State/UT wise Afforestation/Tree plantation achievements in the country under Twenty Point Programme (TPP) is given in **Statement 6.04**. Area covered under plantation during 2021-22 was more than 2 lakh hectares in Gujarat, Telangana and Uttarakhand.



Similarly, the area covered under afforestation in metalliferous mines has increased from 1027.65 Ha in 2017-18 to 1472.51 Ha in 2021-22. (**Statement 6.05**)

- India is endowed with huge solar energy potential with most of the country having about 300 days of sunshine per year with annual mean daily global solar radiation in the range of 4 - 6 kWh/m<sup>2</sup>/day. To tap this energy, Ministry of New and Renewable Energy has rolled out the scheme "Development of Solar Parks and Ultra-Mega Solar Power Projects". Under the scheme, 57 solar parks have been sanctioned as on

January 2023 with 13 parks having a capacity of 1 or more Giga Watts (**Statement 6.08**).

- With an objective to provide clean gaseous fuel for cooking and organic bio-manure as a by-product, MNRE is implementing a National Biogas and Manure Management Programme (NBMMP). As of 31st March 2021, 50.8 lakh family-type biogas plants have been installed against an estimated potential of 123.4 lakh biogas plants (**Statement 6.09**)
- Eco clubs in schools empower students to participate and take up meaningful environmental activities and projects. It is a forum through which students can reach out to influence, engage their parents and neighbourhood communities to promote sound environmental behaviour. It empowers students to explore environmental concepts and actions beyond the confines of a syllabus or curriculum. While everyone, everywhere, asserts the importance of 'learning to live sustainably,' environment remains a peripheral issue in the formal schooling system. In 2021-22, 1,55,827 Eco Clubs were there in schools and colleges in India with 62.33 lakh student members. (**Statement 6.10**)

## **Conclusion**

1. FDES being a frame work with vast coverage, the data gap is also more, which the Ministry has tried to address using proxy indicators. However, there is a need, not only for awareness of environmental issues but also for awareness to create/capture data which are vital for understanding the current state of the environment, tracking changes over time, making informed decisions, and evaluating the effectiveness of environmental policies and interventions. Reducing data gaps in environmental statistics requires a concerted effort from governments, organizations, and individuals. By increasing monitoring, improving data sharing, using advanced technology, involving citizen science, and increasing funding, we can fill data gaps and obtain a more comprehensive understanding of the environment.
2. Data on Environment and related aspects are produced by different Ministries/Departments/Organisations. These should be easily accessible to a wide range of users, including policymakers, researchers, and the general public. This could be achieved through the use of open data formats and online platforms that provide easy access to the data.

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