

# Reporting of Environment-Related Statistics and Its Economic Significance: Analysing Key Environmental Statistics of Gujarat

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## **Abstract**

*Sustainable development is paramount for the well-being of current and future generations, demanding a delicate balance between economic growth, environmental protection, and social equity. This paper aims to shed light on the evolution of reporting of environmental statistics and datasets in India and the global stage and highlight their importance in crafting effective socio-economic and environmental policies. Collecting and maintaining region-specific environmental data is essential for understanding the interaction between humans and nature. This study focuses on critical environmental statistics in Gujarat such as air and water quality, land use, waste generation, pollution levels, forest area, tree cover, and expenditures on environmental protection and management. Ultimately, it seeks to convey the message that accurate information and knowledge regarding environmental statistics in each state can be instrumental in effective policy making.*

**Keywords:** *Environment Statistics, Envistats, Economic development in Gujarat, UNSD, Renewable Energy*

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Date of Submission: 10-01-2025

Date of Acceptance: 20-01-2025

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## **I. Introduction**

In today's world, despite technological advancements, environmental issues such as climate change, global warming, decreasing agricultural productivity, and melting glaciers are crucial for both developed and developing countries. It is now understood that the sustainability of economic development heavily relies on effective environmental management. Therefore, investing in environmental management today is indeed necessary to ensure a safe and secure future. Therefore, the theme of India's G20 Presidency is "Vasudhaiva Kutumbakam" i.e. "One Earth, One Family, One Future" which resembles the LiFE (Lifestyle for Environment) (Ministry of External Affairs, 2022).

For better environmental management and sustainable development, environment-related statistics play a crucial role. Analysis of environmental statistics increasingly recognizes the importance of natural capital—the stock of natural resources and ecosystems that contribute to economic activity. Integrating environmental considerations into economic analysis is essential for achieving sustainable development, promoting long-term economic stability, and ensuring the well-being of both current and future generations (Dasgupta, 2021). Many countries have committed to achieving the United Nations' Sustainable Development Goals, which include environmental objectives (United Nations, 2015). Such analysis helps assess progress toward these goals and identifies areas requiring policy interventions (OECD, 2021).

It is a well-known fact that environmental degradation and resource depletion can lead to reduced productivity, increased costs, and disruptions in supply chains. Environmental issues often result in externalities, where the costs or benefits of an activity are not reflected in market prices. (OECD, 2021). For example, pollution may impose health costs on society not accounted for by the polluting industry (Stiglitz, 2000). Economic analysis helps identify and address such market failures (Pigou, 1920). Environmental factors, such as air and water quality, directly impact human health (WHO, 2018). Poor environmental conditions can lead to increased healthcare costs, reduced labour productivity, and higher absenteeism, all of which have economic implications (UNEP, 2020). Further, it is noted that climate change poses significant risks to economies, including extreme weather events, disruptions in agriculture, and threats to infrastructure (IPCC, 2022). Integrating climate-related considerations into economic analysis helps in building resilience and adaptive capacity (OECD, 2021).

Thus, environmental statistics is crucial for gaining a comprehensive understanding of economic systems, promoting responsible resource management, and encouraging sustainable development. It acknowledges the interconnectedness of economic, social, and environmental factors, aiming for outcomes that balance prosperity with environmental stewardship (United Nations, 2015; Dasgupta, 2021).

## **II. Objective and Rationale**

This paper aims to emphasize the critical importance of reporting environmental statistics, not just at the global and national levels, but also at state and local levels. By examining the evolution and concept of environmental statistics reporting, this research reveals its undeniable value. Through an analysis of vital environmental statistics from Gujarat, it makes a compelling case that these datasets are instrumental in guiding this industrially advanced state toward adopting sustainable, eco-friendly measures that enable rapid and responsible economic growth.

## **III. Data Collection and Methodology**

The study is descriptive and elaborative in nature. It uses reports of various international organizations on environment and sustainable development which includes OECD, World Bank, United Nations etc. It takes into consideration authentic datasets for analysing environmental statistics of Gujarat. This study is based on secondary data. It includes various publications of the Government of Gujarat and the Government of India like Environmental Strategies of Gujarat (2014-19) by the Gujarat Ecology Commission, Envistats Gujarat for the last five years by the Directorate of Economics and Statistics, Gujarat Forest Statistics by the Forest Department of Gujarat, Socio-Economic Review of Gujarat, Envistats India 2023 by MoSPI, NSSO, Economic analysis of Environmental Impacts by World Bank etc.

## **IV. Concept and Evolution of Environment Statistics**

In 1984, the United Nations Statistical Division (UNSD) developed and published 'A Framework for the Development of Environment Statistics' (FDES). In 1988 and 1991, it released two reports describing the concepts and methods of environment statistics. The first report focused on human settlements, while the second report focused on the natural environment. In 1995, it developed a list of environment and related socio-economic indicators and in 1997, it published a Glossary of Environmental Statistics. UNSD started environment related international data collection process through questionnaire from the year 1999, repeated in 2001/2002 and after that with some modifications in 2004, data collection process initiated jointly with United Nations Environment Programme (UNEP). Since then, UNSD has been guiding and providing best practices to be followed in collecting basic environment statistics to different countries via environment statistics manual. The aim is to develop environment indicators and accounts. To avoid duplication of efforts in data collection, UNSD works closely with organizations such as the OECD, Eurostat, UNEP, the UN Division of Sustainable Development, and regional commissions, as well as with specialized agencies, international conventions, and NGOs. In 2013, UNSD introduced the revised version of FDES, which was endorsed by the United Nations Statistical Commission as the framework for strengthening environment statistics programmes and acknowledged as an important manual for sustainable development goals and the post-2015 development agenda (United Nations Statistics Division, 2017).

During the 5<sup>th</sup> conference of Central and State Statistical Organizations (CSSO) held in New Delhi in 1981, the topic of environment statistics was discussed for the first time. After the recommendation in the 7<sup>th</sup> conference of CSSO held in 1985, a multi-disciplinary working group was formed in 1986 to review the availability of data, identify various parameters and assign priority to major areas of concerns for the environment. In November 1990, the group submitted its report and provided a provisional framework for the development of environment statistics in India based on UNSD guidelines. In 1996, an Environment Statistics Cell was set up in CSO for compilation and dissemination of data on environment. In the same year, a steering committee on Environment Statistics was constituted and on the basis of discussions in the committee, CSO prepared a draft of the Compendium of Environment Statistics. Thus, India also adopted UNSD framework for development of environment statistics and Central Statistical Office under the Ministry of Planning and Programme Implementation came with the first publication of 'Compendium of Environment Statistic' in 1997. Up to March 2017, sixteen issues of this compendium had been brought out by CSO. 'Statistics related to Climate Change' was another publication by the office during 2013 to 2015. Since 2018, CSO merged these two publications based on FDES 2013 given by UNSD and named it as '*EnviStats - India*' (CSO, 1999).

Government of Gujarat also understood the importance of environmental statistics and established the Department of Forest and Environment. The department has four executing agencies namely, Gujarat Pollution Control Board (GPCB), Gujarat Ecology Commission (GEC), Gujarat Institute of Desert Ecology (GIDE) and Gujarat Environmental Management Institute (GEMI) for implementation of any environment related function.

Gujarat followed UNSD framework for development of environment statistics which was adopted by the steering committee on Environment Statistics under the CSO, India during 1996. Hence, the Directorate of Economics and Statistics (DES) of Gujarat brought out the first edition of the Compendium of Environment Statistics Gujarat in the year 2010. But as mentioned earlier after the introduction of FDES 2013, DES of Gujarat also changed the name as 'EnviStats- Gujarat' and published its first EnviStats – Gujarat 2019 in March 2019 (Directorate of Economics and Statistics, 2023).

Components of FDES 2013 which are to be followed by EnviStats – India and EnviStats- Gujarat respectively (Department of Economic and Social Affairs, 2017). They are:

1. Environmental Conditions and Quality
2. Environmental Resources and their use
3. Residuals
4. Extreme Events and Disasters
5. Human Settlements and Environmental Health
6. Environmental Protection, Management and Engagement

Thus, environment statistics came up gradually in India and Gujarat. They delineate the qualitative and quantitative aspects of the state and changes in the environment, as well as its interaction with human activities and natural events (United Nations Statistics Division, 2012). It is relatively a young branch of statistics having multi- disciplinary nature. Environment statistics come from various sources, and different methods are used to compile them. These statistics typically pull together data from different subject areas and sources to aid in developing and assessing integrated socio-economic environmental policies. The goal is to offer statistical information that enhances public awareness and supports policy decisions based on evidence (Directorate of Economic and Statistics, 2023). Economic analysis of environmental issues related statistics is crucial for promoting intergenerational equity. As suggested by United Nations Statistics Division, environmental statistics come with different themes which include atmosphere, climate, ambient air, biodiversity and biota, land, forest, water, ocean, natural resources, pollution, environmental quality, residuals and waste, environmental protection expenditure, environmental management, etc. (United Nations Statistics Division, 2012).

## **V. Analysis of Environment Related Statistics of Gujarat**

During the past one-decade Gujarat has achieved remarkable success in industrial investment and expansion. The state plays an important role in India's economic growth. It accounts for 5.97 % of India's geographical area and 5% of the population, 33% of the national exports and 8.2% GDP of India. Gujarat is a maritime state with having 1600 km long coastline, rich biodiversity of flora-fauna and natural resources. India's westernmost state, Gujarat, is rapidly emerging as an industrial powerhouse. The state's economic landscape is dominated by companies producing petrochemicals, fertilizers, and pharmaceutical products, employing millions of residents. Gujarat has an 18.14% share in all India industrial output as on 2019-20. With the best investment climate and friendly industrial policies, Gujarat has become an industrially vibrant state. It is also noted that Gujarat has the highest share in the manufacturing sector in the National Manufacturing GDP as of 2020-21. Under various innovative policies to promote industrial development in the state, the Gujarat government has framed a Drone Promotion and Usage Policy, Semiconductor Policy, Cinematic Tourism Policy, Student Start-up and Innovation Policy, Telecom Infrastructure Policy, IT/ITeS Policy and Bio-Technology Policy (Directorate of Economics and Statistics, 2023). But with the increased industrialization and urbanization, a large flow of wastage is being created.

Gujarat is home to over 7000 units that produce hazardous waste, accounting for more than a quarter of India's total. (United Nations Environment Programme, 2018). Gujarat has 20.60% of degraded land area as recorded up to March 2018, 480.12 sq. kms. of area under National Parks and 16622.22 sq. km. of area under sanctuaries, 1,38,15,600-hectare land under gross cropped area, 84,313 under gross irrigated area i.e. 61.03% of gross cropped area and 52,382 under net irrigated area in the year 2021(NSO, 2023).

Mahadevia (1999) in her book on Economic Growth and Environmental Degradation discussed about the case of Gujarat for neglecting the negative effects of industrial development on the environment. It emphasized the environmental consequences of Gujarat's rapid economic growth and the severe impact on a segment of the population, leading to inequity within the system. The case of Gujarat was cited as an example where economic growth took precedence over equity across regions, social groups, and generations, as well as short-term wealth generation over long-term sustainability. Analysis of various data on water, air, soil, and forests led to the conclusion that Gujarat had experienced imbalanced development. It was further noted that the nature of industrialization, low forest cover, increasing exploitation of groundwater, and declining availability and quality of water were major contributors to environmental degradation.

### Air and Water

Industrial activities, vehicular emissions, and construction projects contribute to air pollution in Gujarat. Major cities like Ahmedabad and Surat often experience high levels of particulate matter (PM), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>). Today air pollution is a major cause of sudden or premature death of a person in the world especially in developing countries like India. It is a significant environmental threat to the society. The risk due to air pollution is measured by looking at the ambient particulate matter pollution, household air pollution, and tropospheric ozone. The main sources of ambient particulate matter pollution in Gujarat are construction activities, emission from vehicles, re-suspensions of road dust, burning of domestic fossil fuels, open burning of solid waste, emissions from industries like chemicals, textiles, pharmaceuticals etc., transportation of construction materials such as sand, soil etc. without covering. (Gujarat Pollution Control Board, 2019).

**Table 1.1 Ambient air quality in major cities**

City	2014	2015	2016	2017	2018	2019	CAGR
Ahmedabad	13	13	14	14	16	20	7%
Bangalore	13	6	3	2	2	3	-22%
Chennai	13	13	10	9	9	9	-6%
Delhi	5	5	7	7	15*	14*	19%
Hyderabad	5	4	4	6	5	5	0%
Kolkata	9	7	4	6	6	8	-2%
Mumbai	4	4	6	3	2	2	-11%

\* Delhi: Continuous ambient air quality monitoring data

In the above table 1.1, it is seen that among the major cities of India, Ahmedabad is having highest PM<sub>10</sub> level which has been increasing since 2014. This is because of many reasons including increasing use of four wheelers, construction activities like Metro-Rail, commercial and residential buildings etc. Bangalore, Kolkata, Mumbai, Hyderabad and Chennai have succeeded in reducing their air pollution during the period from 2014 to 2019.

In addition, due to the presence of major ports in the state, there is a significant amount of cargo movement and industrial development in Gujarat. As of 2019-20, there were 2.52 crore registered vehicles and 4,575 fuel retail outlets in the state, leading to a total petroleum consumption of 10.52% of India's total consumption. Consequently, the state is more susceptible to VOC-induced air pollution. VOCs (Volatile Organic Compounds) are organic chemical compounds that evaporate under normal atmospheric conditions of temperature and pressure. The primary outdoor sources of VOC emissions in Gujarat are the combustion and distribution of petroleum products, which contain traces of Benzene, Toluene, and Xylene (BTX). The levels of VOCs contribute to the formation of ground-level ozone. According to reports by GPCB from 2014-15 to 2019-20, the concentration of Benzene and o-Xylene have significantly increased. It is proven that exposure to high levels of these two compounds causes neuro-toxic symptoms, and persistent exposure may result in injury to human bone marrow, DNA damage in mammalian cells, and damage to the immune system (Government of Gujarat, 2022).

It is also observed from the table 1.2 that ambient air quality under National Air Monitoring Programme 2021, Ahmedabad, Ankleshwar, Jamnagar, Rajkot, Surat, Vadodara and Vapi have PM<sub>10</sub> level of 102 µg/m<sup>3</sup> (microgram per cubic meter of air) which is above National Ambient Air Quality Standards of 60 µg/m<sup>3</sup> (Residential / industrial / rural / other areas).

**Table 1.2 Ambient air quality in cities of Gujarat under NAMP (National Air Monitoring Programme) (2021)**

Cities	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Ahmedabad	14	18	102	28
Ankleshwar	15	21	92	32
Jamnagar	14	17	92	25
Rajkot	14	17	97	27
Surat	20	25	100	37
Vadodara	15	18	91	26
Vapi	17	22	90	34

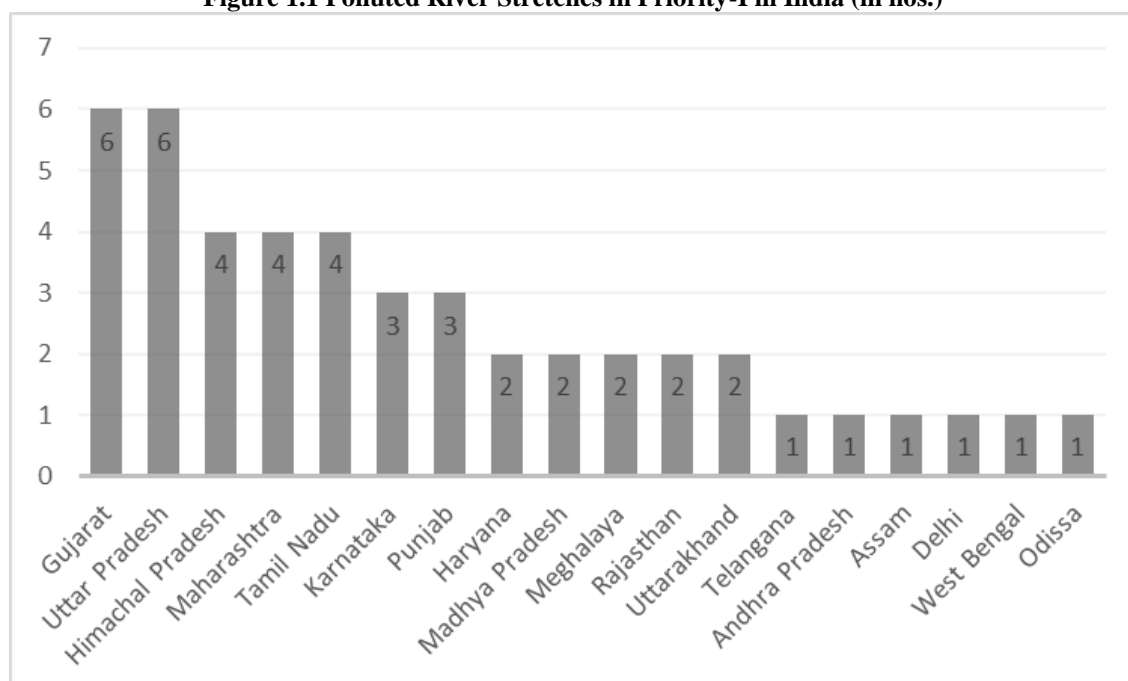
Source: EnviStats – India 2023, MoSPI, GoI

Note: National Ambient Air Quality Standards (NAAQS) (annual): SO<sub>2</sub>=20µg/m<sup>3</sup>, NO =30 µg/m<sup>3</sup> PM<sub>10</sub>=60 µg/m<sup>3</sup> (Residential / industrial / rural / other areas), PM<sub>2.5</sub> = 40 µg/m<sup>3</sup> (Ecologically sensitive area)

Recently, The Union Ministry of Environment, Forests and Climate Change has revealed that Gujarat has the highest number of highly polluted river stretches in India. Six stretches in Gujarat were classified as critically polluted for four years from 2018 to 2022. Sabarmati, Amlakhadi, Bhadar, and Khari have remained

critically polluted for the past four years. Among these rivers, all except Amlakhadi have biological oxygen demand levels that exceed the permissible level of 3 mg/L. Poor wastewater treatment and heavy industrialization are cited as key reasons for the increasing river pollution. Out of 46 polluted river stretches identified in 18 states and Union Territories, the highest number of highly polluted river stretches are in Gujarat, which is shown in the following figure 1.1 (Parikh, 2023).

**Figure 1.1 Polluted River Stretches in Priority-I in India (in nos.)**



Source: Times of India, March 25, 2023

It is observed from the following table 1.3 that net availability of ground water in Gujarat increased from 0.13 billion cubic meter (BCM) per year in 2010 to 24.91 billion cubic meter per year in 2020. It is also seen that during this one decade, annual ground water draft for irrigation increased to 12.65 BCM/year while for industrial and domestic as combined use was increased by 0.62 BCM/year. Another interesting statistics is that projected demand for domestic and industrial uses up to 2025 was increased by 0.74 BCM/year which shows that increasing urbanization and industrialization have more demand for water in future.

**Table – 1.3 Ground Water Resources of Gujarat (BCM/year)**

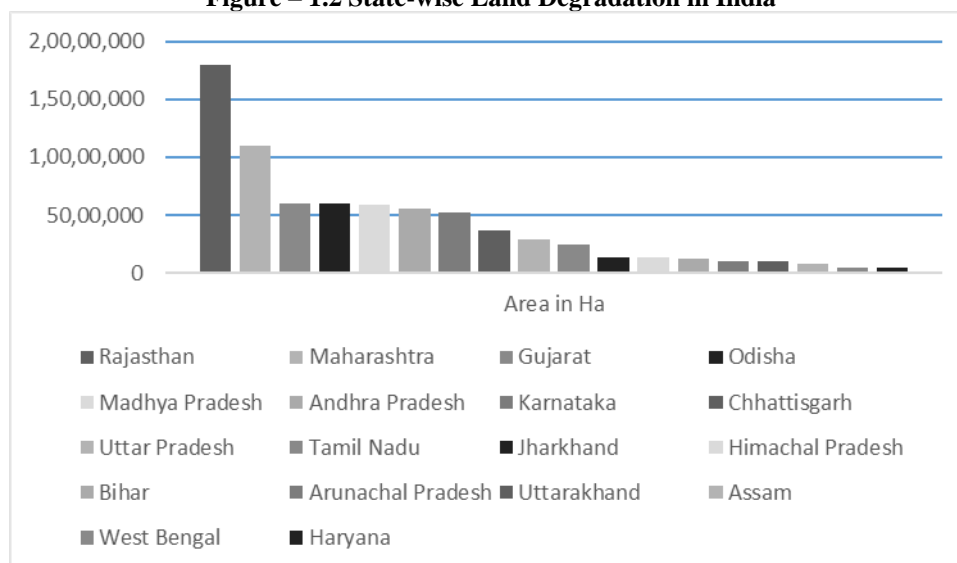
Category	Ground Water Resources	2010	2020
Monsoon Season	Recharge from rainfall	0.14	19.59
	Recharge from other sources	0.01	2.89
Non-monsoon Season	Recharge from rainfall	0.01	0
	Recharge from other source	0.07	4.32
	<b>Total</b>	<b>0.22</b>	<b>26.81</b>
Net Annual Ground water Availability		0.13	24.91
Annual Ground Water Draft	Irrigation	0.01	12.65
	Industrial uses & Domestic Uses	0.03	0.65
	<b>Total</b>	<b>0.04</b>	<b>13.3</b>
Projected Demand for Domestic and Industrial uses up to 2025		0.04	0.78
Ground Water availability for future irrigation		0.08	12.52
Stage of Ground Water Development (%)		33	53.39

Source: Compendium of Environment Statistics – 2013 & EnviStats – India 2023, MoSPI, GoI

### Land

Gujarat has the third largest land degradation in India having 59,88,898 hectares of land under land degradation. As seen from the following Figure 1.2, Rajasthan (18,034,066 ha) has the highest amount of land degradation followed by Maharashtra (10,992,906 ha), Odisha (5,967,117 ha), Madhya Pradesh (5,909,442 ha), Andhra Pradesh (5,510,756 ha), Karnataka (5,270,205 ha) etc.

**Figure – 1.2 State-wise Land Degradation in India**



Source: *EnviStats India- 2023, MoSPI, NSO, SSD, Gol*

**Table – 1.4 Land Degradation in Gujarat (by type)**

S.No.	Land Degradation in Gujarat	2005-06	2015-16	% change
1	Water Erosion	1624152	1618709	-0.34
2	Wind Erosion	1392	1328	-4.60
3	Water Logging	94290	85339	-9.49
4	Salinization	3839898	3793377	-1.21
5	Anthropogenic	25127	35645	41.86
6	Others	469712	454500	-3.24
	Total	6054571	5988898	-1.08

Source: *EnviStats India- 2023, MoSPI, NSO, SSD, Gol*

It has been noted from the above table 1.4 that anthropogenic land degradation in Gujarat during 2005-06 to 2015-16 has been increased by 41.86 percent. While land degradation by water erosion, wind erosion, salinization and others have been reduced.

**Forest, Tree and Mangrove**

Now if we look at forest cover in the state, it is observed in the following table- 1.5 that area under forest cover has increased from 12913 sq. km. on 2000-01 to 14926 sq.km. in 2019-20. That means during the same period, the area under forest cover as a percentage of total geographical area of the state has increased from 6.59 percent to 7.61 percent. It is hardly 1.02 percent increase during these two decades. The share of Gujarat in the total forest cover of India is 2.09 percent as on 2019-20 as shown in the figure- 1.3.

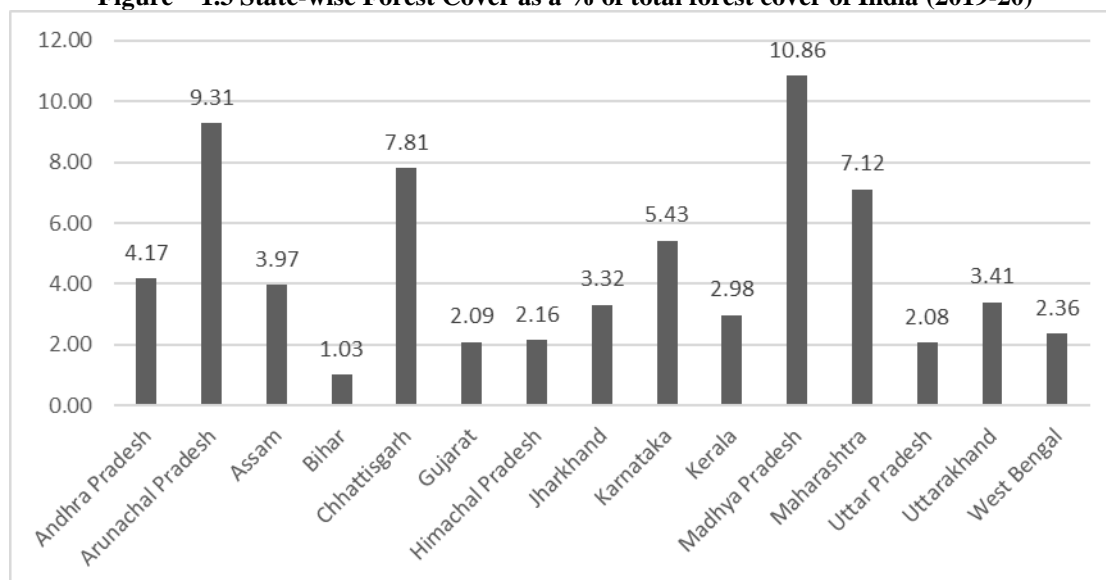
**Table – 1.5 Forest cover in Gujarat**

Year	Area under Forest Cover (Sq.Km.)	Area under Forest Cover as a % of Total Geographical Area of Gujarat (percentage)
2000-01	12913	6.59
2002-03	14814	7.56
2004-05	14715	7.51
2006-07	14620	7.46
2008-09	14620	7.46
2010-11	14619	7.46
2012-13	14653	7.48
2014-15	14660	7.48
2015-16	14757	7.53
2018-19	14857	7.58
2019-20	14926	7.61

Source: *Gujarat Forest Statistics, 2021-22*

In the following figure-1.3, the forest cover of each state as a percentage of India's total forest cover is provided. Madhya Pradesh has the highest percentage of forest cover, followed by Arunachal Pradesh, Chhattisgarh, Maharashtra, Karnataka, Andhra Pradesh, and so on. As of 2019-20, India's total forest cover is 21.71 percent of its total geographical area.

**Figure – 1.3 State-wise Forest Cover as a % of total forest cover of India (2019-20)**



Trees are the major source of oxygen and they protect the environment by air purification. Trees are helpful in reducing the greenhouse effect and noise pollution on the earth. Tree cover was only 2.06 percent of total geographical area of the state in 2000. Tree cover in Gujarat has reduced over a period of time from 2010-11 as seen from the following table – 1.6. It was 8358 sq.km. in the year 2010-11. Then it reduced to 7914 sq.km. in 2013-14. While it slightly increased in the year 2015-16 by 110 sq.km. but again in 2017-18 and in 2019-20, it reduced to 6912 sq.km. and 5489 sq.km. respectively. In the year 2002, tree cover increased drastically to 5.40 percent but afterwards there was no such increase in tree cover till 2019-20. Overall, there has been only 0.74 percent net increase in tree cover during last two decades.

**Table – 1.6 Tree Cover in Gujarat**

Year	Tree Cover (Sq.Km.)	Tree Cover as a % of Total Geographical Area of Gujarat
2000	4036	2.06
2002	10586	5.40
2004	7621	3.89
2006	8390	4.28
2008-09	7837	3.99
2010-11	8358	4.26
2013-14	7914	4.04
2015-16	8024	4.09
2017-18	6912	3.53
2019-20	5489	2.80

Source: Extracted from *EnviStats India 2023, MoSPI, NSO, SSD, GoI*

Mangrove plays important role in sustaining the ecosystem of coastal region. The mangroves are prevalent along the east and west coasts of the mainland India, as well as on the islands of Andaman and Nicobar and Lakshadweep. It helps to protect soil from erosion and ingress of salt in the nearby land of coastal area. Mangroves are called the natural infrastructure on the earth. Gujarat has the second largest mangrove cover in India after Sunderban of West Bengal. During the last two decades, it has consistently increased by two and half folds. Mangroves are found in 13 coastal districts in Gujarat. Katchh and Jamnagar are the most important districts for mangroves. Gujarat has a share of 23.54 percent in the total mangrove cover in India. As on 2021, total mangrove cover in the state is 1175 sq.km. which is 0.60 percent of the total geographical area of the state. Since 2000, it has increased by 264 sq.km. as shown in the following table – 1.7.

**Table-1.7 Mangrove Cover in Gujarat**

Year	Mangrove Cover (Sq. Km.)	As a % of Total Geographical Area of Gujarat	As a % of Total Mangrove Cover of India
2001	911	0.46	20.33
2003	916	0.47	20.59
2005	991	0.51	21.63
2009	1046	0.53	22.55
2011	1058	0.54	22.69
2013	1103	0.56	23.83
2015	1107	0.56	23.35
2017	1140	0.58	23.17
2019	1177	0.60	23.66
2021	1175	0.60	23.54

Source: Extracted from EnviStats India 2020, MoSPI, NSO, SSD, GoI

### Waste Generation

As on March 2022, Ahmedabad, Vadodara, Surat, Bharuch, Valsad, Mehsana and Kutch are the major captive hazardous waste incinerators in Gujarat. According to GPCB Annual Report 2021-22, Gujarat has 96 sewage treatment plants in major cities of Ahmedabad, Surat, Rajkot and Valsad. Gujarat has 62 sewage treatment plants under installation in small towns and 27 are under planning. Total hazardous waste generated per capita in the year 2020-21 in Gujarat is 5.634 tonnes. Out of this 30.5 % of hazardous waste is treated by sanitary landfill, 3.6 % by incineration, 5 % by recycling, 5.6 % by reuse and 20.5 % by waste to energy mode. In India, Gujarat is the state where nearly 100 % of the Municipal Solid Waste is collected and 67 % of it is managed in controlled facilities (NSO, 2023). If we look at the category-wise generation of solid waste in Gujarat, the following table 1.8 indicates that there was a reduction of 3.3% of municipal solid waste generation between 2018-19 to 2020-21. However, during the same period, there was a significant increase in the generation of bio-medical waste, hazardous waste and e-waste which rose by 31.9 %, 21.0% and 86.6 % respectively. The primary reason for these increase can be attributed to the impact of Covid-19.

**Table – 1.8 Category-wise Generation of Solid Waste in Gujarat (in tonnes)**

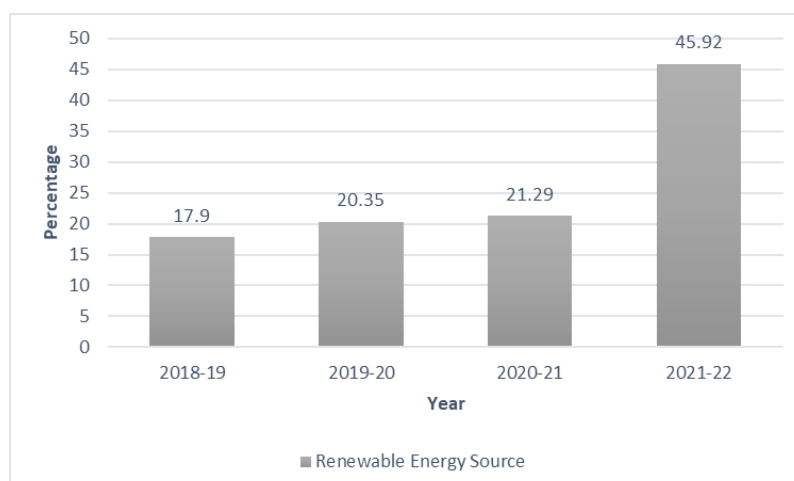
Waste Category	Generation of Solid waste in Gujarat			% change between 2018-19 to 2020-21
	2018-19	2019-20	2020-21	
Municipal Solid Waste	3911340	3925575	3786433	-3.3
Bio-Medical Waste	12303	13294	18064	31.9
Hazardous Waste	2521317	2485317	3193378	21.0
E-waste	3107	14186	23501	86.8
Plastic Waste	356873	408201	337694	-5.7

### Energy

Gujarat is producing the renewable energy in form of wind, hydro, biomass, waste and solar. Gujarat is second largest state in generating renewable energy in India in 2021-22 after Karnataka. Gujarat has 14.15 percent share of renewable energy generation in India. It is good to note in the following figure that percentage share of renewable energy generation in total energy generation in Gujarat has increased from 17.9 percent in 2018-19 to 45.92 percent in 2021-22 which shows the 28.02 percent increase during this period.

**Figure –1.4 Percentage share of Renewable Energy in total energy generation in Gujarat**





Source: CMIE states of India

Gujarat is leading state in availability of electricity and power generation. The state has power deficit of 9.5 percent in 2001-02 which came down to zero in 2022-23 as shown from the following table 1.9. Since 2013-14, the power deficit has remained zero percent. It is also noted that power requirement in the state has increased by 85669 million kwh during last twenty years and the availability has also increased by 90655 million kwh. It will increase further in the coming years as shown in the table 1.9. Further, from 2011-12 to 2022-23, the CAGR for power requirements and availability has been an impressive 5%. This growth presents an opportunity for the government to enhance energy infrastructure and improve efficiency to meet the rising demands for power in a sustainable manner.

**Table –1.9 Power requirement, availability and deficit**

Year	Power requirement	Power availability	Power deficit	Power deficit
	Million kwh	Million kwh	Million kwh	Per cent
2001-02	53,125.00	48,098.00	-5,027.00	-9.5
2005-06	57,224.00	52,763.00	-4,461.00	-7.8
2009-10	70,369.00	67,220.00	-3,149.00	-4.5
2011-12	74,713.00	74,446.00	-267	-0.4
2012-13	93,475.00	88,902.00	-4,573.00	-4.9
2013-14	88,497.00	88,488.00	-9	0
2014-15	96,235.00	96,211.00	-24	0
2015-16	1,03,544.00	1,03,540.00	-4	0
2016-17	1,03,706.00	1,03,705.00	-1	0
2017-18	1,09,985.00	1,09,973.00	-12	0
2018-19	1,16,588.00	1,16,572.00	-16	0
2019-20	1,13,940.00	1,13,939.00	-1	0
2020-21	1,11,622.00	1,11,622.00	0	0
2021-22	1,23,953.00	1,23,667.00	-286	-0.2
2022-23	1,38,794.00	1,38,753.00	-41	0
<b>Forecast*</b>				
2025	1,44,147.81	1,44,936.12		
2030	1,63,600.14	1,65,497.30		
2035	1,86,297.68	1,87,986.54		

Source: CMIE states of India & \*Author's calculation

Recently, Government of Gujarat has started Vande Bharat express. Its second version from Gandhinagar to Mumbai is equipped with advanced features with Wi-Fi content on-demand facility. The new version of the ACs is eco-friendly, boasting 15% greater energy efficiency. What's more, it comes equipped with a cutting-edge photo-catalytic ultraviolet air purification system in the Roof Mounted Package Unit (RMPU) for superior air quality. (Directorate of Economics and Statistics, 2023).

### Health Impacts

A recent article in Lancet Planet Health (2019) sheds light on the profound economic impact of air pollution on health in Indian states. The study revealed that a staggering 1.6 million deaths in India in 2019—equivalent to 17.8% of total deaths—were directly linked to air pollution. The primary culprits were ambient particulate matter pollution and household air pollution. Shockingly, while the death rate due to household air pollution decreased by 64.2% from 1990 to 2019, the death rate from ambient particulate matter pollution

surged by 115.3%. These findings underscore the urgent need for comprehensive action to address the severe health impacts of air pollution in India.

In 2019, air pollution led to a staggering economic loss in India. The output loss from premature deaths due to air pollution amounted to a massive US \$28.8 billion, while the output loss from morbidity accounted for an economic loss of US \$8 billion. Together, these losses totalled \$36.8 billion, which equates to 1.36% of India's gross domestic product (GDP). Furthermore, in Gujarat alone, the economic losses due to premature deaths and morbidity attributable to air pollution were US \$2288 million and US \$571 million, respectively. This means that the per capita economic loss due to air pollution in Gujarat was around US \$41.3 million. (India State-Level Disease Burden Initiative Air Pollution Collaborators, 2020)

Cholera is an acute diarrhoeal illness caused due to water contamination. According to National Health Profile of India- 2022, Gujarat had 79 cases of cholera in 2021 next to West Bengal which had 603 cases out of all India cases of 836. In 2020, 371 people died due to Acute Diarrhoeal Disease in Gujarat out of total 1880 deaths in India. Gujarat has recorded 7,41,205 cases of acute diarrheal disease in the year 2019. During 2017 to 2022, Gujarat has recorded 83,480 cases of chikungunya fever. During 2020 to 2022, total 13,922 cases of Malaria and 17,358 cases of Dengue have been recorded in Gujarat (NSO, 2023).

### Expenditure on Environmental Protection, Management and Engagement

In Gujarat, under the Swachhh Bharat Mission – Urban, Rs. 597.76 crore and Rs. 410.80 crores have been allotted to 8 Municipal Corporations and 156 Municipalities, respectively, for Solid Waste Management in 2022-23.

Expenditure on science, technology and environment as a percentage of total expenditure on revenue account has increased from 0.19 percent in 2014-15 to 0.67 percent in 2021-22 (P). As a percentage of total developmental expenditure, it has increased from 0.29 in 2014-15 to 1.03 in the year 2021-22 (P) and as a percentage of total expenditure on economic services, it has increased to more than 3 percent in 2021-22 (P). It shows in the following table 1.10.

**Table – 1.10 Revenue Expenditure on Science, Technology and Environment in Gujarat**

Year	As a % of Total Expenditure	As a % of Total Developmental Expenditure	As a % of Total Expenditure on Economic Services
2014-15	0.19	0.29	0.79
2015-16	0.24	0.37	1.13
2016-17	0.24	0.37	1.10
2017-18	0.29	0.45	1.27
2018-19	0.22	0.35	0.94
2019-20	0.34	0.53	1.51
2020-21	0.60	0.92	2.42
2021-22 (P)	0.67	1.03	3.02

Source: Calculated from Socio-Economic Survey, 2019-20 & 2022-23 Directorate of E&S, GoG

There has been an increase of Rs. 41.16 crore in annual corporate expenditure on environment protection during 2014-15 to 2020-21 in environment sustainability sector and in that way total Rs. 201.54 crore has been spent under this sector as shown in the following table 1.8. While Rs. 230.28 crore has been spent across three sectors of the economy during 2014-15 to 2020-21.

**Table-1.11: Annual Corporate Expenditure on Environment Protection in Gujarat (CSR spent- in Rs. Cr)**

Year	Environmental Sustainability Sector	Across 3 Sectors (Agri./Ind./Services)
2014-15	8.75	9.31
2015-16	14.46	15.71
2016-17	12.61	14.25
2017-18	29.23	31.12
2018-19	37.77	42.49
2019-20	37.54	40.90
2020-21	49.91	64.25
<b>Total</b>	<b>201.54</b>	<b>230.28</b>

Source: Extracted from EnviStats India 2022, MoSPI, NSO, SSD, GoI

## VI. Conclusion

After looking at the various statistics of environment of Gujarat it has been noted that it is urgently required for the government to take care of air quality of major cities in Gujarat. Besides, the quality of river stretches of the state, increase in anthropogenic land degradation, increase in bio-medical waste, hazardous waste and e-waste, reduction in tree cover as a % of total geographical area of the state are significant indicators for unsustainable socio-economic development. Therefore, the state government started initiatives to increase the forest cover and mangrove cover in the state. It has also increased the development expenditure on science, technology and environment as a part of the revenue expenditure since 2014-15. Further, it is noted that there has been an increase in annual corporate expenditure on environment protection during last one decade. There is an increase in environmental expenditure by CSR activities also in Gujarat. It is noted that Gujarat has sound position in renewable power generation capacity in India as seen in the above statistics on energy. Besides, Government of Gujarat has declared a new Energy Policy 2023-28 and targeted a 50% energy generation from renewable sources like wind, solar, and wind-solar hybrid by 2030 (Directorate of Economic and Statistics, 2024).

Hence, the intricate and multifaceted connection between environmental statistics and the economic growth of any state cannot be overstated. It necessitates a deep understanding of how various economic activities impact the environment, including resource depletion, pollution, and habitat destruction. Simultaneously, it is essential to comprehensively grasp how environmental conditions, such as air and water quality, biodiversity, and climate stability, can significantly influence economic development through factors like public health, natural resource availability, and infrastructure costs. In summary, this paper aims to comprehend and assess the current environment statistics in relation to their socio-economic value. Thus, transparency and accessibility of environment-related data will empower people to make informed decisions and drive sustainable practices.

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