



## SPATIO-TEMPORAL CHANGES OF FOREST AREA IN GUJARAT STATE

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 OPEN ACCESS

Received: 22.09.2020

Accepted: 15.11.2020

Published: 27.11.2020

**Citation:** Dehingia H, Surendra P. (2020). SPATIO-TEMPORAL CHANGES OF FOREST AREA IN GUJARAT STATE. Geographical Analysis. 9(2): 42-50. <https://doi.org/10.53989/bu.ga.v9i2.9>

**Funding:** None

**Competing Interests:** None

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Published By Bangalore University, Bengaluru, Karnataka

**ISSN**

Print: 2319-5371

Electronic: XXXX-XXXX

### Abstract

*In this paper an attempt has been made to analyse the Spatio-temporal changes of forest area in Gujarat state. This study is based on secondary data collected from the Gujarat forest department and forest survey of India for the period of 2001-02 to 2018-19. The trends in forest area of Gujarat state from 2001-02 with 9.7% and in the year 2018-19, thus making the forest area 11.4% of the total geographical area. The forest area under reserved forest 75.3%, protected forest 2.0% and unclassed forest 23.7% of Gujarat during the period of 2001-02 and 2018-19 reserved forest 66.7%, protected forest 13.3% and unclassed forest 20.1%. The study covers 33 districts of Gujarat state which come under the variation in spatio-temporal changes in the forest area of different divisions during the period of 2001-02, 2010-11 and 2018-19.*

**Keywords:** Forest area; temporal changes

### Introduction

A forest is a large area of land dominated by trees. Forests are the dominant terrestrial ecosystem of Earth, and are distributed around the globe. Forests account for 75% of the gross primary production of the Earth's biosphere, and contain 80% of the Earth's plant biomass. The origins of the word link back to the Latin 'foris' meaning 'outside', so that rather than an area of dense tree cover, the term originally referred to any land 'outside of cultivation'. FAO's Forest Resources Assessment (FRA) defines forest as land with certain characteristics that determine its demarcation. Under this definition, harvesting or clearing of all trees from a tract of land does not constitute deforestation in cases "where the forest is expected to regenerate naturally

or with the aid of silvicultural measures within the long-term".

According to the 2019 report, the total forest cover of India is 712,249 square kilometres (21.67 percent of India's total geographical area) slightly up from 708,273 sq. km (21.54 percent) in 2017. The tree cover of the country is 95,027 sq. km (2.89 percent of the total area) again slightly up from 93,815 sq. km. (2.85 percent) in 2017.

Gujarat state having total geographical area of 1,96,024 sq. kms is located on the western most part of the country. The climatic condition of the State is tropical. Forest area of the state is 21909 km<sup>2</sup> of which 14769.58 km<sup>2</sup> area is reserved forest, 3001.40 km<sup>2</sup> is protected forest and 4102.44 km<sup>2</sup> area is unclassed forest. This constitutes 11.18% of the geographical area of the state.

## Objectives

- The present study is to assess the trend and spatio-temporal change in forest area and forest cover in Gujarat state.

## Study Area

Gujarat, the Land of the Legends stands bordered by Pakistan and Rajasthan in the northeast, Madhya Pradesh in the east, and Maharashtra and the Union territories of Diu, Daman, Dadra and Nagar Haveli in the south. The Arabian Sea borders the state both to the west and the southwest. It is located between 20°01' to 24°07' north latitudes and 68°04' to 74°04' East longitude. It experiences diverse climatic conditions, wet in the southern districts and desertic in the north-west region. Summer temperature varies between 25 degrees to 45 degrees. Winter temperature varies between 15 degrees to 35 degrees and monsoon temperatures from 27 degrees to 35 degrees. Its ecosystem ranges from deserts, scrublands, grasslands, deciduous forests, and wetlands to mangroves, coral reefs, estuaries, and gulfs.

The topography of Gujarat shows wide variations. It is located near the Thar desert, therefore most of the land is dry and arid in nature. Moreover, the topography of Gujarat is characterized by the small hilly tracts especially around the Rann of Kutch region.

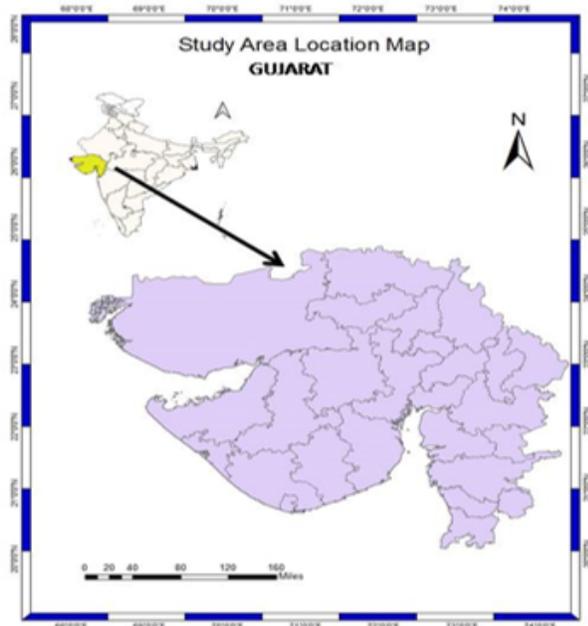


Fig. 1. Study area map

## Methodology

Present study based on secondary data was collected from various sources such as Gujarat Forest Department, Forest Survey of India and review of literature. Quantitative techniques were mostly used for the study. Simple statistical techniques were used to facilitate visual interpretation.

a) Forest area data of Gujarat were collected from the Gujarat Forest Department and Forest Survey of India for the period of 2001-02 to 2018-19.

b) Trends of yearly change in the forest area data of Gujarat were collected from Gujarat Forest Department. Here we have studied how the area changes from 2001-02 to 2018-19 and the reasons behind it.

c) Classified forest area under reserved forest, protected forest and unclassified forest differs in different divisions of the Gujarat state. We have also included the temporal changes in the forest area of different divisions during the period of 2001-02, 2010-11 and 2018-19.

d) The state has been categorized into four divisions i.e., Central Gujarat, north Gujarat, Saurashtra-Kutch & south Gujarat and the assessment has been done for over a period of 18 years.

## Results and Discussions

A temporal change refers to the changing of a particular phenomenon or certain size or quantity in a period of time. Here, temporal change in forest area and forest cover shows how the forest area and forest cover is changing in different divisions of Gujarat during the period of 2001-02 to 2018-19.

### Trend of forest area

A trend shows a general direction in which something is developing or changing. Trends of forest area show the year wise forest area of Gujarat from 2001-02 to 2018-19 in which the forest area of Gujarat is changing towards 2018-19.

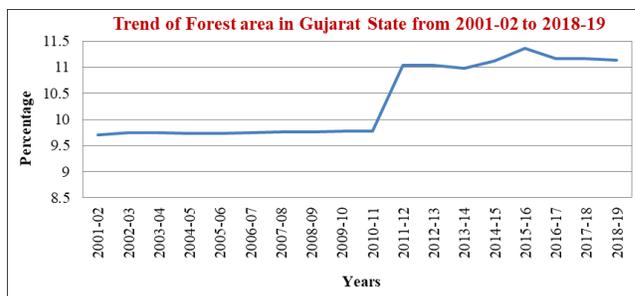


Fig. 2. Trends of forest area in Gujarat from 2001-02 to 2018-19

Table 2 represents the trends in forest area of Gujarat state from 2001-02 to 2018-19. The data as depicted in the figure shows that Forest area was unchanged till 2003-04 with 9.74%

**Table 1. Trend of Forest area in Gujarat State from 2001-02 to 2018-19**

Divisions	No. of District	Name of District	Area (in Sq.Km)	Sr. No.	Year	% to Geographical Area
Central Gujarat	8	Ahmedabad	7090	1	2001-02	9.7
		Vadodara	6354	2	2002-03	9.74
		Anand	3204	3	2003-04	9.74
		Chota Udaipur	1192	4	2004-05	9.73
		Dahod	3642	5	2005-06	9.73
		Kheda	3442	6	2006-07	9.74
		Mahisagar	2261	7	2007-08	9.76
		Panchmahal	3481	8	2008-09	9.76
North Gujarat	6	Gandhinagar	2140	9	2009-10	9.77
		Aravalli	3308	10	2010-11	9.77
		Banaskantha	10743	11	2011-12	11.03
		Mehasana	4401	12	2012-13	11.04
		Patan	5792	13	2013-14	10.98
		Sabarkantha	4086	14	2014-15	11.12
Saurashtra-Kutch	12	Rajkot	7750	15	2015-16	11.36
		Amreli	7397	16	2016-17	11.16
		Bhavnagar	8487	17	2017-18	11.16
		Botad	2564	18	2018-19	11.14
		Dev Bhumi Dwaraka	4051			
		Gir Somnath	3289			
		Jamnagar	5980			
		Junagadh	5542			
		Morbi	8786			
		Porbandar	2316			
		Surendranagar	9238			
		Kachchh	45674			
South Gujarat	7	Surat	4549			
		Bharuch	6509			
		Dang	1766			
		Narmada	2817			
		Navsari	2246			
		Tapi	3139			
		Valsad	3008			

Source: Gujarat Forest Department

of its geographical area. A change of -0.01% of forest area is observed in the year 2003-04 but this change is made up in the year 2006-07 when the forest area increased by 0.01%. Year 2007-08 shows an increase of 0.02% which again increases by 0.01% in the year 2009-10. Year 2011-12 has witnessed an undeniable change in the forest area of 1.26% and an additional increase of 0.01% in the year 2012-13. Again a change of -0.06% of the forest area was observed in the year 2013-14 but was made up the next year as the forest area increased by 0.14% in 2014-15. Year 2015-16 saw an additional increase of 0.24% in its forest area while there has been a decrease in the forest area by -0.2% in the year 2016-17 and then -0.02% in the year 2018-19, thus making the forest area 11.4% of the total geographical area.

Thus it is observed that there have not been many changes in the forest area till 2010-11 and that the forest area started to increase from the year 2011-12 due to increase in protected forest areas, success in social forestry schemes (started in 1969-70), which led to an increase of 268.7 million trees and it has remain almost unchanged since 2014-15.

### Divisions wise Forest Area

The term 'Forest Area' (or recorded forest area) generally refers to all the geographic areas recorded as forest in government records. Recorded forest areas largely comprise Reserved Forests (RF) and Protected Forests (PF), which have been constituted under the provisions of Indian Forest Act,

1927. Besides RFs and PFs, the recorded forest area may include all such areas, which have been recorded as forests in the revenue records or have been constituted so under any State Act or local laws.

Table 2 and Figure 3 shows the division wise forest area of the Gujarat state, where it is shown that-Forest cover of central Gujarat has experienced a decrease in its forest area from 3052.68 Sq.Km. in 2001-02 to 3044.36 Sq.Km. in 2010-11 and again increased towards 2018-19 to 3055.79 Sq.Km. North Gujarat has witnessed an increase in its forest area in the first phase but in the later phase towards 2018-19, a minimal decrease can be seen. Saurashtra-Kutch has undeniably witnessed an increase in its forest area both in the first phase and in the later phase as well. Forest area of south Gujarat is seen to be decreasing from 2001-02 to 2010-11 and eventually towards 2018-19.

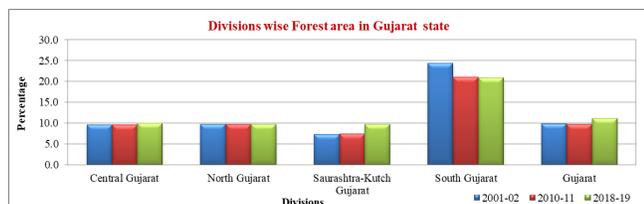


Fig. 3. Forest Areas in Gujarat State

Table 3 shows the temporal changes in the forest area of Gujarat state (in %), which is depicted in the Figure 3. This graph shows that -

From 2001-02 to 2010-11, there has not been much change in the forest area of central Gujarat, north Gujarat & Saurashtra-Kutch. Forest area has neither increased nor decreased as for the divisions of central Gujarat & north Gujarat and Saurashtra-Kutch has an increase of 0.1% of the forest area but in South Gujarat the changes are observed to be taking a negative turn i.e., forest area has a decreased of -3.3% due to illicit cutting down of woods, smuggling of timber woods, etc.

From 2010-11 to 2018-19, central Gujarat has shown an increase of 0.3% in the forest area and as for north Gujarat, there has not been any change for the same. In Saurashtra-Kutch forest area has an increase of 2.4% due to increase in area under 20 point plantation programme (2010-11) and social forestry schemes. However, south Gujarat has witnessed a change of -0.1 % of the forest area which means that there has been minimal change in the forest area as compared to the previous decade of -3.3%.

From 2001-02 to 2018-19, change in the forest area of central Gujarat has been at 0.3% while north Gujarat has neither increased nor decreased. In Saurashtra-Kutch forest area has increased 2.4% and in south Gujarat the forest area has decreased of -3.4%.

South Gujarat has the highest percentage of geographical area under forest area amongst all the divisions but the percentage in forest area has decreased from 2001-02 to 2010-11 and 2010-11 to 2018-19 at a decreasing rate. The percentage of forest area for both north and central Gujarat is less than 10% of its geographical area and the forest area has neither increased nor decreased much during the period of 2001-19. Saurashtra-Kutch has the lowest percentage of geographical area under forest area but it has shown an applauding increment in its forest area as compared to the other three divisions.

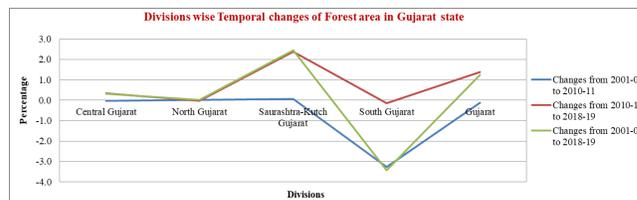


Fig. 4. Temporal change of forest area in Gujarat

### Trends of Classified Forest Area

Trends of classified forest area shows the change in the forest area under reserved forest, protected forest and unclassified forest of Gujarat during the period of 2001-02 to 2018-19. Table 4 Shows The Trends in Forest Classification of Gujarat State From 2001-02 to 2018-19.

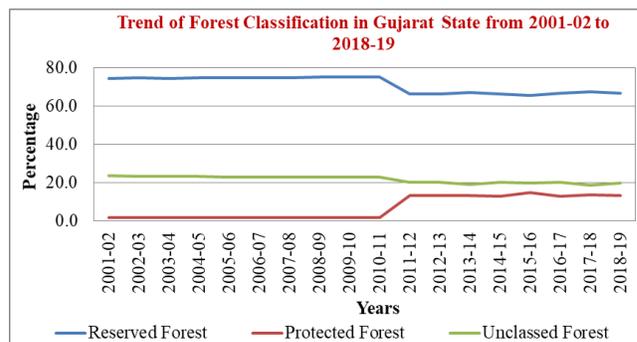


Fig. 5. Trends of Classified Forest in Gujarat State

It has been depicted in the Figure 5 where it has been observed that-As for Reserved Forest, there have not been many changes from 2001-02 to 2010-11. But there have been a drastic change in the Reserved Forest area of -8.6% in the year 2010-11 to 2011-12 due to extraction of timber and fuel wood, forest fires and the trend for the later years seem more or less similar.

As for Protected Forest, there have not been any changes till 2010-11. But there has been an increment in the Protected Forest area of 11.3% in the year 2010-11 to 2011-12 due



Table 2. Divisions wise Forest area in Gujarat state

S.N	Divisions	Area in Sq. Km					
		2001-02		2010-11		2018-19	
		Geographical Area	Forest Area	Geographical Area	Forest Area	Geographical Area	Forest Area
1	Central Gujarat	31662	3052.68	31662	3044.36	30666	3055.79
2	North Gujarat	30424	2945.02	30424	2953.1	30470	2951.94
3	Saurashtra-Kutch Gujarat	110081	8041.27	110081	8101.57	111074	10821.75
4	South Gujarat	20708	5042.02	23947	5046.8	24034	5029.74
	Gujarat	<b>192875</b>	<b>19080.99</b>	<b>196114</b>	<b>19145.83</b>	<b>196244</b>	<b>21859.22</b>

Source: Gujarat Forest Department

Table 3. Divisions wise Temporal changes of Forest area in Gujarat state

S.N	Divisions	2001-02	2010-11	2018-19	Changes from 2001-02 to 2010-11	Changes from 2010-11 to 2018-19	Changes from 2001-02 to 2018-19
1	Central Gujarat	9.6	9.6	10.0	0.0	0.3	0.3
2	North Gujarat	9.7	9.7	9.7	0.0	0.0	0.0
3	Saurashtra-Kutch Gujarat	7.3	7.4	9.7	0.1	2.4	2.4
4	South Gujarat	24.3	21.1	20.9	-3.3	-0.1	-3.4
	Gujarat	9.9	9.8	11.1	-0.1	1.4	1.2

Source: Gujarat Forest Department

Table 4. Trend of classified forest in Gujarat State from 2001-02 to 2018-19

Sr. No.	Year	Reserved Forest	%	Protected Forest	%	Unclassed Forest	%	Total Forests
1	2001-02	14126.4	74.3	377.6	2.0	4510.0	23.7	19013.9
2	2002-03	14257.1	74.7	378.1	2.0	4459.3	23.4	19094.5
3	2003-04	14225.6	74.5	378.8	2.0	4488.9	23.5	19093.3
4	2004-05	14263.7	74.8	378.9	2.0	4431.9	23.2	19074.4
5	2005-06	14271.4	74.8	379.1	2.0	4422.7	23.2	19073.2
6	2006-07	14270.9	74.8	383.3	2.0	4429.9	23.2	19084.2
7	2007-08	14349.2	75.0	389.3	2.0	4387.6	22.9	19126.1
8	2008-09	14364.6	75.0	389.3	2.0	4386.6	22.9	19140.4
9	2009-10	14368.3	75.1	389.3	2.0	4386.8	22.9	19144.3
10	2010-11	14368.1	75.0	389.6	2.0	4388.1	22.9	19145.8
11	2011-12	14373.1	66.4	2886.5	13.3	4387.8	20.3	21647.4
12	2012-13	14387.2	66.4	2888.9	13.3	4389.0	20.3	21665.0
13	2013-14	14471.0	67.2	2896.8	13.4	4171.5	19.4	21539.3
14	2014-15	14529.1	66.6	2886.7	13.2	4404.3	20.2	21820.1
15	2015-16	14596.1	65.4	3299.4	14.8	4407.1	19.8	22302.7
16	2016-17	14594.9	66.6	2884.1	13.2	4420.5	20.2	21899.5
17	2017-18	14769.6	67.4	3001.4	13.7	4138.0	18.9	21909.0
18	2018-19	14571.4	66.7	2898.4	13.3	4389.5	20.1	21859.2

Source: Gujarat Forest Department



to inclusion of new protected forests of Girnar Wildlife Sanctuary, Kachchh Biosphere Reserve and Chhari Dhand Conservation Reserve. The trends for the later years are almost similar as there have not been many changes. As for Unclassed Forest, the trend is almost similar starting from the year 2001-02 to 2018-2019 but there has been a bit decrease in the Unclassed Forest area of -2.6% in the year 2010-11 to 2011-12 and the trend afterwards is almost stagnated.

### Division Wise Classified Forest Area

Division wise classified forest area shows percentage of reserved forest, protected forest and unclassified forest present in the four divisions of Gujarat i.e., Central Gujarat, North Gujarat, Saurashtra-Kutch and South Gujarat in 2001-02 to 2018-19.

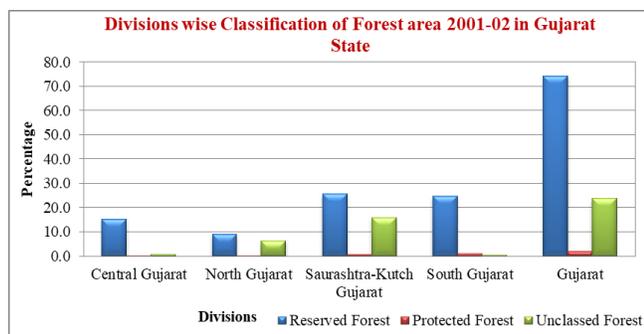


Fig. 6. Classified Forest Area in Gujarat State from 2001-02

Table 5 represents The Area And Percentage of Division Wise Classification of Forest Area 2001-02 In Gujarat State. It has been observed that-Central Gujarat has Reserved Forest of about 15.1%, Protected Forest of 0.1% and Unclassed Forest of about 0.8% of the total forest area of the state. North Gujarat has Reserved Forest of about 8.9%, Protected Forest of 0.1% and Unclassed Forest of about 6.4% of the total forest area of the state. Saurashtra-Kutch has highest percentage of Reserved Forest of about 25.6%, Protected Forest of about 0.7% and the highest percentage in Unclassed Forest of about 15.9% of the total forest area of the state. South Gujarat has Reserved Forest of about 24.6%, Protected Forest of 1.1% and Unclassed Forest of 0.6% of the total forest area of the state.

shows The Area And Percentage Of Division Wise Classification of Forest Area 2010-11 In Gujarat State. It has been observed that-Central Gujarat has Reserved Forest of about 15.1%, Protected Forest of about 0.1% and Unclassed Forest of about 0.7%. North Gujarat has Reserved Forest of about 9.2%, Protected Forest of about 0.1% and Unclassed Forest of about 6.1%. Saurashtra-Kutch has the highest area under Reserved Forest and Unclassed Forest of about 26.2% and 15.4% respectively. Protected forest forms only 0.7% of the total forest area. South Gujarat has Reserved Forest of about 24.5%, Protected Forest of about 1.1% and Unclassed Forest

of about 0.7% of the total forest area of the state.

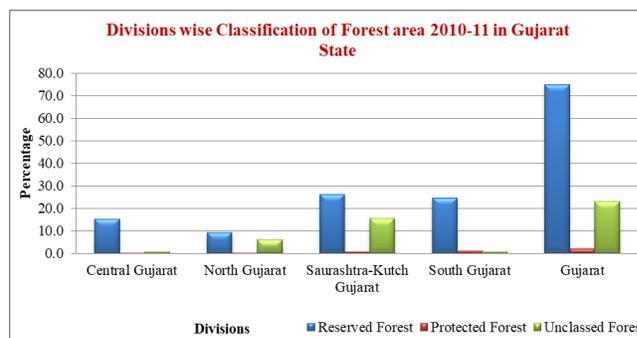


Fig. 7. Classified Forest Area of Gujarat State in 2010-11

Table 7 shows the area And Percentage Division Wise Classification of Forest Area 2018-19 In Gujarat State. It has been observed that-Central Gujarat has Reserved Forest of about 13.2%, Protected Forest of about 0.1% and Unclassed Forest of about 0.7% of the total forest area. North Gujarat has the lowest area under Reserved Forest of 8.3%, Protected Forest of about 0.1% and Unclassed Forest of about 5.1%. Saurashtra-Kutch has the highest area under Reserved Forest of about 23.7%, Protected Forest of about 0.1% and has the highest area under Unclassed Forest of about 13.7%. South Gujarat has Reserved Forest of about 21.4%, Protected Forest of about 1.0% and has the lowest area under Unclassed Forest of about 0.6% of the total forest area.

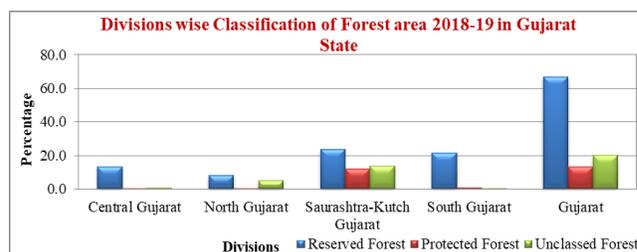


Fig. 8. Classified Forest Area in Gujarat State from 2018-19

Table 8 shows the division Wise Temporal Changes in Reserved Forest in Gujarat State for the period of 2001-2019. The table depicts that-From 2001-02 to 2010-11, there has not been any changes in the Reserved Forest area of Central Gujarat. But there has been a decrease in the reserved forest area of about -1.9% from 2010-11 to 2018-19. From 2001-02 to 2018-19 there has been an overall decrease in the Reserved Forest area of Central Gujarat of about -1.9%. From 2001-02 to 2010-12, North Gujarat has witnessed an increase in the Reserved Forest area of about 0.3% and from 2010-11 to 2018-19 a decrease of -0.9%. From 2001-02 to 2018-19, there has been an overall decrease in the Reserved Forest area of about -0.6%. From 2001-02 to 2010-11, Saurashtra-Kutch Gujarat has witnessed an increase of 0.7% of Reserved Forest area and



Table 5. Divisions wise Classification of Forest area 2001-02 in Gujarat State

S.N	Divisions	Area in Sq. Km				Total
		Reserved Forest	Protected Forest	Unclassed Forest		
1	Central	Area	2887.9	13.7	151.1	3052.7
	Gujarat	%	15.1	0.1	0.8	16.0
2	North	Area	1700.6	19.7	1224.7	2945.0
	Gujarat	%	8.9	0.1	6.4	15.4
3	Saurashtra-	Area	4874.2	131.7	3034.8	8040.7
	Kutch	%	25.6	0.7	15.9	42.2
4	Gujarat	Area	4696.9	215.5	113.3	5025.6
	Gujarat	%	24.6	1.1	0.6	26.4
Gujarat		Area	14159.6	380.6	4523.8	19064.0
		%	<b>74.3</b>	<b>2.0</b>	<b>23.7</b>	<b>100.0</b>

Source: Gujarat Forest Department

Table 6. Divisions wise Classification of Forest area 2010-11 in Gujarat State

S.N	Divisions	Area in Sq. Km				Total
		Reserved Forest	Protected Forest	Unclassed Forest		
1	Central	Area	2886.3	18.0	140.0	3044.2
	Gujarat	%	15.1	0.1	0.7	15.9
2	North	Area	1763.9	25.0	1164.3	2953.1
	Gujarat	%	9.2	0.1	6.1	15.4
3	Saurashtra-	Area	5022.9	133.9	2945.4	8102.2
	Kutch	%	26.2	0.7	15.4	42.3
4	Gujarat	Area	4694.7	212.6	139.5	5046.8
	Gujarat	%	24.5	1.1	0.7	26.4
Gujarat		Area	14367.8	389.4	4389.1	19146.3
		%	<b>75.0</b>	<b>2.0</b>	<b>22.9</b>	<b>100.0</b>

Source: Gujarat ForestDepartment

Table 7. Divisions wise Classification of Forest area 2018-19 in Gujarat State

S.N	Divisions	Area in Sq. Km				Total
		Reserved Forest	Protected Forest	Unclassed Forest		
1	Central	Area	2884.7	16.7	154.4	3055.8
	Gujarat	%	<b>13.2</b>	<b>0.1</b>	<b>0.7</b>	14.0
2	North	Area	1819.7	25.1	1107.1	2951.9
	Gujarat	%	<b>8.3</b>	<b>0.1</b>	<b>5.1</b>	13.5
3	Saurashtra-	Area	5179.5	2643.8	2998.5	10821.8
	Kutch	%	<b>23.7</b>	<b>12.1</b>	<b>13.7</b>	49.5
4	Gujarat	Area	4687.5	212.8	129.5	5029.7
	Gujarat	%	<b>21.4</b>	<b>1.0</b>	<b>0.6</b>	23.0
Gujarat		Area	14571.4	2898.4	4389.5	21859.2
		%	<b>66.7</b>	<b>13.3</b>	<b>20.1</b>	<b>100.0</b>

Source: Gujarat Forest Department



a decrease of -2.5% from 2010-11 to 2018-19. From 2001-02 to 2018-19, there has been an overall decrease in -1.9% in the Reserved Forest area. From 2001-02 to 2010-11, South Gujarat has witnessed a decrease in the Reserved Forest area of about -0.1% and moreover a decrease of -3.1% from 2010-11 to 2018-19. From 2001-02 to 2018-19, there has been an overall decrease of -3.2% in the Reserved Forest area of South Gujarat.

Table 9 shows the Division Wise Temporal Changes of Protected Forest in Gujarat state for the period of 2001-2019. The table depicts that-From 2001-02 to 2018-19, there has not been any changes in the Protected Forest area of Central Gujarat and North Gujarat. From 2001-02 to 2010-11, there has not been any changes in the Protected Forest area of Saurashtra-Kutch Gujarat but from 2010-11 to 2018-19 there has been an increase in the Protected Forest area of about 11.4%. From 2001-02 to 2010-11, there has not been any changes in the Protected Forest area of South Gujarat but there has been a decrease of -0.1% in the Protected Forest area from 2010-11 to 2018-19.

Table 10 shows the Division Wise Temporal Changes of Unclassed Forest area in Gujarat state for the period of 2001-2019. The table depicts that-From 2001-02 to 2010-11, Central Gujarat has witnessed a decrease of -0.1% of unclassified forest area and the period later till 2018-19 there has not been any changes in the unclassified forest area. From 2010-11 to 2018-19, North Gujarat has witnessed a change of -0.3% in the Unclassed Forest area and a decrease of -0.1% from 2010-11 to 2018-19. From 2001-02 to 2018-19, the overall change in the unclassified forest area of north Gujarat is about -1.4%. From 2001-02 to 2010-11, Saurashtra-Kutch Gujarat has witnessed a change of -0.5% in the Unclassed Forest area and a change of -1.7% from 2010-11 to 2018-19. From 2001-02 to 2018-19, there has been an overall change in the Unclassed Forest area of about -2.2%. From 2001-02 to 2018-19, South Gujarat has witnessed negligible changes in the Unclassed Forest Area.

The temporal changes shows that there has not been much changes in the Reserved Forests but the changes which has occur has been negative rather than a positive change due to diversion of forest land for non-forestry purpose such as construction of roads and railways under the Forest Conservation Act, 1980 (MoEF & CC, 2019). And as for Protected Forest only Saurashtra-Kutch division has shown a positive change of 11.4% due to increase in protected forests of Kachchh Biosphere Reserve, Chhari Dhand Conservation Reserve and Girnar Wildlife Sanctuary as notified in 2008, but there were not many changes in the rest of the division.

## Conclusion

Forests are essential for healthy environment. The high rates of population growth and rapid urbanization have had

negative impact on forest and are responsible for vicious cycle of environmental degradation in Gujarat. This study has shown how Gujarat has come up with the challenges subjected to forestry and has managed to bring 11.145 of its geographical area under forest in 20018-19 from 9.7% in 2001-02. It's obvious that Gujarat has also witnessed loss of trees which are mainly due to natural factors such as wind, age; to facilitate infrastructural development, increasing housing accommodation due to increase in population and illegal cutting down of trees. Achieving the goals and policies requires joint effort to move from national commitment to local level implementation, to which Gujarat government has been successful to many extents.

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**Table 8. Divisions wise Temporal changes of Reserved Forest area in Gujarat state**

S.N	Divisions	2001-02	2010-11	2018-19	Changes from 2001-02 to 2010-11	Changes from 2010-11 to 2018-19	Changes from 2001-02 to 2018-19
1	Central Gujarat	15.1	15.1	13.2	0	-1.9	-1.9
2	North Gujarat	8.9	9.2	8.3	0.3	-0.9	-0.6
3	Saurashtra-Kutch Gujarat	25.6	26.2	23.7	0.7	-2.5	-1.9
4	South Gujarat	24.6	24.5	21.4	-0.1	-3.1	-3.2
	Gujarat	74.3	75.0	66.7	0.8	-8.4	-7.6

Source: Gujarat ForestDepartment

**Table 9. Divisions wise Temporal changes of Protected Forest area in Gujarat state**

S.N	Divisions	2001-02	2010-11	2018-19	Changes from 2001-02 to 2010-11	Changes from 2010-11 to 2018-19	Changes from 2001-02 to 2018-19
1	Central Gujarat	0.1	0.1	0.1	0.0	0.0	0.0
2	North Gujarat	0.1	0.1	0.1	0.0	0.0	0.0
3	Saurashtra-Kutch Gujarat	0.7	0.7	12.1	0.0	11.4	11.4
4	South Gujarat	1.1	1.1	1.0	0.0	-0.1	-0.1
	Gujarat	2.0	2.0	13.3	0.0	11.3	11.3

Source: Gujarat ForestDepartment

**Table 10. Divisions wise Temporal changes of Unclassed Forest area in Gujaratstate**

S.N	Divisions	2001-02	2010-11	2018-19	Changes from 2001-02 to 2010-11	Changes from 2010-11 to 2018-19	Changes from 2001-02 to 2018-19
1	Central Gujarat	0.8	0.7	0.7	-0.1	0.0	-0.1
2	North Gujarat	6.4	6.1	5.1	-0.3	-1.0	-1.4
3	Saurashtra-Kutch Gujarat	15.9	15.4	13.7	-0.5	-1.7	-2.2
4	South Gujarat	0.6	0.7	0.6	0.1	-0.1	0.0
	Gujarat	23.7	22.9	20.1	-0.8	-2.8	-3.6

Source: Gujarat ForestDepartment

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