Report for ForestQuery into Global Deforestation, 1990 to 2016

ForestQuery is on a mission to combat deforestation around the world and to raise awareness about this topic and its impact on the environment. The data analysis team at ForestQuery has obtained data from the World Bank that includes forest area and total land area by country and year from 1990 to 2016, as well as a table of countries and the regions to which they belong.

The data analysis team has used SQL to bring these tables together and to query them in an effort to find areas of concern as well as areas that present an opportunity to learn from successes.

## 1. **GLOBAL SITUATION**

According to the World Bank, the total forest area of the world was 41,282,694.9 km^2 in 1990.

As of 2016, the most recent year for which data was available, that number had fallen to39,958,245.9 km^2, a loss of 1324449 km^2 , or 3.2%.

The forest area lost over this time period is slightly more than the entire land area of Peru listed for the year 2016 (which is 1279999.9891 km^2).

## 2. **REGIONAL OUTLOOK**

In 2016, the percent of the total land area of the world designated as forest was 31.38%.

The region with the highest relative forestation was Latin America & Caribbean, with 46.16%, and the region with the lowest relative forestation was Middle East & North Africa, with 2.07% forestation.

In 1990, the percent of the total land area of the world designated as forest was 32.42%.

The region with the highest relative forestation was Latin America and the Caribbean, with 51.03%, and the region with the lowest relative forestation was Middle East & North Africa, with 1.78% forestation.

Table 2.1: Percent Forest Area by Region, 1990 & 2016:

| Region | 1990 Forest Percentage | 2016 Forest Percentage |
| --- | --- | --- |
| Latin America and Caribbean | 51.03% | 46.16% |
| Europe and Central Asia | 37.28% | 38.04% |
| North America | 35.65% | 36.04% |
| World | 32.42% | 31.38% |
| Sub-Saharan Africa | 30.67% | 28.79% |
| East Asia & Pacific | 25.78% | 26.36% |
| South Asia | 16.51% | 17.51% |
| Middle East & North Africa | 1.78% | 2.07% |

The only regions of the world that decreased in percent forest area from 1990 to 2016 were Latin America and Caribbean (dropped from 51.03% % to 46.16%) and Sub-Saharan Africa (30.67% to 28.79%). All other regions actually increased in forest area over this time period. However, the drop in forest area in the two aforementioned regions was so large, the percent forest area of the world decreased over this time period from 32.42% to 31.38%.

## 3. **COUNTRY-LEVEL DETAIL**

### SUCCESS STORIES

There is one particularly bright spot in the data at the country level, China. This country actually increased in forest area from 1990 to 2016 by 527,229.06 km^2 . It would be interesting to study what has changed in this country over this time to drive this figure in the data higher. The country with the next largest increase in forest area from 1990 to 2016 was the United States, but it only saw an increase of 79,200 km^2 , much lower than the figure for China. China and the U.S are of course very large countries in total land area, so when we look at the largest percent change in forest area from 1990 to 2016, we aren’t surprised to find a much smaller country listed at the top. Iceland increased in forest area by 213.66% from 1990 to 2016.

B.LARGEST CONCERNS

Which countries are seeing deforestation to the largest degree? We can answer this question in two ways. First, we can look at the absolute square kilometer decrease in forest area from 1990 to 2016. The following 3 countries had the largest decrease in forest area over the time period under consideration:

Table 3.1: Top 5 Amount Decrease in Forest Area by Country, 1990 & 2016:

| Country | Region | Absolute Forest Area Change |
| --- | --- | --- |
| Brazil | Latin America and Caribbean | 541,510 km^2 |
| Indonesia | East Asia and Pacific | 282,193.98 km^2 |
| Myanmar | East Asia and Pacific | 107,234 km^2 |
| Nigeria | Sub-Saharan Africa | 106,506 km^2 |
| Tanzania | Sub-Saharan Africa | 102,320 km^2 |

The second way to consider which countries are of concern is to analyze the data by percent decrease.

Table 3.2: Top 5 Percent Decrease in Forest Area by Country, 1990 & 2016:

| Country | Region | Pct Forest Area Change |
| --- | --- | --- |
| Togo | Sub-Saharan Africa | 75.45% |
| Nigeria | Sub-Saharan Africa | 61.80% |
| Uganda | Sub-Saharan Africa | 59.27% |
| Mauritania | Sub-Saharan Africa | 46.75% |
| Honduras | Latin America and Caribbean | 45.03% |

When we consider countries that decreased in forest area percentage the most between 1990 and 2016, we find that four of the top 5 countries on the list are in the region of Sub-Saharan Africa. The countries are Togo, Nigeria, Uganda and Mauritania. The 5th country on the list is Honduras, which is in the Latin America and Caribbean region.

From the above analysis, we see that Nigeria is the only country that ranks in the top 5 both in terms of absolute square kilometer decrease in forest as well as percent decrease in forest area from 1990 to 2016. Therefore, this country has a significant opportunity ahead to stop the decline and hopefully spearhead remedial efforts.

### QUARTILES

Table 3.3: Count of Countries Grouped by Forestation Percent Quartiles, 2016:

| Quartile | Number of Countries |
| --- | --- |
| 0-25 | 85 |
| 25-50 | 73 |
| 50-75 | 38 |
| 75-100 | 9 |

The largest number of countries in 2016 were found in the 0-25 quartile.

There were 85 countries in the top quartile in 2016. These are countries with a very high percentage of their land area designated as forest. The following is a list of countries and their respective forest land, denoted as a percentage.

Table 3.4: Top Quartile Countries, 2016:

| Country | Region | Pct Designated as Forest |
| --- | --- | --- |
| Suriname | Latin America and Caribbean | 98.26 |
| Micronesia, Fed. Sts | East Asia and Pacific | 91.86 |
| Gabon | Sub-Saharan Africa | 90.04 |
| Seychelles | Sub-Saharan Africa | 88.41 |
| Palau | East Asia and Pacific | 87.61 |
| American Samoa | East Asia and Pacific | 87.5 |
| Guyana | Latin America and Caribbean | 83.9 |
| Lao PDR | East Asia and Pacific | 82.11 |

## 5. RECOMMENDATIONS

*Write out a set of recommendations as an analyst on the ForestQuery team.*

* *What have you learned from the World Bank data?*
* *Which countries should we focus on over others?*

-I learned from the project that there is a serious problem regarding forests all over the world, in a variety of different regions.

We can see the only regions of the world that decreased in percent forest area from 1990 to 2016 were Latin America and Caribbean (dropped from 51.03% % to 46.16%) and Sub-Saharan Africa (30.67% to 28.79%) but we can see that most of the regions are increasing in forest area like North America and South Asia.

-We can see that the top 5 amount decrease in forest Area by country is Brazil,Indonesia,Myanmar,Nigeria and Tanzania so i think we need to focus on this countries over the others.

I think those countries can discuss with the countries who does’nt decrese for their better future.

I will say that it was really interesting to do this project because I’ve learned a lot about the forestation in the world and some of the information I came across was very surprising.

**PART 1**

CREATING A VIEW Forestation-

CREATE VIEW Forestation AS

SELECT r.country\_name, f.year, r.income\_group, r.region, l.total\_area\_sq\_mi, f.forest\_area\_sqkm, ((Sum(forest\_area\_sqkm) / Sum(total\_area\_sq\_mi\*2.59))\*100) percentage\_forest

FROM forest\_area AS f

JOIN land\_area AS l

ON f.country\_code = l.country\_code

AND l.year = f.year

JOIN regions AS r

ON r.country\_code = f.country\_code

GROUP BY r.country\_name, f.year, r.income\_group, r.region,f.forest\_area\_sqkm, l.total\_area\_sq\_mi

**a**

SELECT SUM (forest\_area\_sqkm)

FROM forestation

WHERE year = '1990' AND region = 'World'

**b**

SELECT SUM (forest\_area\_sqkm)

FROM forestation

WHERE year = '2016' AND region = 'World'

**c**

SELECT

( (SELECT SUM(forest\_area\_sqkm) thetotal\_forest\_area

FROM forestation

WHERE YEAR = 1990 AND country\_name = 'World') -

(SELECT SUM(forest\_area\_sqkm) AS thetotal\_forest\_area

FROM forestation

WHERE YEAR = 2016 AND country\_name = 'World'))

AS THE\_CHANGE

FROM forestation

LIMIT 1;

**d**

SELECT (((

(SELECT SUM(forest\_area\_sqkm) thetotal\_forest\_area

FROM forestation

WHERE YEAR = 1990 AND country\_name = 'World') - (SELECT SUM(forest\_area\_sqkm) AS thetotal\_forest\_area

FROM forestation

WHERE YEAR = 2016

AND country\_name = 'World')) / ((SELECT SUM(forest\_area\_sqkm) thetotal\_forest\_area

FROM forestation

WHERE YEAR = 1990

AND country\_name = 'World'))) \*100)

AS thepercent\_change

FROM forestation

LIMIT 1;

**e**

SELECT country\_name, SUM(total\_area\_sq\_mi\*2.59)

AS total\_LAND\_area

FROM forestation

WHERE year = 2016 AND total\_area\_sq\_mi IS NOT NULL

GROUP BY total\_area\_sq\_mi, country\_name

ORDER BY total\_area\_sq\_mi DESC

(I use the NULL function because i saw there are missing data)

I can see the the country with the closest total area to the amount of forest area lost between 1990 and 2016 is Peru with 1279999.9891 km^2 compare to 1324449 km^2 .

**PART 2**

**a**

What was the percent forest of the entire world in 2016?

SELECT country\_name,

ROUND(((Sum(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100)::NUMERIC, 2) AS

THEforest\_percent

FROM forestation

WHERE YEAR = 2016

AND country\_name = 'World'

GROUP BY country\_name

SELECT region,

ROUND(((Sum(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100)::NUMERIC, 2) AS

THEforest\_percent

FROM forestation

WHERE YEAR = 2016

GROUP BY region

ORDER BY THEforest\_percent desc

2b-

SELECT country\_name,

ROUND(((Sum(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100)::NUMERIC, 2) AS

THEforest\_percent

FROM forestation

WHERE YEAR = 1990

AND country\_name = 'World'

GROUP BY country\_name

SELECT region,

ROUND(((Sum(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100)::NUMERIC, 2) AS

THEforest\_percent

FROM forestation

WHERE YEAR =1990

GROUP BY region

ORDER BY THEforest\_percent desc

Table 2.1

SELECT region,

Round(((Sum(forest\_area\_sqkm) / Sum(total\_area\_sq\_mi\*2.59))\*100)::Numeric, 2)

AS THEforest\_percent

FROM forestation

WHERE YEAR = 1990

GROUP BY region

ORDER BY THEforest\_percent DESC

SELECT region,

Round(((Sum(forest\_area\_sqkm) / Sum(total\_area\_sq\_mi\*2.59))\*100)::Numeric, 2)

AS THEforest\_percent

FROM forestation

WHERE YEAR = 2016

GROUP BY region

ORDER BY THEforest\_percent DESC

## **Part 3:COUNTRY-LEVEL DETAIL**

I’m creating tables for year 1990&2016:

a-

WITH TABLE1 AS

(SELECT country\_name,

SUM(forest\_area\_sqkm) AREA\_FOREST\_1

FROM forestation

WHERE YEAR = 1990

GROUP BY country\_name,

forest\_area\_sqkm),

TABLE2 AS

(SELECT country\_name,

SUM(forest\_area\_sqkm) AREA\_FOREST\_2

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name,

forest\_area\_sqkm)

SELECT f.country\_name,

(f.AREA\_FOREST\_1 - t.AREA\_FOREST\_2) forest\_change

FROM TABLE1 f

JOIN TABLE2 t ON f.country\_name = t.country\_name

ORDER BY forest\_change

Limit 2

3b-

WITH TABLE1 AS

(SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 forestation\_percent1

FROM forestation

WHERE YEAR = 1990

GROUP BY country\_name,

forest\_area\_sqkm),

TABLE2 AS

(SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 forestation\_percent2

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name,

forest\_area\_sqkm)

SELECT f.country\_name,

Round((((f.forestation\_percent1 -

t.forestation\_percent2)/(f.forestation\_percent1))\*100)::Numeric, 2) CHANGE\_IN\_PERCENT

FROM TABLE1 f

JOIN TABLE2 t ON f.country\_name = t.country\_name

ORDER BY CHANGE\_IN\_PERCENT

limit 1

ANSWER: Iceland with -213.66 percent change

**Table 3.1: Top 5 Amount Decrease in Forest Area by Country, 1990 & 2016**

WITH TABLE1 AS

(SELECT country\_name,

SUM(forest\_area\_sqkm) AS FOREST\_of\_area1

FROM forestation

WHERE YEAR = 1990

GROUP BY country\_name,

forest\_area\_sqkm),

TABLE2 AS

(SELECT country\_name,

SUM(forest\_area\_sqkm) FOREST\_of\_area2

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name,

forest\_area\_sqkm)

SELECT f.country\_name,

(f.forest\_of\_area1 - t.forest\_of\_area2) AS FOREST\_CHANGES

FROM TABLE1 f

JOIN TABLE2 t ON f.country\_name = t.country\_name

WHERE f.forest\_of\_area1 IS NOT NULL AND t.forest\_of\_area2 IS NOT NULL

AND f.country\_name != 'World'

ORDER BY FOREST\_CHANGES DESC

Limit 5;

**Table 3.2: Top 5 Percent Decrease in Forest Area by Country, 1990 & 2016**

WITH TABLE1 AS

(SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100

AS percentFORESTATION\_1

FROM forestation

WHERE YEAR = 1990

GROUP BY country\_name,

forest\_area\_sqkm),

TABLE2 AS

(SELECT country\_name,

(SUM(forest\_area\_sqkm)/SUM(total\_area\_sq\_mi\*2.59))\*100

AS percentFORESTATION\_2

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name,

forest\_area\_sqkm)

SELECT f.country\_name,

ROUND((((f.percentFORESTATION\_1 -

t.percentFORESTATION\_2)/(f.percentFORESTATION\_1))\*100)::Numeric, 2) AS PER\_CHANGE

FROM TABLE1 f

JOIN TABLE2 t

ON f.country\_name = t.country\_name

WHERE f.percentFORESTATION\_1 IS NOT NULL AND t.percentFORESTATION\_2

IS NOT NULL

AND f.country\_name != 'World'

ORDER BY PER\_CHANGE DESC

LIMIT 5;

**To find out which country is in which region:**

SELECT

DISTINCT (region) , country\_name

from forestation

WHERE country\_name IN ('Honduras','Togo','Nigeria','Mauritania', 'Uganda')

**Table 3.3 Count of Countries Grouped by Forestation Percent Quartiles, 2016**

WITH TABLE1 AS

(SELECT country\_name,year,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 percent\_FORESTATION

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name, year,forest\_area\_sqkm)

SELECT DISTINCT(quartiles),

COUNT(country\_name)OVER(PARTITION BY quartiles)

FROM

(SELECT country\_name, CASE

WHEN percent\_FORESTATION<25 THEN '0-25'

WHEN percent\_FORESTATION>=25

AND percent\_FORESTATION<50 THEN '25-50'

WHEN percent\_FORESTATION>=50

AND percent\_FORESTATION<75 THEN '50-75'

ELSE '75-100'

END AS quartiles

FROM TABLE1

WHERE percent\_FORESTATION IS NOT NULL

AND YEAR = 2016) SUB

**Table 3.4: Top Quartile Countries, 2016**

WITH TABLE2 AS

(WITH TABLE1 AS

(SELECT country\_name,

YEAR,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 percent\_forestation

FROM forestation

WHERE YEAR = 2016

GROUP BY country\_name,year,

forest\_area\_sqkm) SELECT DISTINCT(quartiles),

COUNT(country\_name)OVER(PARTITION BY quartiles),country\_name,

percent\_FORESTATION

FROM

(SELECT country\_name,

percent\_FORESTATION,

CASE

WHEN percent\_FORESTATION<=25 THEN '0-25'

WHEN percent\_FORESTATION>25

AND percent\_FORESTATION<=50 THEN '25-50'

WHEN percent\_FORESTATION>50

AND percent\_FORESTATION<=75 THEN '50-75'

ELSE '75-100'

END AS quartiles

FROM TABLE1

WHERE percent\_FORESTATION IS NOT NULL

AND YEAR = 2016) sub)

SELECT country\_name, quartiles,

ROUND(percent\_FORESTATION::Numeric, 2) percent\_OFFORESTATION

FROM TABLE2

WHERE quartiles = '75-100'

ORDER BY percent\_OFFORESTATION DESC;

SELECT

DISTINCT (region) , country\_name

from forestation

WHERE country\_name IN ('Suriname','Micronesia, Fed. Sts.','Gabon','Seychelles', 'Palau','Solomon Islands',

'Lao PDR','Guyana','American Samoa')