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 \_41282694.9 km2\_ in 1990. As of 2016, the most recent year for which data was available, that number had fallen to\_39958245.9 km2 , a loss of \_\_1324449 km2\_\_, or \_\_3.21 %.

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 km2\_\_).

## 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 & 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% |
| Sub-Saharan Africa | 30.67% | 28.79% |
| North America | 35.65% | 36.04 |
| World | 32.42 | 31.38 |
| East Asia & Pacifi | 25.78 | 26.36 |
| South Asia | 16.51 | 17.51 |
| Middle East & North Africa | 1.78 | 2.07 |
| Еurope and Central Asia | 37.28 | 38.04 |

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 527229.06 km2\_. 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 \_79200 km2\_, much lower than the figure for \_China\_.

\_\_China\_\_ and \_United States\_ 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.

### 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 | 541510 |
| Indonesia | East Asia and Pacific | 282193.9844 |
| Myanmar | East Asia and Pacific | 107234.0039 |
| Nigeria | Sub-Saharan Africa | 106506 |
| Tanzania | Sub-Saharan Africa | 102320 |

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 9 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 Amer | 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 Amer | 83.9 |
| Lao PD | 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?*

The world situation shows that the number of forests is reduced, despite the trend in increasing the number of forest areas as well as in percentage way in certain regions of the world: North America, Europe and Central Asia, East Asia and the Pacific, South Asia, Middle East and North. However, due to Sub-Saharan Africa and Latin America and Caribbean, the effect of the world level is significant as they both give more than 70 % of influence.

But it is worth paying attention to a unique example of increasing the forests in China in order to find best practices for increasing forest area and try to apply them for the top 5 leaders (countries) in reducing the number of forests.

Appendix

CREATE VIEW forestation AS

(SELECT r.country\_name, r.income\_group, r.region,

f.year, f.forest\_area\_sqkm,

l.total\_area\_sq\_mi,

((Sum(forest\_area\_sqkm) / Sum(total\_area\_sq\_mi\*2.59))\*100) percentage\_for

FROM forest\_area f

JOIN land\_area l ON f.country\_code = l.country\_code

AND f.year = l.year

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

GROUP BY 1,2,3,4,5,6)

1A)

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

FROM forestation

WHERE YEAR = 1990

AND country\_name = 'World'

1B) SELECT SUM(forest\_area\_sqkm) total\_forest\_area

FROM forestation

WHERE YEAR = 2016

AND country\_name = 'World'

1C) SELECT (

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

FROM Forestation

WHERE YEAR = 1990

AND country\_name = 'World') -

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

FROM forestation

WHERE YEAR = 2016

AND country\_name = 'World')) AS difference

FROM forestation

1D)

SELECT

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

FROM Forestation

WHERE YEAR = 1990

AND country\_name = 'World') -

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

FROM forestation

WHERE YEAR = 2016

AND country\_name = 'World')) / (

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

FROM forestation

WHERE YEAR = 1990

AND country\_name = 'World'))) \*100) AS percent\_decrease

FROM forestation

1E)

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 country\_name,

total\_area\_sq\_mi

ORDER BY total\_land\_area DESC

2a)

WITH perc AS

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

FROM forestation

WHERE year = 2016 )

SELECT region,

SUM(total\_area\_sq\_mi \* 2.59) as total,

ROUND(((SUM(forest\_area\_sqkm) / (SUM(total\_area\_sq\_mi) \* 2.59)) \* 100):: NUMERIC, 2) as perc\_region

FROM forestation

WHERE forest\_area\_sqkm is not null and year = 2016

GROUP BY 1

ORDER BY perc\_region DESC

2b)

SELECT region,

SUM(total\_area\_sq\_mi \* 2.59) as total,

ROUND(((SUM(forest\_area\_sqkm) / (SUM(total\_area\_sq\_mi) \* 2.59)) \* 100):: NUMERIC, 2) as perc\_region

FROM forestation

WHERE forest\_area\_sqkm is not null and year = 1990

GROUP BY 1

ORDER BY perc\_region DESC

2c-Table)

with t1 as (SELECT region,

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

perc\_forest\_1

FROM forestation

WHERE YEAR = 1990

GROUP BY region

ORDER BY perc\_forest\_1 DESC),

t2 AS (SELECT region,

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

perc\_forest\_2

FROM Forestation

WHERE YEAR = 2016

GROUP BY region

ORDER BY perc\_forest\_2 DESC)

SELECT t1.region, t1.perc\_forest\_1, t2.perc\_forest\_2

FROM t1 JOIN t2

ON t1.region = t2.region

3a)

WITH t1 AS (SELECT country\_name,

SUM(forest\_area\_sqkm) as total\_area\_2016

FROM forestation

WHERE year = 2016

GROUP BY 1, forest\_area\_sqkm ),

t2 AS (SELECT country\_name,

SUM(forest\_area\_sqkm) as total\_area\_1990

FROM forestation

WHERE year = 1990

GROUP BY 1, forest\_area\_sqkm )

SELECT t1.country\_name,

(t2.total\_area\_1990 - t1.total\_area\_2016) AS total\_area\_differ

FROM t1 JOIN t2

ON t1.country\_name = t2.country\_name

ORDER BY total\_area\_differ

LIMIT 5

3b)

WITH t1 AS (SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 percent\_1990

FROM forestation

WHERE year = 1990

GROUP BY 1, forest\_area\_sqkm ),

t2 AS (SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi\*2.59))\*100 AS percent\_2016

FROM forestation

WHERE year = 2016

GROUP BY 1, forest\_area\_sqkm )

SELECT t1.country\_name,

ROUND((((t1.percent\_1990 - t2.percent\_2016)/(t1.percent\_1990))\*100)::Numeric, 2) AS total\_area\_differ

FROM t1 JOIN t2

ON t1.country\_name = t2.country\_name

ORDER BY total\_area\_differ

LIMIT 5

3c table 3.1)

WITH t1 AS (SELECT country\_name, region,

SUM(forest\_area\_sqkm) AS for\_area\_1990

FROM forestation

WHERE year = 1990

GROUP BY 1, forest\_area\_sqkm),

t2 AS (SELECT country\_name, region,

SUM(forest\_area\_sqkm) AS for\_area\_2016

FROM forestation

WHERE year = 2016

GROUP BY 1, forest\_area\_sqkm)

SELECT t1.country\_name, t1.region,

(t1.for\_area\_1990 - t2.for\_area\_2016) AS forest\_differ

FROM t1 JOIN t2

ON t1.country\_name = t2.country\_name

WHERE t1.for\_area\_1990 IS NOT NULL

AND t2.for\_area\_2016 IS NOT NULL

ORDER BY forest\_differ DESC

LIMIT 5

table 3.2)

WITH t1 AS

(SELECT country\_name, region,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi \* 2.59)) \* 100 AS percent\_1

FROM forestation

WHERE year = 1990

GROUP BY 1,2, forest\_area\_sqkm),

t2 AS (SELECT country\_name, region,

(SUM(forest\_area\_sqkm)/SUM(total\_area\_sq\_mi \* 2.59)) \* 100 AS percent\_2

FROM forestation

WHERE year = 2016

GROUP BY 1,2, forest\_area\_sqkm)

SELECT t1.country\_name, t1.region,

ROUND((((t1.percent\_1 - t2.percent\_2)/(t1.percent\_1)) \* 100)::Numeric, 2) AS percent\_differ

FROM t1 JOIN t2

ON t1.country\_name = t2.country\_name

WHERE t1.percent\_1 IS NOT NULL

AND t2.percent\_2 IS NOT NULL

ORDER BY percent\_differ DESC

LIMIT 5

3 table 3.3)

WITH t1 AS

(SELECT country\_name,

(SUM(forest\_area\_sqkm) / SUM(total\_area\_sq\_mi \* 2.59)) \* 100 AS percent\_1

FROM forestation

WHERE year = 2016

GROUP BY 1, forest\_area\_sqkm)

SELECT Distinct(quartiles),

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

FROM

(SELECT country\_name,

CASE

WHEN percent\_1 < 25 THEN '0-25'

WHEN percent\_1 >= 25 AND percent\_1 < 50 THEN '25-50'

WHEN percent\_1 >= 50 AND percent\_1 < 75 THEN '50-75'

ELSE '75-100' END AS quartiles

FROM t1

WHERE percent\_1 IS NOT NULL) sub

3 table 3.4)

WITH t2 AS

(WITH T1 AS (SELECT country\_name, year, region,

(SUM(forest\_area\_sqkm)/SUM(total\_area\_sq\_mi\*2.59)) \* 100 AS percent\_1

FROM forestation

WHERE year = 2016

GROUP BY 1,2, 3, forest\_area\_sqkm)

SELECT Distinct(quartiles),

country\_name, percent\_1, region,

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

FROM

(SELECT country\_name, percent\_1, region,

CASE

WHEN percent\_1 < 25 THEN '0-25'

WHEN percent\_1 >= 25 AND percent\_1 < 50 THEN '25-50'

WHEN percent\_1 >= 50 AND percent\_1 < 75 THEN '50-75'

ELSE '75-100' END AS quartiles

FROM t1

WHERE percent\_1 IS NOT NULL AND year = 2016) sub)

SELECT country\_name, region, quartiles, ROUND(percent\_1::Numeric, 2) AS percent\_1

FROM t2

WHERE quartiles = '75-100'

ORDER BY percent\_1 DESC