

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 sq km in 1990. As of 2016, the most recent year for which data was available, that number had fallen to 39958245.9 sq km, a loss of 1324449 sq km, 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 sq km).

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

The only regions of the world that decreased in percent forest area from 1990 to 2016 were Latin America & 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

A. 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 527229.062 sq km. 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 sq km, 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.

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 & Caribbean	541510
Indonesia	East Asia & Pacific	282193.9844
Myanmar	East Asia & Pacific	107234.0039
Nigeria	Sub-Saharan Africa	106506.00098
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	59.13
Mauritania	Sub-Saharan Africa	46.75
Honduras	Latin America & 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 & 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.

C. QUARTILES

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

Quartile	Number of Countries
> 75%	9
> 50% and <= 75%	38
> 25% and <= 50%	73
<= 25%	85

The largest number of countries in 2016 were found in the <= 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 America & Caribbean	98.26
Micronesia, Fed. Sts.	East Asia & Pacific	91.86
Gabon	Sub-Saharan Africa	90.04
Seychelles	Sub-Saharan Africa	88.41
Palau	East Asia & Pacific	87.61
American Samoa	East Asia & Pacific	87.50

Guyana	Latin America & Caribbean	83.90
Lao PDR	East Asia & Pacific	82.11
Solomon Islands	East Asia & Pacific	77.86

4. RECOMMENDATIONS

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

- *What have you learned from the World Bank data?*

The total area of forest decreased from 1990 to 2016. The Latin America & Caribbean region lost most forest area. Most countries have less than 50% coverage of forests.

- *Which countries should we focus on over others?*

Brazil, Indonesia, Myanmar, Nigeria, Tanzania, Togo, Uganda

5. Appendix: SQL queries used

A. Set up

```
CREATE VIEW forestation
```

```
AS
```

```
SELECT f.country_code country_code, f.country_name country_name, f.year yearinfo,
f.forest_area_sqkm forest_area_sqkm, l.total_area_sq_mi total_area_sq_mi, r.region region,
r.income_group income_group, (f.forest_area_sqkm / (l.total_area_sq_mi * 2.59)) * 100
forest_percent
```

```
FROM forest_area f
```

```
JOIN land_area l
```

```
ON f.country_code = l.country_code AND f.year = l.year
```

```
JOIN regions r
```

```
ON f.country_code = r.country_code
```

B. Global situation

a.

```
SELECT yearinfo, region, forest_area_sqkm, total_area_sq_mi * 2.59 total_area_sqkm
FROM forestation
WHERE yearinfo = '1990' AND region = 'World'
```

b.

```
SELECT yearinfo, region, forest_area_sqkm, total_area_sq_mi * 2.59 total_area_sqkm
```

```
FROM forestation
WHERE yearinfo = '2016' AND region = 'World'
```

e.

```
SELECT country_name, total_area_sq_mi * 2.59 total_area_sqkm
FROM forestation
WHERE yearinfo = '2016'
ORDER BY total_area_sqkm DESC
```

C. Regional outlook

a.

```
WITH t1 AS (
    SELECT yearinfo, region, SUM(forest_area_sqkm) forest, SUM(total_area_sq_mi) * 2.59
total
    FROM forestation
    GROUP BY yearinfo, region
    ORDER BY yearinfo, region)
SELECT *, (forest / total) * 100 coverage
FROM t1
WHERE yearinfo = '2016'
```

b.

```
WITH t1 AS (
    SELECT yearinfo, region, SUM(forest_area_sqkm) forest, SUM(total_area_sq_mi) * 2.59
total
    FROM forestation
    GROUP BY yearinfo, region
    ORDER BY yearinfo, region)
SELECT *, (forest / total) * 100 coverage
FROM t1
WHERE yearinfo = '1990'
```

D. Country-level detail

a.

```
WITH t1 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '1990'),
t2 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '2016')
```

```

SELECT t1.country_name, t1.forest_area_sqkm - t2.forest_area_sqkm forestdiff
FROM t1
JOIN t2
ON t1.country_code = t2.country_code
ORDER BY forestdiff DESC

```

b.

```

WITH t1 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '1990'),
t2 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '2016')
SELECT t1.country_name, t1.forest_area_sqkm - t2.forest_area_sqkm forestdiff,
(t1.forest_area_sqkm - t2.forest_area_sqkm) * 100 / t1.forest_area_sqkm percentage
FROM t1
JOIN t2
ON t1.country_code = t2.country_code
ORDER BY percentage DESC

```

c.

```

WITH t1 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '2016')
SELECT COUNT(CASE WHEN forest_percent > 75 THEN 1 ELSE NULL END) q4,
COUNT(CASE WHEN forest_percent > 50 AND forest_percent <= 75 THEN 1 ELSE
NULL END) q3,
COUNT(CASE WHEN forest_percent > 25 AND forest_percent <= 50 THEN 1 ELSE
NULL END) q2,
COUNT(CASE WHEN forest_percent <= 25 THEN 1 ELSE NULL END) q1
FROM t1

```

d.

```

WITH t1 AS (
    SELECT *
    FROM forestation
    WHERE yearinfo = '2016')
SELECT *
FROM t1
WHERE forest_percent > 75

```