

# 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 sq.km in 1990. As of 2016, the most recent year for which data was available, that number had fallen to 39,958,245.9 sq.km, a loss of 1,324,449 sq.km, or 3.2082%.

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 1,279,999.9891 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
Latin America & Caribbean	51.03	46.16
Europe & Central Asia	37.28	38.04
North America	35.65	36.04
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 & 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 527,229.062 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 79,200 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	541,510.00
Indonesia	East Asia & Pacific	282,193.98
Myanmar	East Asia & Pacific	107,234.00
Nigeria	Sub-Saharan Africa	106,506.00
Tanzania	Sub-Saharan Africa	102,320.00

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 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
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 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

As a data analyst on the ForestQuery team, I found something bad about our future. According to the World Bank data, Deforestation exists. We need to take this issue seriously. Our primary focus should be on Suriname which in the Latin America & Caribbean Region.

## 5. APPENDIX: SQL queries used

```
-- 1. GLOBAL SITUATION
SELECT *
FROM forest_area
WHERE country_name = 'World'
AND (year = 2016 OR year = 1990)
;

-- country_code country_name year forest_area_sqkm
-- WLD World 2016 39958245.9
-- WLD World 1990 41282694.9

SELECT
curr.forest_area_sqkm - prev.forest_area_sqkm
AS difference
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990'
AND curr.country_name = 'World' AND prev.country_name = 'World')
;

-- difference
-- -1324449

SELECT
100.0*(curr.forest_area_sqkm - prev.forest_area_sqkm) /
prev.forest_area_sqkm AS percentage
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990'
AND curr.country_name = 'World' AND prev.country_name = 'World')
;

-- percentage
-- -3.20824258980244

SELECT country, (total_area_sq_mi * 2.59) AS total_area_sqkm
FROM forestation
WHERE year = 2016
ORDER BY total_area_sqkm
;

-- Peru 1279999.9891
```

```

-- 2. REGIONAL OUTLOOK
SELECT percentage
FROM forestation
WHERE year = 2016
      AND country = 'World'
;
-- 31.3755709643095

SELECT *
FROM forestation
WHERE year = 1990
      AND country = 'World'
;
-- 32.4222035575689

SELECT ROUND(CAST((region_forest_1990/ region_area_1990) * 100 AS NUMERIC), 2)
      AS forest_percent_1990,
      ROUND(CAST((region_forest_2016 / region_area_2016) * 100 AS NUMERIC), 2)
      AS forest_percent_2016,
      region
FROM (
      SELECT SUM(a.forest_area_sqkm) region_forest_1990,
             SUM(a.total_area_sqkm) region_area_1990, a.region,
             SUM(b.forest_area_sqkm) region_forest_2016,
             SUM(b.total_area_sqkm) region_area_2016
      FROM forestation a, forestation b
      WHERE a.year = '1990'
            AND a.country != 'World'
            AND b.year = '2016'
            AND b.country != 'World'
            AND a.region = b.region
      GROUP BY a.region) region_percent
ORDER BY forest_percent_1990 DESC
;
-- forest_percent_1990 forest_percent_2016 region
-- 51.03                46.16                Latin America & Caribbean
-- 37.28                38.04                Europe & Central Asia
-- 35.65                36.04                North America
-- 30.67                28.79                Sub-Saharan Africa
-- 25.78                26.36                East Asia & Pacific
-- 16.51                17.51                South Asia
-- 1.78                2.07                Middle East & North Africa

```

```

-- 3. COUNTRY-LEVEL DETAIL
SELECT curr.country_name,
       curr.forest_area_sqkm - prev.forest_area_sqkm AS difference
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990')
   AND curr.country_name = prev.country_name
ORDER BY difference DESC
;
-- China          527229.062
-- United States  79200

SELECT curr.country_name,
       100.0*(curr.forest_area_sqkm - prev.forest_area_sqkm) /
       prev.forest_area_sqkm AS percentage
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990')
   AND curr.country_name = prev.country_name
ORDER BY percentage DESC
;
-- Iceland          213.664588870028
-- French Polynesia 181.818181818182

```

```

SELECT curr.country_name,
       curr.forest_area_sqkm - prev.forest_area_sqkm AS difference
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990')
   AND curr.country_name = prev.country_name
ORDER BY difference
;
-- Brazil      -541510
-- Indonesia -282193.9844
-- Myanmar     -107234.0039
-- Nigeria     -106506.00098
-- Tanzania    -102320

```

```

SELECT curr.country_name,
       100.0*(curr.forest_area_sqkm - prev.forest_area_sqkm) /
       prev.forest_area_sqkm AS percentage
FROM forest_area AS curr
JOIN forest_area AS prev
ON (curr.year = '2016' AND prev.year = '1990')
   AND curr.country_name = prev.country_name
ORDER BY percentage
;
-- Togo        -75.4452559270073
-- Nigeria     -61.7999309388418
-- Uganda      -59.1286034729531
-- Mauritania  -46.7469879518072
-- Honduras    -45.0344149459194

```



```

SELECT distinct(quartiles), COUNT(country) OVER (PARTITION BY quartiles)
FROM (
    SELECT country,
        CASE WHEN percentage <= 25 THEN '0-25%'
        WHEN percentage <= 75 AND percentage > 50 THEN '50-75%'
        WHEN percentage <= 50 AND percentage > 25 THEN '25-50%'
        ELSE '75-100%'
        END AS quartiles
    FROM forestation
    WHERE percentage IS NOT NULL AND year = 2016) quart
;

-- quartiles count
-- 0-25%      85
-- 25-50%     73
-- 50-75%     38
-- 75-100%    9

SELECT country, percentage
FROM forestation
WHERE percentage > 75 AND year = 2016
ORDER BY percentage DESC
;

-- country          percentage
-- Suriname          98.2576939676578
-- Micronesia, Fed. Sts. 91.8572390715248
-- Gabon              90.0376418700565
-- Seychelles         88.4111367385789
-- Palau              87.6068085491204
-- American Samoa     87.5000875000875
-- Guyana             83.9014489110682
-- Lao PDR            82.1082317640861
-- Solomon Islands    77.8635177945066

```