

# Report for ForestQuery into Global Deforestation, 1990 to 2016

=> All underlined is answers  
for sql queries scroll down

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 in 1990. As of 2016, the most recent year for which data was available, that number had fallen to 39958245.9, a loss of 1324449, or 3.2%.

The forest area lost over this time period is slightly more than the entire land area of puru listed for the year 2016 ( which is 1279999.9 ).

## 2. REGIONAL OUTLOOK

In 2016, the percent of the total land area of the world designated as forest was 31.37%. The region with the highest relative forestation was latin america and caribbean, with 23.15 %, and the region with the lowest relative forestation was middle east and north africa, with 00.58% 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 caribbean, with 24.81% , and

the region with the lowest relative forestation was middle east and north africa, with 00.48% forestation.

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

Region	1990 Forest Percentage	2016 Forest Percentage
Latin america & caribbean	24.81 %	23.15%
Sub-saharan Africa	15.78 %	15.30%
Europe & central asia	24.70 %	26.12%

The only regions of the world that decreased in percent forest area from 1990 to 2016 were Latin america and caribbean (dropped from 24.81 % to 23.15 %) and sub-saharan africa (15.78 % to 15.30 %). 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 31.37 %.

### 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 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 the 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 314% 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 3 Amount Decrease in Forest Area by Country, 1990 & 2016:

Country	Region	Absolute Forest Area Change
Brazil	Latin america & caribbean	541510 sq km
Indonesia	East asia & pacific	282193.98 sq km
myanmar	East asia & pacific	107234 sq km

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

Table 3.2: Top 3 Percent Decrease in Forest Area by Country, 1990 & 2016:

Country	Region	Pct Forest Area Change
togo	Sub-sahran africa	75%
Nigeria	Sub-sahran africa	62%
Uganda	Sub-sahran africa	59%

When we consider countries that decreased in forest area percentage the most between 1990 and 2016, we find that four of the top 3 countries on the list are in the region of sub-saharan . The countries are togo , nigeria , uganda .

From the above analysis, we see that Nigeria is the only country that ranks in the top 3 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
1	9
2	38
3	73
4	85

The largest number of countries in 2016 were found in the 4 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.

## 4. 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?*

## 5. APPENDIX: SQL Queries Used

```

CREATE VIEW forestation AS
SELECT
    forest_area.* ,
    land_area.total_area_sq_mi * 2.59 total_area_sqkm,
    regions.region region,
    ((forest_area.forest_area_sqkm / (land_area.total_area_sq_mi * 2.59)) *
100) AS forest_percent
FROM forest_area
JOIN land_area ON forest_area.country_code = land_area.country_code
                AND forest_area.year = land_area.year
JOIN regions ON forest_area.country_code = regions.country_code;

```

```

SELECT forest_area_sqkm AS forest_sum
FROM forest_area
WHERE year IN ('2016') AND country_name = 'World'

```

```

SELECT forest_area_sqkm AS forest_sum
FROM forest_area
WHERE year IN ('1990') AND country_name = 'World'

```

```

WITH loss AS
    (SELECT
        (SELECT forest_area_sqkm AS forest_sum
        FROM forest_area
        WHERE year IN ('1990') AND country_name = 'World')
        -
        (SELECT forest_area_sqkm AS forest_sum
        FROM forest_area
        WHERE year IN ('2016') AND country_name = 'World') AS loss) ,

forest_1990 AS
    (SELECT forest_area_sqkm AS forest_sum
    FROM forest_area
    WHERE year IN ('1990') AND country_name = 'World')

SELECT (loss / forest_sum) * 100 AS loss_percent
FROM loss
CROSS JOIN forest_1990

```

```

WITH loss AS
(SELECT
(SELECT forest_area_sqkm AS forest_sum
FROM forest_area
WHERE year IN ('1990') AND country_name = 'World')
-
(SELECT forest_area_sqkm AS forest_sum
FROM forest_area
WHERE year IN ('2016') AND country_name = 'World') AS loss)

SELECT country , area
FROM
(SELECT country_name country , (total_area_sq_mi * 2.59) area ,
ABS((total_area_sq_mi * 2.59) - loss) AS difference
FROM land_area
CROSS JOIN loss -- can also be : FULL JOIN loss ON 1=1
WHERE year = '2016' ) sub1

JOIN
(SELECT MIN(difference) min_difference
FROM ( SELECT country_name , ABS((total_area_sq_mi * 2.59) - loss) AS
difference
FROM land_area
CROSS JOIN loss -- can also be : FULL JOIN loss ON 1=1
WHERE year = '2016') sub2 ) sub3

ON sub3.min_difference = sub1.difference

```

```
-- 2 regional outlook
```

```

SELECT country_name , total_area_sqkm , forest_percent
FROM forestation
WHERE year = '2016' AND country_name = 'World' ;

SELECT country_name , total_area_sqkm , forest_percent
FROM forestation
WHERE year = '1990' AND country_name = 'World' ;

```

```

WITH total_forest_2016 AS
    (SELECT forest_area_sqkm AS forest_2016
     FROM forest_area
     WHERE year = 2016 AND country_name = 'World' )

SELECT region ,ROUND(CAST((forest_sum / forest_2016 * 100)AS INTEGER) , 2)
region_percent
FROM (SELECT region , SUM(forest_area_sqkm) forest_sum
     FROM forestation
     WHERE year = 2016 AND region NOT IN ('World')
     GROUP BY 1 ) sub1
FULL JOIN total_forest_2016 ON true
-- to know the maximum over regions
ORDER BY 2 DESC
LIMIT 1 -- delet DESC for the lowest

```

```

WITH total_forest_1990 AS
    (SELECT forest_area_sqkm AS forest_1990
     FROM forest_area
     WHERE year = 1990 AND country_name = 'World' )

SELECT region ,ROUND(CAST((forest_sum / forest_1990 * 100)AS INTEGER) , 2)
region_percent
FROM (SELECT region , SUM(forest_area_sqkm) forest_sum
     FROM forestation
     WHERE year = 1990 --AND region NOT IN ('World')
     GROUP BY 1 ) sub1
FULL JOIN total_forest_1990 ON true

```

```
-- Part 3 - Country-Level Detail
```

```
-- 1
```

```
SELECT f1990.country_name AS country,  
       f1990.forest_area_sqkm - f2016.forest_area_sqkm AS  
decrease_in_forest_area  
FROM forestation f1990  
JOIN forestation f2016 ON f1990.country_name = f2016.country_name  
WHERE f1990.year = 1990  
      AND f2016.year = 2016  
      AND f1990.country_name NOT IN ('World')  
      AND f1990.forest_area_sqkm IS NOT NULL  
      AND f2016.forest_area_sqkm IS NOT NULL  
ORDER BY decrease_in_forest_area DESC  
LIMIT 3;
```



```

WITH country_forest_2016 AS
    (SELECT country_name country2 , forest_area_sqkm forest_area_2016
     FROM forestation
     WHERE year = 2016
      AND country_name NOT IN ('World')
      AND forest_area_sqkm IS NOT NULL
    ) ,
region_country AS
    (SELECT country_name , region reg
     FROM forestation
     GROUP BY 1,2)

SELECT country , reg ,
    ROUND(CAST(100 - (forest_area_2016 / forest_area_1990 * 100) AS INTEGER)
, 2) AS change_in_forest_percent
FROM (
    SELECT country_name country , forest_area_sqkm forest_area_1990
    FROM forestation
    WHERE year = 1990
      AND country_name NOT IN ('World')
      AND forest_area_sqkm IS NOT NULL
    ) sub1
JOIN country_forest_2016 ON country_forest_2016.country2 = sub1.country
JOIN region_country ON region_country.country_name = sub1.country
WHERE country IS NOT NULL
ORDER BY 3 DESC
LIMIT 3;

```

```

SELECT SUM(CASE
            WHEN forest_percent > 75 THEN 1
            ELSE 0
        END ) AS countries_larger_75 ,
SUM (CASE
        WHEN forest_percent BETWEEN 50 AND 75 THEN 1
        ELSE 0
    END) AS countries_between_50_and_75 ,
SUM (CASE
        WHEN forest_percent < 50 AND forest_percent > 25 THEN 1
        ELSE 0
    END) AS countries_less50_above25 ,
SUM (CASE
        WHEN forest_percent < 25 THEN 1
        ELSE 0
    END ) AS countries_less25

FROM forestation
WHERE year = 2016

```

```

SELECT COUNT(*)
FROM (
SELECT country_name , forest_percent
FROM forestation
WHERE year = 2016 AND forest_percent >
        (SELECT forest_percent usa_forestation
        FROM forestation
        WHERE country_name = 'United States' AND year = 2016) )sub2

```