

# 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 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 3.21%.

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 1279999.99).

## 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 the 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 the 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
WORLD	32.42%	31.38% (1.04% decrease)
Sub-Saharan Africa	30.67%	28.79% (1.88% decrease)
Latin America & Caribbean	51.03%	46.16% (4.87% decrease)

The only regions of the world that decreased in percent forest area from 1990 to 2016 were Sub-Saharan Africa (dropped from 30.67% to 28.79%) and Latin America & Caribbean (51.03% to 46.16%). 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 sqkm. 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 sqkm, 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 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 & Caribbean	541510 sqkm

Indonesia	East Asia & Pacific	282193.98 sqkm
Myanmar	East Asia & Pacific	107234 sqkm

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	-75.45%
Nigeria	Sub-Saharan	-61.80%
Uganda	Sub-Saharan	-59.27%

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. 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.

## - QUARTILES

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

Quartile	Number of Countries
75% +	9
50% -75%	38
25%-50%	73
0%-25%	98

The largest number of countries in 2016 were found in the Bottom 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	East Asia & Pacific	91.86
Gabon	Sub-Saharan Africa	90.04
Seychelles	Sub-Saharan Africa	88.42

## 4. RECOMMENDATIONS

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

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

*Learned although there are some countries that cause the overall drop in percentage globally there are many more that are trying to do their part to offset their negative effect*

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

*The countries that are having a major negative impact. Maybe if they see on what level they are affecting the planet over all changes could be put into place towards sustainability.*

## APPENDIX. SQL Code to find answers:

- **Creating a view:**

```
DROP VIEW IF EXISTS forestation;
```

```
CREATE VIEW forestation AS
(SELECT fa.country_code,fa.country_name
,fa.year,fa.forest_area_sqkm
,la.total_area_sq_mi
,r.region,r.income_group
,(la.total_area_sq_mi * 2.59) as land_area_sqkm
,(fa.forest_area_sqkm / (la.total_area_sq_mi * 2.59) * 100) as
percentage_of_forest
FROM
forest_area as fa
JOIN land_area as la
ON la.country_code = fa.country_code
AND la.year = fa.year
JOIN regions as r
```

ON r.country\_code = fa.country\_code)

- **Part 1 (Global Situation) question A:**

```
SELECT country_name, forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 1990
```

- **Part 1 (Global Situation) question B:**

```
SELECT country_name, forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 2016
```

- **Part 1 (Global Situation) question C:**

```
SELECT
(SELECT forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 1990)
```

-

```
(SELECT forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 2016)
as difference
```

- **Part 1 (Global Situation) question D:**

```
SELECT
ROUND((((SELECT forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 1990)
```

-

```
(SELECT forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 2016)) *100
```

/

```
(SELECT forest_area_sqkm
FROM forestation
WHERE region = 'World'
AND year = 1990))::numeric,2) as percent_change
```

- **Part 1 (Global Situation) question E:**

```
SELECT country_name
,ROUND(land_area_sqkm::NUMERIC,2)
```

FROM forestation  
 where land\_area\_sqkm > 1270000  
 AND land\_area\_sqkm < 1350000  
 AND year = 2016  
 ORDER BY land\_area\_sqkm

- **Part 2 (Regional Outlook) question A:**

SELECT region  
 , year  
 , ROUND((SUM(Forest\_area\_sqkm)\*100 / SUM(land\_area\_sqkm))::numeric,2) as  
 percent\_forest  
 FROM forestation  
 WHERE YEAR= 2016  
 GROUP by region,year  
 ORDER BY percent\_forest

- **Part 2 (Regional Outlook) question B:**

SELECT region  
 , year  
 , ROUND((SUM(Forest\_area\_sqkm)\*100 / SUM(land\_area\_sqkm))::numeric,2) as  
 percent\_forest  
 FROM forestation  
 WHERE YEAR = '1990'  
 GROUP by region,year  
 ORDER BY percent\_forest

- **Part 2 (Regional Outlook) question C:**

WITH region\_1990 as(SELECT region  
 , year  
 , ROUND((SUM(Forest\_area\_sqkm)\*100 / SUM(land\_area\_sqkm))::numeric,2) as  
 percent\_forest  
 FROM forestation  
 WHERE YEAR = 1990  
 GROUP by region,year  
 ORDER BY percent\_forest)  
 , region\_2016 as(SELECT region  
 , year  
 , ROUND((SUM(Forest\_area\_sqkm)\*100 / SUM(land\_area\_sqkm))::numeric,2) as  
 percent\_forest  
 FROM forestation  
 WHERE YEAR = 2016  
 GROUP by region,year  
 ORDER BY percent\_forest)  
 SELECT region\_1990.region

```

, region_1990.percent_forest as percent_forest_1990
, region_2016.percent_forest as percent_forest_2016
, (region_2016.percent_forest - region_1990.percent_forest)
as differenc
FROM region_1990
Join region_2016
ON region_1990.region = region_2016.region

```

- **Part 3 (Country Level) question A:**

```

WITH cf1990 as (SELECT country_name
, SUM(Forest_area_sqkm) as total_forest
FROM forestation
WHERE YEAR = '1990'
GROUP BY 1)

```

```

,
cf2016 as (SELECT country_name
, SUM(Forest_area_sqkm)as total_forest
FROM forestation
WHERE YEAR = '2016'
GROUP BY 1)

```

```

,
diff_cf as (SELECT f.country_name
,(cf2016.total_forest -
cf1990.total_forest) as diff_forest_total
FROM forestation as f
JOIN cf1990
ON cf1990.country_name = f.country_name
JOIN cf2016
ON cf2016.country_name = f.country_name)

```

```

SELECT cf1990.country_name
, f.region
, cf1990.total_forest as total_forest_1990
, cf2016.total_forest as total_forest_2016
, diff_cf.diff_forest_total
FROM cf1990
JOIN cf2016
ON cf1990.country_name = cf2016.country_name
JOIN diff_cf
ON diff_cf.country_name = cf1990.country_name
JOIN forestation as f

```

ON f.country\_name = cf1990.country\_name  
 GROUP BY 1,2,3,4,5  
 ORDER BY 5

- **Part 3 (Country Level) question B:**

```
WITH cfp1990 as (SELECT country_name
, SUM(Forest_area_sqkm)*100 /
SUM(land_area_sqkm) as percent_forest
FROM forestation
WHERE YEAR = '1990'
GROUP BY 1
Order by 2)
,
cfp2016 as (SELECT country_name
, SUM(Forest_area_sqkm)*100 /
SUM(land_area_sqkm) as percent_forest
FROM forestation
WHERE YEAR = '2016'
GROUP BY 1
Order by 2)
,
diff_cfp as (SELECT f.country_name
,ROUND((((cfp2016.percent_forest -
cfp1990.percent_forest)*100
/cfp1990.percent_forest))::NUMERIC,2)
as diff_forest_percentage
FROM forestation as f
JOIN cfp1990
ON cfp1990.country_name = f.country_name
JOIN cfp2016
ON cfp2016.country_name = f.country_name)
```

```
SELECT cfp1990.country_name
, cfp1990.percent_forest as forest_percent_1990
, cfp2016.percent_forest as forest_percent_2016
, diff_cfp.diff_forest_percentage
FROM cfp1990
JOIN cfp2016
ON cfp1990.country_name = cfp2016.country_name
JOIN diff_cfp
ON diff_cfp.country_name = cfp1990.country_name
GROUP BY 1,2,3,4
```



ORDER BY 4

- **Part 3 (Country Level) quartiles**

```
WITH percent_2016 as(
  SELECT country_name
  ,ROUND((SUM(Forest_area_sqkm)*100 /
    SUM(land_area_sqkm))::NUMERIC,2) as percent
  FROM forestation as f
  WHERE year = 2016
  GROUP BY 1)
SELECT --p2016.percent,
COUNT(f.country_name)
,CASE WHEN percent > 75 THEN 'top tier'
  WHEN percent > 50 THEN 'second Tier'
  WHEN percent > 25 THEN 'third Tier'
  ELSE 'Bottom Tier' END AS quartile
  FROM forestation as f
  JOIN percent_2016 as p2016
  ON p2016.country_name = f.country_name
  WHERE YEAR = 2016
  GROUP BY 2
  ORDER BY 1
```