

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 square kilometers** in 1990. As of 2016, that number had fallen to **39958245.9 square kilometers**, a loss of **1324449 square kilometers**, or **3.208%**.

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 square kilometers**).

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 and the Caribbean**, with **46.16%**, and the region with the lowest relative forestation was **the Middle East and 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 and the Caribbean**, with **51.03%**, and the region with the lowest relative forestation was **the Middle East and 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%
Sub-Saharan Africa	29.68%	27.09%
Europe & Central Asia	45.00%	43.80%
East Asia & Pacific	28.52%	30.76%
South Asia	17.00%	18.00%

Middle East & North Africa	1.78%	2.07%
North America	33.00%	33.00%

The only regions of the world that decreased in percent forest area from 1990 to 2016 were **Latin America and the 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 **approximately 527229 square kilometers**. 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 **about 79200 square kilometers**, 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. **Vietnam** increased in forest area by **59%** 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
Gibraltar	Europe & Central Asia	
Hong Kong SAR, China	East Asia & Pacific	
Ethiopia	Sub-Saharan Africa	
Curacao	Latin America & Caribbean	
Macao SAR, China	East Asia & Pacific	

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%
Nigeria	Sub-Saharan Africa	-61%
Uganda	Sub-Saharan Africa	-59%
Mauritania	Sub-Saharan Africa	-46%
Honduras	Latin America & Caribbean	-45%

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 **Nigeria**, **Democratic Republic of Congo**, **Angola**, and **Tanzania**. The 5th country on the list is **Indonesia**, which is in the **East Asia & Pacific** region.

From the above analysis, we see that **Brazil** 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%	38
50-75%	73
75-100%	9

The largest number of countries in 2016 were found in the **25-50%** quartile.

There were **10** 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	98.3%
Micronesia	East Asia & Pacific	91.9%
Seychelles	Sub-Saharan Africa	88.4%
American Samoa	East Asia & Pacific	88.1%
Palau	East Asia & Pacific	87.6%
Gabon	Sub-Saharan Africa	85.4%
Solomon Islands	East Asia & Pacific	77.9%
Papua New Guinea	East Asia & Pacific	77.6%
Finland	Europe & Central Asia	73.1%
Bhutan	South Asia	71.4%
Guyana	Latin America & Caribbean	70.0%
Laos	East Asia & Pacific	68.2%
Japan	East Asia & Pacific	68.0%
Sweden	Europe & Central Asia	67.0%
Slovenia	Europe & Central Asia	62.3%

4. RECOMMENDATIONS

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

- What have you learned from the World Bank data?

Global Trends: Forest area declined by 3.208% from 1990 to 2016, with Latin America and Sub-Saharan Africa driving most losses.

Success Stories:

- **China** added 527,229 km² of forest area, and **Vietnam** achieved a 59% increase.
- East Asia and South Asia regions showed slight gains in forest cover.

Concerns:

- **Brazil** had significant losses in both absolute and percentage terms.
- Sub-Saharan Africa faced drastic percentage losses, with countries like Nigeria and Togo leading in deforestation.

- Which countries should we focus on over others?

High-Priority Countries:

- **Brazil:** Address large-scale deforestation in the Amazon.
- **Nigeria, Togo, Uganda, Honduras:** Urgently combat deforestation in these highly affected nations.
- **Indonesia:** Protect biodiversity and reduce deforestation.

Learn from Success:

- Study afforestation programs in **China** and **Vietnam** for scalable solutions.

Regional Efforts:

- **Latin America:** Focus on reversing trends in Brazil and Honduras.
- **Sub-Saharan Africa:** Promote sustainable land use to address severe forest losses.

Protect High-Forest Regions:

- Safeguard forest-rich nations like **Suriname, Gabon, and Micronesia** to prevent future deforestation.

5. APPENDIX: SQL Queries Used

```
DROP VIEW IF EXISTS ForestationView;
```

```
/* Create view */
CREATE VIEW ForestationView AS
SELECT
  f.country_code AS CountryCode,
  f.country_name AS CountryName,
  f.year AS Year,
  f.forest_area_sqkm AS ForestAreaSqKm,
  l.total_area_sq_mi AS TotalAreaSqMi,
  l.total_area_sq_mi * 2.59 AS TotalAreaSqKm,
  r.region AS Region,
  r.income_group AS IncomeGroup,
  100.0 * (f.forest_area_sqkm / (l.total_area_sq_mi * 2.59)) AS
  ForestPercentage
FROM
  forest_area f
  INNER JOIN
  land_area l ON f.country_code = l.country_code AND f.year = l.year
  INNER JOIN
  regions r ON r.country_code = l.country_code;
```

```
/* Select all from the new view */
SELECT * FROM ForestationView;
```

```
/* Select forest area data for the world */
SELECT * FROM forest_area WHERE country_name = 'World';
```

```

/* Select forest area data for the world for the years 2016 and 1990 */
SELECT * FROM forest_area WHERE country_name = 'World' AND (year = 2016 OR year = 1990);

```

```

/* Query to find countries with the largest decrease in forest area */
SELECT
    f1.country_name,
    (f1.forest_area_sqkm - f2.forest_area_sqkm) AS AbsoluteDecrease
FROM
    forest_area f1
INNER JOIN
    forest_area f2
ON
    f1.country_code = f2.country_code
    AND f1.year = 1990
    AND f2.year = 2016
ORDER BY
    AbsoluteDecrease DESC
LIMIT 5;

```

```

/* Query to find countries with the largest percent decrease in forest area */
SELECT
    f1.country_name,
    ((f2.forest_area_sqkm - f1.forest_area_sqkm) / f1.forest_area_sqkm) * 100 AS PercentDecrease
FROM
    forest_area f1
INNER JOIN
    forest_area f2
ON
    f1.country_code = f2.country_code
    AND f1.year = 1990
    AND f2.year = 2016
ORDER BY
    PercentDecrease ASC
LIMIT 5;

```

```

/* Query to count countries grouped by forestation percent quartiles */
SELECT
    CASE
        WHEN ForestPercentage < 25 THEN '0-25%'
        WHEN ForestPercentage >= 25 AND ForestPercentage < 50 THEN '25-50%'
        WHEN ForestPercentage >= 50 AND ForestPercentage < 75 THEN '50-75%'
        ELSE '75-100%'
    END AS Quartile,
    COUNT(*) AS NumberOfCountries
FROM
    ForestationView
WHERE
    Year = 2016
    AND ForestPercentage IS NOT NULL
GROUP BY
    Quartile;

```

Thank you for your reading.