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[1] in 1990. As of 2016, the most recent year for which data was available, that number had fallen to39,958,245.9[1], a loss of 1,324,449[3], or 3.31[4]%.

The forest area lost over this time period is slightly more than the entire land area of Peru[5] listed for the year 2016 (which is 1279999.9891).

## 2. **REGIONAL OUTLOOK**

In 2016, the percent of the total land area of the world designated as forest was 31.11[6]. The region with the highest relative forestation was Latin America & Caribbean[7], 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 32.25[8]. The region with the highest relative forestation was Latin America & Caribbean[7], with 51.03%, and the region with the lowest relative forestation was Middle East & North Africa, with 1.77% forestation.

Table 2.1: Percent Forest Area by Region, 1990 & 2016:[7]

| Region | 1990 Forest Percentage | 2016 Forest Percentage |
| --- | --- | --- |
| East Asia & Pacific | 25.77 | 26.35 |
| Europe & Central Asia | 37.27 | 38.05 |
| Sub-Saharan Africa | 32.18 | 27.55 |

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 (32.19% to 27.55%). 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 32.21% to 31.34%.

## 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 527,229.06. 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, 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. French Polynesia increased in forest area by 27.32% 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 | -541,510 |
| Indonesia | East Asia & Pacific | -282,193.98 |
| Myanmar | East Asia & Pacific | -107,234.0039 |
| Nigeria | Sub-Saharan Africa | -106,506.00098 |
| Tanzania | Sub-Saharan Africa | -102,320 |

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 | -407.25 |
| Nigeria | Sub-Saharan Africa | -261.78 |
| Uganda | Sub-Saharan Africa | -244.67 |
| Mauritania | Sub-Saharan Africa | -187.78 |
| Honduras | Latin America & Caribbean | -181.93 |

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 and 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 and 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 |
| --- | --- |
| less than 25 | 85 |
| between 25 and 50 | 73 |
| between 50 and 75 | 38 |
| between 75 and 100 | 9 |

The largest number of countries in 2016 were found in the less than 25 quartile.

There were nine 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 | 88.41 |

## 5. RECOMMENDATIONS

* *Write out a set of recommendations as an analyst on the ForestQuery team.*
  + *What have you learned from the World Bank data?*
    - *That the global deforestation entities are neglecting the education of deforestation in many countries that should be much more aware of the devastation that will be caused by deforestation.*
* *Which countries should we focus on over others?*
  + *We should not focus on any country over any other country. All countries need to be treated equally. The main problem appears to be that some of these countries are not receiving any attention. Any country that has a declining forestation should be educated on methods of sustainable forest growth.*

*/\* APPENDIX*

*GLOBAL SITUATION*

*\*/*

*CREATE VIEW forestation AS*

*SELECT f.country\_code,*

*f.year,*

*f.country\_name,*

*r.region,*

*l.total\_area\_sqkm,*

*f.forest\_area\_sqkm,*

*(f.forest\_area\_sqkm / l.total\_area\_sqkm)\*100 AS forest\_percent,*

*r.income\_group,*

*CASE*

*WHEN (f.forest\_area\_sqkm / l.total\_area\_sqkm) \* 100 < 25*

*THEN 'less than 25'*

*WHEN (f.forest\_area\_sqkm / l.total\_area\_sqkm) \* 100 >= 25*

*AND (f.forest\_area\_sqkm / l.total\_area\_sqkm) \* 100 < 50*

*THEN 'between 25 and 50'*

*WHEN (f.forest\_area\_sqkm / l.total\_area\_sqkm) \* 100 >= 50*

*AND (f.forest\_area\_sqkm / l.total\_area\_sqkm) \* 100 < 75*

*THEN 'between 50 and 75'*

*ELSE 'between 75 and 100'*

*END AS quartiles*

*FROM forest\_area f*

*JOIN (*

*SELECT country\_code,*

*country\_name,*

*year,*

*total\_area\_sq\_mi \* 2.59 total\_area\_sqkm*

*FROM land\_area*

*WHERE total\_area\_sq\_mi IS NOT NULL) l*

*ON f.country\_code = l.country\_code AND f.year = l.year*

*JOIN regions r*

*ON r.country\_code = l.country\_code*

*WHERE f.forest\_area\_sqkm IS NOT NULL AND l.total\_area\_sqkm IS NOT NULL*

*ORDER BY country\_code, year*

*/\*[1]\*/*

*SELECT country\_name, year, forest\_area\_sqkm*

*FROM forestation*

*WHERE (year = 1990 or year = 2016) AND country\_name='World'*

*/\*[3]\*/*

*SELECT (SELECT forest\_area\_sqkm*

*FROM forestation*

*WHERE year = 1990 AND country\_name='World' )-*

*(SELECT forest\_area\_sqkm*

*FROM forestation*

*WHERE year = 2016 AND country\_name='World' ) AS Change\_in\_time*

*FROM forestation*

*LIMIT 1*

*/\*[4]\*/*

*SELECT (((SELECT forest\_area\_sqkm*

*FROM forestation*

*WHERE year = 1990 AND country\_name='World' )/*

*(SELECT forest\_area\_sqkm*

*FROM forestation*

*WHERE year = 2016 AND country\_name='World' )-1)\*100) AS percent\_change\_in\_time*

*FROM forestation*

*LIMIT 1*

*/\*[5]\*/*

*SELECT country\_name, total\_area\_sqkm*

*FROM forestation*

*WHERE year = '2016' AND total\_area\_sqkm < 1324449*

*ORDER BY total\_area\_sqkm DESC*

*LIMIT 1*

*/\*REGIONAL OUTLOOK\*/*

*/\*[6]\*/*

*SELECT SUM(f.total\_area\_sqkm) AS land\_total\_2016,*

*SUM(f.forest\_area\_sqkm) AS forest\_total\_2016,*

*ROUND(CAST((SUM(f.forest\_area\_sqkm) \* 100 / SUM(f.total\_area\_sqkm)) AS*

*NUMERIC),2) AS forest\_percent*

*FROM (SELECT \**

*FROM forestation*

*WHERE country\_name != 'World') AS f*

*WHERE year = 2016*

*/\*[7]\*/*

*SELECT f.region,*

*sum(forest\_area\_sqkm)\*100/sum(total\_area\_sqkm) AS percent\_1990,*

*percent\_2016.percent\_2016*

*FROM forestation f*

*JOIN (SELECT ft.region,*

*sum(ft.forest\_area\_sqkm)\*100/sum(ft.total\_area\_sqkm)*

*AS percent\_2016*

*FROM forestation ft*

*WHERE ft.year = 2016 AND ft.forest\_percent > 0*

*AND ft.region != 'World'*

*GROUP BY ft.region) AS percent\_2016*

*ON f.region = percent\_2016.region*

*WHERE year = 1990 AND forest\_percent > 0 AND f.region != 'World'*

*GROUP BY f.region, percent\_2016.percent\_2016*

*ORDER BY percent\_2016 DESC*

*/\*[8]\*/*

*SELECT SUM(total\_area\_sqkm) AS land\_total\_1990,*

*SUM(forest\_area\_sqkm) AS forest\_total\_1990,*

*SUM(forest\_area\_sqkm) \* 100 / SUM(total\_area\_sqkm) AS forest\_percent*

*FROM (SELECT \**

*FROM forestation*

*WHERE country\_name != 'World') AS f*

*WHERE year = 1990*

*/\*COUNTRY-LEVEL DETAIL\*/*

*SELECT f.country\_name,*

*f.region,*

*f.year,*

*f.forest\_area\_sqkm AS forest\_area\_sqkm\_1990,*

*forest\_area\_2016.forest\_area\_sqkm AS forest\_area\_sqkm\_2016,*

*forest\_area\_2016.forest\_area\_sqkm - f.forest\_area\_sqkm AS*

*change\_over\_time*

*FROM forestation f*

*JOIN (SELECT ft.forest\_area\_sqkm, ft.country\_name*

*FROM forestation ft*

*WHERE year = 2016) AS forest\_area\_2016*

*ON f.country\_name = forest\_area\_2016.country\_name*

*WHERE f.year = 1990 AND f.forest\_area\_sqkm > 0*

*AND forest\_area\_2016.forest\_area\_sqkm > 0*

*ORDER BY change\_over\_time DESC*

*/\*Table 3.1: Top 5 Amount Decrease in Forest Area by Country, 1990 & 2016\*/*

*SELECT f.country\_name,*

*region,*

*f.forest\_area\_sqkm AS forest\_area\_sqkm\_1990,*

*forest\_area\_2016.forest\_area\_sqkm AS forest\_area\_sqkm\_2016,*

*forest\_area\_2016.forest\_area\_sqkm - f.forest\_area\_sqkm AS*

*change\_over\_time*

*FROM forestation f*

*JOIN (SELECT ft.forest\_area\_sqkm, ft.country\_name*

*FROM forestation ft*

*WHERE year = 2016) AS forest\_area\_2016*

*ON f.country\_name = forest\_area\_2016.country\_name*

*WHERE f.year = 1990*

*AND f.forest\_area\_sqkm IS NOT NULL*

*AND forest\_area\_2016.forest\_area\_sqkm IS NOT NULL*

*AND f.region != 'World'*

*ORDER BY change\_over\_time*

*/\*Table 3.2: Top 5 Percent Decrease in Forest Area by Country, 1990 & 2016\*/*

*SELECT f.country\_name,*

*f.region,*

*f.forest\_area\_sqkm AS forest\_area\_sqkm\_1990,*

*forest\_area\_2016.forest\_area\_sqkm AS forest\_area\_sqkm\_2016,*

*ROUND(CAST(((forest\_area\_2016.forest\_area\_sqkm - f.forest\_area\_sqkm) /*

*forest\_area\_2016.forest\_area\_sqkm-1)\*100 AS NUMERIC),2) AS change\_over\_time*

*FROM forestation f*

*JOIN (SELECT \**

*FROM forestation ft*

*WHERE year = 2016) AS forest\_area\_2016*

*ON f.country\_name = forest\_area\_2016.country\_name*

*WHERE f.year = 1990*

*AND f.forest\_area\_sqkm IS NOT NULL*

*AND forest\_area\_2016.forest\_area\_sqkm IS NOT NULL*

*AND forest\_area\_2016.forest\_percent IS NOT NULL*

*AND f.forest\_percent IS NOT NULL*

*AND f.region != 'World'*

*ORDER BY change\_over\_time*

*/\* [Table 3.3: Count of Countries Grouped by Forestation Percent Quartiles, 2016] \*/*

*SELECT quartiles,*

*COUNT(quartiles) AS q\_count*

*FROM forestation*

*WHERE year = 2016*

*GROUP BY quartiles*

*ORDER BY q\_count DESC*

*/\* [Table 3.4: Top Quartile Countries, 2016]\*/*

*SELECT \**

*FROM forestation*

*WHERE year = 2016 AND quartiles = 'between 75 and 100'*

*ORDER BY forest\_percent DESC*