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 41282694.90 in 1990. As of 2016, the most recent year for which data was available, that number had fallen to39958245.9

, a loss of 1324449 , or 3.20824258980244%

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 494208.49).

## 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**

### 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 527229.062. 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 , 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.

### 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 |
| Indonesia | East Asia & Pacific | 282193.9844 |
| Myanmar | East Asia & Pacific | 107234.0039 |
| Nigeria | Sub-Saharan Africa | 106506.00098 |
| Tanzania | Sub-Saharan Africa | 102320 |

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 | -75.4452559270073 |
| Nigeria | Sub-Saharan Africa | -61.7999309388418 |
| Uganda | Sub-Saharan Africa | -59.1286034729531 |
| Mauritania | Sub-Saharan Africa | -46.7469879518072 |
| Honduras | Latin America & Caribbean | -45.0344149459194 |

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 kilometera 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 |
| 1st Quartile | 85 |
| 2ND Quartile | 73 |
| 3rD Quartile | 38 |
| 4th Quartile | 9 |

The largest number of countries in 2016 were found in the  **First** 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 |
| American Samoa | East Asia & Pacific | 87.5000875000875 |
| Micronesia, Fed. Sts. | East Asia & Pacific | 91.8572390715248 |
| Gabon | Sub-Saharan Africa | 90.0376418700565 |

## 5. RECOMMENDATIONS

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

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

World Bank Data provides us as Data Analysts a huge amount of data that helps us analyze them, mine and extract important numbers and accurate percentages from them, to know which countries and regions has increased or decreased in their forest area to focus on protecting and keeping them. Also, helps us spread awareness based on our analysis of the provided data.

*Which countries should we focus on over others?*

Not to diminish the importance of all existing Forests, but I think we should focus on Nigeria, since it’s the only country that ranked in the top 5 both in terms of absolute square kilometera decrease in forest as well as percent decrease in forest area from 1990 to 2016. Therefore, it’s worthy to protect and focus on keeping Nigerian Forests.

## 6. Appendix:

**1. GLOBAL SITUATION**

1- forestation view

CREATE view forestation

as

SELECT f.\*,l.total\_area\_sq\_mi,r.region, r.income\_group,(f.forest\_area\_sqkm/(l.total\_area\_sq\_mi \* 2.59) \*100) as forest\_percentage

FROM forest\_area f

JOIN land\_area l

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

JOIN regions r

ON r.country\_code= f.country\_code AND r.country\_code= l.country\_code

 a- What was the total forest area (in sq km) of the world in 1990? Please keep in mind that you can use the country record denoted as “World" in the region table.

b. What was the total forest area (in sq km) of the world in 2016? Please keep in mind that you can use the country record in the table is denoted as “World.”

SELECT \*

FROM forest\_area

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

c. What was the change (in sq km) in the forest area of the world from 1990 to 2016?

SELECT b.forest\_area\_sqkm - a.forest\_area\_sqkm

AS difference

FROM forest\_area a

JOIN forest\_area b

ON (a.year = '2016' AND b.year = '1990'

AND a.country\_name = 'World' AND b.country\_name = 'World');

d. What was the percent change in forest area of the world between 1990 and 2016?

SELECT 100\*(b.forest\_area\_sqkm - a.forest\_area\_sqkm)/b.forest\_area\_sqkm

AS Percentage

FROM forest\_area a

JOIN forest\_area b

ON (a.year = '2016' AND b.year = '1990' AND a.country\_name = 'World' AND b.country\_name = 'World');

e. If you compare the amount of forest area lost between 1990 and 2016, to which country's total area in 2016 is it closest to?

SELECT country\_name,total\_area\_sq\_mi,YEAR

FROM forestation

WHERE YEAR = 2016 AND total\_area\_sq\_mi <

(SELECT (b.forest\_area\_sqkm - a.forest\_area\_sqkm)/2.59 AS difference

FROM forest\_area a

JOIN forest\_area b

ON (a.year = '2016' AND b.year = '1990' AND a.country\_name = 'World' AND b.country\_name = 'World'))

ORDER BY total\_area\_sq\_mi desc

limit 1

**2. REGIONAL OUTLOOK**

Create a table that shows the Regions and their percent forest area (sum of forest area divided by sum of land area) in 1990 and 2016.

CREATE table regional\_outlook as (

SELECT f.year, r.region,

ROUND(CAST((SUM(f.forest\_area\_sqkm)\*100)/(sum(l.total\_area\_sq\_mi\*2.59))AS NUMERIC),2) as forest\_area\_percentage

from forest\_area f

join land\_area l

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

join regions r

ON r.country\_code=f.country\_code

WHERE f.year IN(1990, 2016)

Group by 2,1);

a. What was the percent forest of the entire world in 2016??

SELECT \*

FROM regional\_outlook

WHERE year= '2016' and region='World'

order by forest\_area\_percentage desc

limit 1

2.aWhich region had the HIGHEST percent forest in 2016

SELECT \*

FROM regional\_outlook

WHERE year= '2016' AND forest\_area\_percentage is not null

order by forest\_area\_percentage desc

limit 1;

3.a Which had the LOWEST percent forest in 1990?

SELECT \*

FROM regional\_outlook

WHERE year= '2016' AND forest\_area\_percentage IS NOT NULL

order by forest\_area\_percentage

limit 1

b. What was the percent forest of the entire world in 1990?

2.b Which region had the HIGHEST percent forest in 1990?

SELECT \*

FROM regional\_outlook

WHERE year= '1990' AND forest\_area\_percentage is not null

order by forest\_area\_percentage desc

limit 1;

3.b Which had the LOWEST percent forest in 1990?

SELECT \*

FROM regional\_outlook

WHERE year= '1990' AND forest\_area\_percentage is not null

order by forest\_area\_percentage

limit 1;

c. Based on the table you created, which regions of the world DECREASED in forest area from 1990 to 2016?

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\_sq\_mi\*2.59) region\_area\_1990, a.region,

SUM(b.forest\_area\_sqkm) region\_forest\_2016,

SUM(b.total\_area\_sq\_mi\*2.59) region\_area\_2016

FROM forestation a, forestation b

WHERE a.year = '1990' AND a.country\_name != 'World'

AND b.year = '2016' AND b.country\_name != 'World'

AND a.region = b.region

GROUP BY a.region) region\_percent

ORDER BY forest\_percent\_1990 DESC;

**3. COUNTRY-LEVEL DETAIL**

Which 5 countries saw the largest amount decrease in forest area from 1990 to 2016? What was the difference in forest area for each?

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 AND

prev.forest\_area\_sqkm is NOT NULL AND curr.forest\_area\_sqkm is NOT NULL AND curr.country\_name != 'World'

ORDER BY difference

limit 5

Which 5 countries saw the largest percent decrease in forest area from 1990 to 2016? What was the percent change to 2 decimal places for each?

SELECT curr.country\_name,

ROUND(CAST(((curr.forest\_area\_sqkm - prev.forest\_area\_sqkm)/ prev.forest\_area\_sqkm)\*100 AS NUMERIC),2) 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 AND

prev.forest\_area\_sqkm is NOT NULL AND curr.forest\_area\_sqkm is NOT NULL AND curr.country\_name != 'World'

ORDER BY percentage

limit 5;

3.1 table

SELECT curr.country\_name,curr.region,

curr.forest\_area\_sqkm - prev.forest\_area\_sqkm AS difference

FROM forestation AS curr

JOIN forestation AS prev

ON (curr.year = '2016' AND prev.year = '1990')

AND curr.country\_name = prev.country\_name AND

prev.forest\_area\_sqkm is NOT NULL AND curr.forest\_area\_sqkm is NOT NULL AND curr.country\_name != 'World'

ORDER BY difference

limit 5

3.2 table:

SELECT curr.country\_name,curr.region,

((curr.forest\_area\_sqkm - prev.forest\_area\_sqkm)/ prev.forest\_area\_sqkm )\*100 AS difference

FROM forestation AS curr

JOIN forestation AS prev

ON (curr.year = '2016' AND prev.year = '1990')

AND curr.country\_name = prev.country\_name AND

prev.forest\_area\_sqkm is NOT NULL AND curr.forest\_area\_sqkm is NOT NULL AND curr.country\_name != 'World'

ORDER BY difference

Limit 5

C:  If countries were grouped by percent forestation in quartiles, which group had the most countries in it in 2016?

SELECT distinct(Quartile), COUNT(country\_name) OVER (PARTITION BY Quartile) as Number\_of\_Countries

FROM( select country\_name,

CASE WHEN forest\_percentage < 25 THEN '1st Quartile'

WHEN forest\_percentage >= 25 AND forest\_percentage < 50 THEN '2ND Quartile'

WHEN forest\_percentage >= 50 AND forest\_percentage <75 THEN '3rD Quartile'

ELSE '4th Quartile' END as Quartile

from forestation

where year='2016' AND forest\_percentage IS NOT NULL )sub order by Quartile

d. List all of the countries that were in the 4th quartile (percent forest > 75%) in 2016.

SELECT country\_name, region, forest\_percentage

FROM forestation

WHERE year='2016' AND forest\_percentage>75