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 3.2%

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

2. **REGIONAL OUTLOOK**

In 2016, the percent of the total land area of the world designated as forest was 31.34%
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 2.06 % 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 _____
51.02% 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:

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
World	32.42	31.38
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**

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 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 79,200.00 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.

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
Brazil	Latin America & Caribbean	-541,510.00
Indonesia	East Asia & Pacific	-282,193.98
Myanmar	East Asia & Pacific	-107,234.00

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	-75.45
Nigeria	Sub-Saharan Africa	-61.8
Uganda	Sub-Saharan Africa	-59.13

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 & 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.

C. QUARTILES

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

Quartile	Number of Countries
0%-25%	85
25% - 50%	72
50% - 75%	38
75% - 100%	9

The largest number of countries in 2016 were found in the 0%-25% 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, Fed. Sts.	East Asia & Pacific	91.86
Gabon	Sub-Saharan Africa	90.04
Seychelles	Sub-Saharan Africa	88.41
Palau	East Asia & Pacific	87.61
American Samoa	East Asia & Pacific	87.50

Guyana	Latin America & Caribbean	83.90
Lao PDR	East Asia & Pacific	82.11
Solomon Islands	East Asia & Pacific	77.86

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?*

From the world Bank data I have learned that there has been a 3.6% drop in the percentage of the world forests in the 26 years from 1990 to 2016. A statistic I find hugely concerning when combined with the large increase in co2 emissions and the planet's increase in temperatures during the same period.

Clearly a huge effort needs to be undertaken in order to maintain these levels of forestation and increase where possible.

With this in mind I recommend that the larger and richer countries and regions as who have the climatic and ecological conditions to grow forests more feasibly should undertake serious efforts in order to increase their percentages, and certainly not decrease their percentages of forested areas.

That is not to say that other countries and regions should be ignored, but smaller less economically developed countries and regions who do not benefit from the climatic and ecological conditions that make growing forests easier should be encouraged in other ways to mitigate climate change.

Focus needs to be placed on the top 10 countries with the bigggest deforestation which are,

Brazil
Indonesia
Myanmar
Nigeria
Tanzania
Zimbabwe
Bolivia
Congo, Dem. Rep.
Argentina

I would also suggest that clear initiatives to use sustainable wood and to replant forests needs to be taken and where possible passed into legislation.

5. APPENDIX: SQL Queries Used

```
DROP VIEW IF EXISTS forestation;
CREATE VIEW forestation
AS
(SELECT forest_area.country_code,
forest_area.year,
forest_area.forest_area_sqkm,
land_area.country_name,
land_area.total_area_sq_mi,
regions.region,
regions.income_group,
forest_area.forest_area_sqkm /
( land_area.total_area_sq_mi * 2.59 ) *100 forest_percentage,
 land_area.total_area_sq_mi *2.59 total_area_sqkm
 from forest_area
 inner join land_area on land_area.country_code = forest_area.country_code and
land_area.year = forest_area.year
 inner join regions on forest_area.country_code =regions.country_code);




SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '1990' and country_name ='World'


SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '2016' and country_name ='World'



select
(SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '1990' and country_name ='World')

-
```

```sql
(SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '2016' and country_name ='World') as difference

select ((SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '1990' and country_name ='World')
-
(SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '2016' and country_name ='World'))
/
(SELECT SUM(forest_area_sqkm) AS standard
FROM forest_area
where year = '1990' and country_name ='World')
 *100

WITH sub1 as
(SELECT country_name, forest_area_sqkm AS standard_1990
FROM forest_area
where year = '1990' and country_name ='World'),
sub2 as
(SELECT country_name, forest_area_sqkm AS standard_2016
FROM forest_area
where year = '2016' and country_name ='World'),
sub3 as
(select * from sub1 inner join sub2 using(country_name))
select (standard_2016 - standard_1990)/standard_1990 *100 from sub3




select country_name,total_area_sqkm
from forestation
WHERE total_area_sqkm < 1324449 and year =2016
order by total_area_sqkm desc



select SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm)
from forestation
where  year ='2016'
```

```sql
select SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm), region
from forestation
where  year ='2016'
group by region
 order by 1 desc



select SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm), region
from forestation
where  year ='1990'
group by region
 order by 1 desc




WITH forest_percentage_1990 AS
( SELECT country_name ,region ,forest_area_sqkm AS area_1990 FROM forestation
WHERE year = 1990 AND forest_area_sqkm IS NOT NULL ) ,
forest_percentage_2016 AS
( SELECT country_name ,region ,forest_area_sqkm AS area_2016 FROM forestation
WHERE year = 2016 AND forest_area_sqkm IS NOT NULL )
SELECT country_name,
forest_percentage_1990.region,
(area_2016 - area_1990) AS forest_change,
Round(((area_2016 - area_1990) * 100 / area_1990)::NUMERIC, 2) AS fp_change
FROM forest_percentage_1990 inner JOIN forest_percentage_2016 using
(country_name) ORDER BY forest_change DESC







WITH t1
 as (select f.country_name,f.forest_percentage,
CASE
 when f.forest_percentage >= 75 then '75% - 100%'
 when f.forest_percentage >= 50 then '50% - 75%'
 when f.forest_percentage >= 25 then '25% - 50%'
```

```
 ELSE '0%-25%'
 END AS QUARTILES
 FROM forestation f
 WHERE YEAR = '2016'
 AND f.forest_percentage IS NOT NULL
 AND country_name != 'World')
select QUARTILES, count(*)
from t1
GROUP by QUARTILES
order by QUARTILESGROUP by QUARTILES
order by QUARTILES


select f.country_name,f.forest_percentage, f.region
 FROM forestation f
 WHERE YEAR = '2016'
 and f.forest_percentage >= 75
```