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 sq km** in 1990. As of 2016, the most recent year for which data was available, that number had fallen to **39958245.9 sq km**, a loss of **1324449 sq km**, or -**3.21%**.

The forest area lost over this period is slightly more than the entire land area of **1279999.9891sq km** listed for 2016 (which is **Peru**).

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 **46.2**%, and the region with the lowest relative forestation was **Middle East & North Africa**, with **2.1**% forestation.

In 1990, the percent of the total land area of the world designated as forest was **32.4**. The region with the highest relative forestation was **Latin America & Caribbean**, with **51**%, and the region with the lowest relative forestation was **Middle East & North Africa**, with **1.8**% forestation.

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

Region	1990 Forest Percentage	2016 Forest Percentage
East Asia & Pacific	25.78	26.36
Europe & Central Asia	37.28	38.04
Latin America & Caribbean	51.03	46.16
Middle East & North Africa	1.78	2.071
North America	35.65	36.04
South Asia	16.51	17.51
Sub-Saharan Africa	30.67	28.79
World	32.42	31.38

The only regions of the world that decreased in percent forest area from 1990 to 2016 were **Latin America & Caribbean** (dropped from **51**% to **46.2**%) and **Sub-Saharan Africa** (**30.7**% to **28.8**%). 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 **32.4**% to **31.4**%.

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 sq km**. 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 **79200.00 sq km**, much lower than the figure for **China**.

Russian Federation and **China** 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
Nigeria	Sub-Saharan Africa	106,506.00
Tanzania	Sub-Saharan Africa	102,320.00

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	75.46
Nigeria	Sub-Saharan Africa	61.79
Uganda	Sub-Saharan Africa	59.29
Mauritania	Sub-Saharan Africa	47.50
Honduras	Latin America & Caribbean	45.03

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 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%	73
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

5. RECOMMENDATIONS

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

- *What have you learned from the World Bank data?*
  According to the data, there are 7 regions and a total of 218 countries. Two regions experienced a decrease in forestation between 1990 and 2016, namely Latin America & Caribbean and Sub-Saharan Africa, as shown in table 2.1.

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

We should focus on the countries in Table 3.4, the top quartile countries. Study and adopt their methods of maintaining a high percentage of forestation. Various forestation techniques could be adopted in the countries listed in Tables 3.1 and 3.2.

SQL QUERIES USED:

```
--forest_area table exploration
SELECT *
FROM   forest_area
LIMIT  5;

--land_area table exploration
SELECT *
FROM   land_area
LIMIT  5;

--regions table exploration
SELECT *
FROM   regions
LIMIT  5;

--View creation called forestation
CREATE VIEW forestation
AS
  (SELECT r.country_code,
          r.country_name,
          l.year,
          forest_area_sqkm,
          l.total_area_sq_mi * 2.59
             total_area_sqkm,
          ( forest_area_sqkm / ( l.total_area_sq_mi * 2.59 ) ) * 100
             pc_dsgnd_as_forest,
          region,
          income_group
   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 = l.country_code)

-- forestation VIEW exploration
SELECT *
FROM   forestation
LIMIT  5

--Confirm the presence of 'World' in the region table
SELECT *
FROM   forestation
WHERE  country_name = 'World'
        OR country_name = 'world'
LIMIT  1

-- confirm 2016 is the most recent year
SELECT year
FROM   forestation
ORDER  BY 1 DESC
LIMIT  1
```

Q1 GLOBAL SITUATION

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.

```
-- total forest area of the world in 1990
SELECT country_name,
       forest_area_sqkm,
       year
FROM   forestation
WHERE  year = 1990
       AND country_name = 'World'
        OR country_name = 'world'
```

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 denoted as “World.”

```
-- total forest area of the world in 2016
SELECT country_name,
       forest_area_sqkm,
       year
FROM   forestation
WHERE  year = 2016
```

```
        AND country_name = 'World'
         OR country_name = 'world'
```

c. What was the change (in sq km) in the world's forest area from 1990 to 2016?
1324449 sq km

```
WITH table_1990
     AS (
        -- total forest area of the world in 1990
        SELECT country_name,
               forest_area_sqkm,
               year
         FROM   forestation
         WHERE  year = 1990
                AND country_name = 'World'
                 OR country_name = 'world'),
     table_2016
     AS (
        -- total forest area of the world in 2016
        SELECT country_name,
               forest_area_sqkm,
               year
         FROM   forestation
         WHERE  year = 2016
                AND country_name = 'World'
                 OR country_name = 'world')
SELECT t16.country_name,
       t16.forest_area_sqkm  forest_area_sqkm_2016,
       t90.forest_area_sqkm  forest_area_sqkm_1990,
       ( t16.forest_area_sqkm - t90.forest_area_sqkm ) diff
FROM   table_2016 t16
       JOIN table_1990 t90
         ON t90.country_name = t16.country_name
```

d. What was the percent change in the world's forest area between 1990 and 2016?
-3.2%.

```
WITH table_1990
     AS (
        -- total forest area of the world in 1990
        SELECT country_name,
               forest_area_sqkm,
               year
         FROM   forestation
         WHERE  year = 1990
```

```
                AND country_name = 'World'
                 OR country_name = 'world'),
     table_2016
     AS (
        -- total forest area of the world in 2016
        SELECT country_name,
               forest_area_sqkm,
               year
         FROM   forestation
         WHERE  year = 2016
                AND country_name = 'World'
                 OR country_name = 'world')
SELECT t16.country_name,
       t16.forest_area_sqkm forest_area_sqkm_2016,
       t90.forest_area_sqkm forest_area_sqkm_1990,
       Round(( ( t16.forest_area_sqkm - t90.forest_area_sqkm )
             * 100 / t90.forest_area_sqkm ) :: NUMERIC, 2) pct_change
FROM   table_2016 t16
       join table_1990 t90
         ON t90.country_name = t16.country_name
```

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? (Peru 1279999.99)

```
SELECT country_name,
       total_area_sqkm,
       year
FROM   forestation
WHERE  year = 2016
       AND total_area_sqkm <= 1324449
ORDER  BY 2 DESC
LIMIT  3
```

2. REGIONAL OUTLOOK

a. In 2016, the percent of the total land area of the world designated as forest was 31.38

```
SELECT   country_name,
         total_area_sqkm,
         year
FROM     forestation
WHERE    year = 2016
AND      total_area_sqkm<=1324449
ORDER BY 2 DESC limit 3SELECT pc_dsgnd_as_forest,
       country_code,
       year
```

```
FROM   forestation
WHERE  year = 2016
AND    country_name = 'World'
OR     country_name = 'world'
```

b.The region with the highest relative forestation was Latin America & Caribbean, with 46.2%

```
SELECT Round(SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm) :: NUM
ERIC, 2) pc_relative_forestation,
       SUM(total_area_sqkm)  total_region_area,
       SUM(forest_area_sqkm) total_region_forest,
       year,
       region
FROM   forestation
WHERE  year = 2016
GROUP  BY 4,
          5
ORDER  BY 1 DESC
```

c. and the region with the lowest relative forestation were Middle East & North Africa, with 2.1% forestation.

```
SELECT Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm) ) * 100
) ::
             NUMERIC, 2) pc_relative_forestation,
       SUM(total_area_sqkm)  total_region_area,
       SUM(forest_area_sqkm) total_region_forest,
       year,
       region
FROM   forestation
WHERE  year = 2016
GROUP  BY 4,
          5
ORDER  BY 1
```

d. In 1990, the percent of the total land area of the world designated as forest was 32.42

```
SELECT pc_dsgnd_as_forest,
       country_code,
       year
FROM   forestation
WHERE  year = 1990
       AND country_name = 'World'
        OR country_name = 'world'
```

e.The region with the highest relative forestation was Latin America & Caribbean, with 51.03%

```
SELECT Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm) ) * 100
) ::NUMERIC, 2) pc_relative_forestation,
       SUM(total_area_sqkm)  total_region_area,
       SUM(forest_area_sqkm) total_region_forest,
       year,
       region
FROM   forestation
WHERE  year = 1990
GROUP  BY 4,
          5
ORDER  BY 1 DESC
```

f.and the region with the lowest relative forestation was Europe & Central Asia, with 1.8% forestation.

```
SELECT Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm) ) * 100
) ::
             NUMERIC, 2)
                              pc_relative_forestation,
       SUM(total_area_sqkm)  total_region_area,
       SUM(forest_area_sqkm) total_region_forest,
       year,
       region
FROM   forestation
WHERE  year = 1990
GROUP  BY 4,
          5
ORDER  BY 1
```

```
--Explore all the distinct regions
SELECT DISTINCT region
FROM   forestation
WHERE  year = 1990
ORDER  BY 1

---Table showing the region and 2016 Forest Percentage
SELECT region,
       Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm) ) * 100
) ::
             NUMERIC, 2)
                              pc_relative_forestation,
       SUM(total_area_sqkm)  total_region_area,
```

```
       SUM(forest_area_sqkm) total_region_forest,
       year
FROM   forestation
WHERE  year = 2016
GROUP  BY 1,
          5
ORDER  BY 1

--- ---Table showing the regions and 1990 Forest Percentage
SELECT region,
       Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm) ) * 100
) ::
             NUMERIC, 2)
                              pc_relative_forestation,
       SUM(total_area_sqkm)   total_region_area,
       SUM(forest_area_sqkm) total_region_forest,
       year
FROM   forestation
WHERE  year = 1990
GROUP  BY 1,
          5
ORDER  BY 1
```

Q3 COUNTRY-LEVEL DETAIL

```
--- ---Table showing countries and 1990 total Forest area
SELECT DISTINCT country_name,
                Sum(forest_area_sqkm) total_region_forest_1990
FROM   forestation
WHERE  year = 1990
GROUP  BY 1
ORDER  BY 1

--- ---Table showing countries and 2016 total Forest area
SELECT DISTINCT country_name,
                Sum(forest_area_sqkm) total_region_forest_2016
FROM   forestation
WHERE  year = 2016
GROUP  BY 1
ORDER  BY 1
```

Next, combine the two tables with a WITH subquery.

---

a. Which five countries saw the most significant amount decrease in forest area from 1990 to 2016? What was the difference in forest area for each?

```
WITH total_1990_forest_area
     AS (SELECT DISTINCT country_name,
                         Sum(forest_area_sqkm) total_country_forest_19
90
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT DISTINCT country_name,
                         Sum(forest_area_sqkm) total_country_forest_20
16
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1
         ORDER  BY 1)
SELECT *,
       COALESCE(total_country_forest_2016 - total_country_forest_1990)
       diff_in_forest_area
FROM   total_2016_forest_area table_2016
       JOIN total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
ORDER  BY diff_in_forest_area DESC
--LIMIT 5
```

```
-----------------------------------------------------------
--TABLE 1990 showing the percentage of forestation
SELECT country_name,
       Round(( SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm) ) ::
 NUMERIC,
       2) pc_relative_forestation,
       SUM(total_area_sqkm)  total_country_area_1990,
       SUM(forest_area_sqkm) total_country_forest_1990
FROM   forestation
WHERE  year = 1990
GROUP  BY 1
ORDER  BY 1
-------------------------
--TABLE 2016 showing the percentage of forestation
SELECT country_name,
       Round(( SUM(forest_area_sqkm) * 100 / SUM(total_area_sqkm) ) ::
 NUMERIC,
```

```
       2) pc_relative_forestation,
       SUM(total_area_sqkm)  total_country_area_2016,
       SUM(forest_area_sqkm) total_country_forest_2016
FROM   forestation
WHERE  year = 2016
GROUP  BY 1
ORDER  BY 1
-------------------------------------------
--Combine the two tables with a WITH subquery
-------------------------------------------
```

b. Which five countries saw the most significant percent decrease in forest area from 1990 to 2016? What was the percent change to 2 decimal places for each?

```
WITH total_1990_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_1990,
                SUM(total_area_sqkm)  total_country_area_1990,
                SUM(forest_area_sqkm) total_country_forest_1990
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_2016,
                SUM(total_area_sqkm)  total_country_area_2016,
                SUM(forest_area_sqkm) total_country_forest_2016
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1
         ORDER  BY 1)
SELECT *,
       ( ( pc_relative_forestation_2016 - pc_relative_forestation_1990
 ) /
         pc_relative_forestation_1990 ) * 100 pc_diff_in_forest_area
FROM   total_2016_forest_area table_2016
```

```
       join total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
WHERE  pc_relative_forestation_1990 > 0
       AND pc_relative_forestation_2016 > 0
ORDER  BY pc_diff_in_forest_area DESC
```

'Russian Federation and 'China' 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

```
WITH total_1990_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                  pc_relative_forestation_1990,
                SUM(total_area_sqkm)  total_country_area_1990,
                SUM(forest_area_sqkm) total_country_forest_1990
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                  pc_relative_forestation_2016,
                SUM(total_area_sqkm)  total_country_area_2016,
                SUM(forest_area_sqkm) total_country_forest_2016
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1
         ORDER  BY 1)
SELECT *,
       ( ( pc_relative_forestation_2016 - pc_relative_forestation_1990
 ) /
         pc_relative_forestation_1990 ) * 100 pc_diff_in_forest_area
FROM   total_2016_forest_area table_2016
       join total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
WHERE  pc_relative_forestation_1990 > 0
       AND pc_relative_forestation_2016 > 0
ORDER  BY total_country_area_2016 DESC
```

' Iceland' increased in forest area by ‘213.66’% from 1990 to 2016.

```
WITH total_1990_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_1990,
                SUM(forest_area_sqkm) total_country_forest_1990
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_2016,
                SUM(total_area_sqkm)  total_country_area_2016,
                SUM(forest_area_sqkm) total_country_forest_2016
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1
         ORDER  BY 1)
SELECT *,
       Round(( ( total_country_forest_2016 - total_country_forest_1990
 ) * 100 /
                     total_country_forest_1990 ) :: NUMERIC, 2)
       pc_diff_in_forest_area
FROM   total_2016_forest_area table_2016
       join total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
WHERE  pc_relative_forestation_1990 > 0
       AND pc_relative_forestation_2016 > 0
ORDER  BY pc_diff_in_forest_area DESC
```

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

```
WITH total_1990_forest_area
     AS (SELECT country_name,
                region,
```

```
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_1990,
                SUM(total_area_sqkm)  total_country_area_1990,
                SUM(forest_area_sqkm) total_country_forest_1990
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1,
                   2
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_2016,
                SUM(total_area_sqkm)  total_country_area_2016,
                SUM(forest_area_sqkm) total_country_forest_2016
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1,
                   2
         ORDER  BY 1)
SELECT *,
       ( total_country_forest_1990 - total_country_forest_2016 )
       abs_forest_area_change
FROM   total_2016_forest_area table_2016
       join total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
ORDER  BY abs_forest_area_change DESC
```

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

```
WITH total_1990_forest_area
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_1990,
```

```
                SUM(total_area_sqkm)  total_country_area_1990,
                SUM(forest_area_sqkm) total_country_forest_1990
         FROM   forestation
         WHERE  year = 1990
         GROUP  BY 1,
                   2
         ORDER  BY 1),
     total_2016_forest_area
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                                    pc_relative_forestation_2016,
                SUM(total_area_sqkm)  total_country_area_2016,
                SUM(forest_area_sqkm) total_country_forest_2016
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1,
                   2
         ORDER  BY 1)
SELECT *,
       Round(( ( pc_relative_forestation_2016 - pc_relative_forestatio
n_1990 ) *
               100 /
                     pc_relative_forestation_1990 ) :: NUMERIC, 2)
       pc_diff_in_forest_area
FROM   total_2016_forest_area table_2016
       join total_1990_forest_area table_1990
         ON table_2016.country_name = table_1990.country_name
WHERE  pc_relative_forestation_1990 > 0
       AND pc_relative_forestation_2016 > 0
ORDER  BY pc_diff_in_forest_area
```

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

```
WITH table_2016
     AS (SELECT country_name,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                pc_relative_forestation_2016
         FROM   forestation
```

```
          WHERE  year = 2016
          GROUP  BY 1
          ORDER  BY 1)
SELECT CASE
          WHEN pc_relative_forestation_2016 <= 25 THEN '0-25%'
          WHEN pc_relative_forestation_2016 < 50
               AND pc_relative_forestation_2016 > 25 THEN '25-50%'
          WHEN pc_relative_forestation_2016 < 75
               AND pc_relative_forestation_2016 > 50 THEN '50-75%'
          WHEN pc_relative_forestation_2016 < 100
               AND pc_relative_forestation_2016 > 75 THEN '75-100%'
          ELSE 'NULL'
       END      quartile,
       Count(*) no_of_countries
FROM   table_2016
GROUP  BY 1
ORDER  BY 1
```

d. List all of the countries that were in the 4th quartile (percent forest > 75%) in 2016.
Table 3.4: Top Quartile Countries, 2016:

```
WITH table_2016
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                pct_designated_as_forest
          FROM   forestation
          WHERE  year = 2016
          GROUP  BY 1,
                    2
          ORDER  BY 1)
SELECT country_name,
       region,
       pct_designated_as_forest
FROM   table_2016
WHERE  pct_designated_as_forest < 100
       AND pct_designated_as_forest > 75
GROUP  BY 1,
          2,
          3
ORDER  BY 3 DESC
```

e. How many countries had a percent forestation higher than the United States in 2016?

```sql
--
first confirmed the value of United States 'pct_designated_as_forest:3
3.93'
WITH table_2016
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                pct_designated_as_forest
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1,
                   2
         ORDER  BY 1)
SELECT country_name,
       region,
       pct_designated_as_forest
FROM   table_2016
WHERE  country_name = 'United States'
GROUP  BY 1,
          2,
          3
ORDER  BY 3 DESC
-------------------------
--then ran a query that met my condition
WITH table_2016
     AS (SELECT country_name,
                region,
                Round(( ( SUM(forest_area_sqkm) / SUM(total_area_sqkm)
 ) * 100 )
                      ::
                      NUMERIC, 2)
                pct_designated_as_forest
         FROM   forestation
         WHERE  year = 2016
         GROUP  BY 1,
                   2
         ORDER  BY 1)
SELECT Count(country_name) no_of_countries_above_usa
FROM   table_2016
WHERE  pct_designated_as_forest > 33.93
```