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_sq.km_____ in 1990. As of 2016, the most recent year for which data was available, that number had fallen to ___39.958.245.9_sq.km_____, a loss of _13.244.490_sq.km_____, or _____3.21_____%.
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 sq.km_____).

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%
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 _____51.03%_____% 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 _____527229.062 km²_____. 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 km²_____, much lower than the figure for _____China_____.
United States_____ 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 km²
Indonesia	East Asia & Pacific	282.194 km²
Myanmar	East Asia & Pacific	107.234 km²
Nigeria	Sub-Saharan Africa	106.506 km²
Tanzania	Sub-Saharan Africa	102.320 km²

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	61.80%
Uganda	Sub-Saharan Africa	59.13%
Mauritania	Sub-Saharan Africa	46.75%
Honduras	Latin America & Caribbean	45.03%

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%	73
50-75%	38
75-100%	22

The largest number of countries in 2016 were found in the _____1_____ 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	98.25%
Micronesia, Fed. Sts	East Asia & Pacific	91.85%
Gabon	Sub-Saharan Africa	90.03%
Seychelles	Sub-Saharan Africa	88.41%
Palau	East Asia & Pacific	87.60%
American Samoa	East Asia & Pacific	87.50%
Guyana	Latin America & Caribbean	83.90%
Lao PDR	East Asia & Pacific	82.10%
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?*

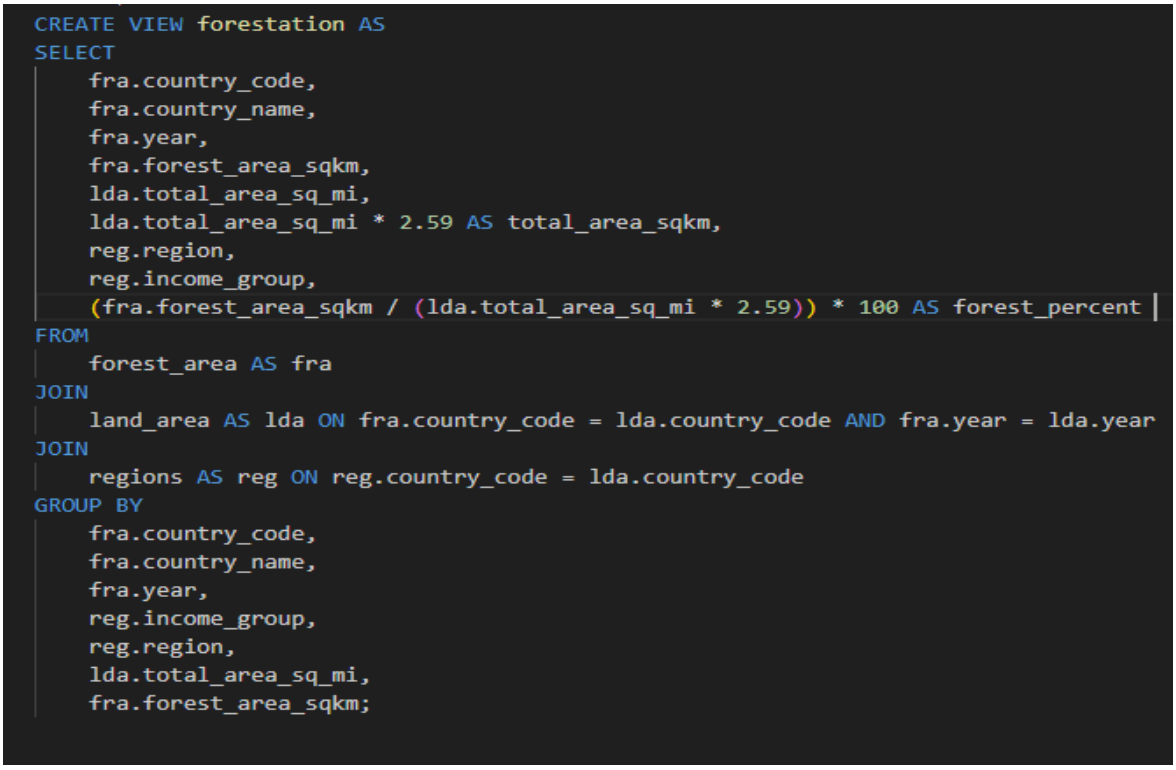
Here's a clearer explanation of the sentence comparing the lost forest area to the land area of Peru:"The forest area lost from 1990 to 2016 is slightly more than the entire land area of Peru in 2016, which is 1,279,999.9891 square kilometers." From 1990 to 2016, global forest coverage decreased from 32.42% to 31.38%, with Latin America & the Caribbean maintaining the highest forest coverage despite a reduction from 51.03% to 46.16%, while the Middle East & North Africa remained the region with the least forest area, though it slightly increased from 1.78% to 2.07%. The summary highlights significant changes in forest areas between 1990 and 2016, showcasing both absolute and relative increases in forest coverage across various countries. Here is a precise explanation of these developments:

China experienced the largest increase in forest area among all countries from 1990 to 2016, with a gain of 527,229.062 km². This remarkable growth far surpasses that of the United States, which had the second-largest increase but at a much smaller scale of 79,200 km². This data suggests significant environmental or policy shifts in China that could be valuable to analyze further. Despite their large total land areas, these increases are still notable. On the other hand, Iceland, a much smaller country, showed the most significant percent increase in forest area, with a 213.66% rise over the same period, underscoring how smaller nations can also achieve substantial proportional changes in forestation.
The report on forest area reductions from 1990 to 2016 highlights that Brazil experienced the largest absolute loss, with 541,510 km², followed by Indonesia, Myanmar, Nigeria, and Tanzania, which also saw significant decreases. Proportionally, Togo leads with a 75.45% decrease, underscoring its critical deforestation situation. Nigeria and Uganda also show substantial percentage losses. These trends underscore the need for targeted conservation measures and more sustainable land use practices, particularly in the most affected regions.

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

To prioritize conservation efforts, focus should be given to countries with the most significant forest losses and those with ecologically valuable forests. Brazil and Indonesia are priorities due to their massive absolute declines, while Togo, Nigeria, and Uganda also require urgent attention due to their high percentage losses. Measures should aim at sustainable land use and strengthening local conservation laws to effectively support these countries in preserving and regenerating their forested areas.

5. APPENDIX: SQL Queries Used

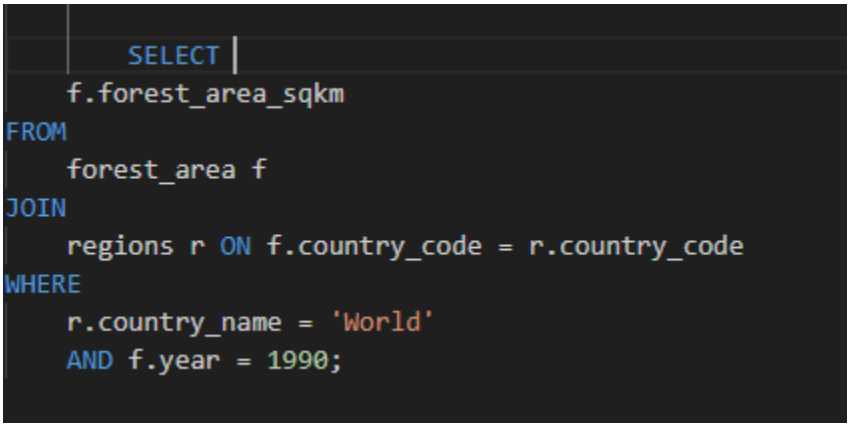


```
CREATE VIEW forestation AS
SELECT
    fra.country_code,
    fra.country_name,
    fra.year,
    fra.forest_area_sqkm,
    lda.total_area_sq_mi,
    lda.total_area_sq_mi * 2.59 AS total_area_sqkm,
    reg.region,
    reg.income_group,
    (fra.forest_area_sqkm / (lda.total_area_sq_mi * 2.59)) * 100 AS forest_percent
FROM
    forest_area AS fra
JOIN
    land_area AS lda ON fra.country_code = lda.country_code AND fra.year = lda.year
JOIN
    regions AS reg ON reg.country_code = lda.country_code
GROUP BY
    fra.country_code,
    fra.country_name,
    fra.year,
    reg.income_group,
    reg.region,
    lda.total_area_sq_mi,
    fra.forest_area_sqkm;
```

CREATE VIEW forestation AS
SELECT
    fra.country_code,
    fra.country_name,
    fra.year,
    fra.forest_area_sqkm,
    lda.total_area_sq_mi,
    lda.total_area_sq_mi * 2.59 AS total_area_sqkm,
    reg.region,
    reg.income_group,
    (fra.forest_area_sqkm / (lda.total_area_sq_mi * 2.59)) * 100 AS forest_percent
FROM
    forest_area AS fra
JOIN
    land_area AS lda ON fra.country_code = lda.country_code AND fra.year = lda.year
JOIN
    regions AS reg ON reg.country_code = lda.country_code
GROUP BY
    fra.country_code,
    fra.country_name,
    fra.year,
    reg.income_group,
    reg.region,
    lda.total_area_sq_mi,
    fra.forest_area_sqkm;

Part 1 - Global Situationa.

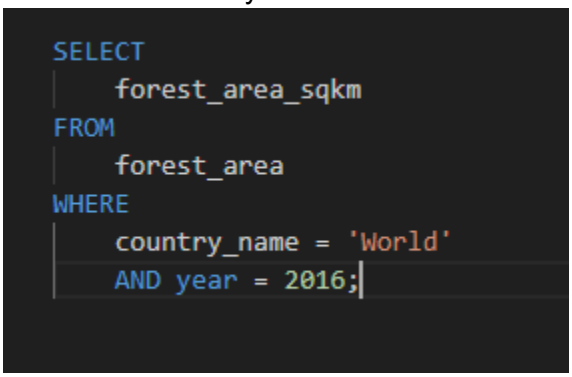
What was the total forest area (in sq km) of the world in 1990? Please keep in mind that you can use the country record denoted as “World" in the region table.



```
SELECT
    f.forest_area_sqkm
FROM
    forest_area f
JOIN
    regions r ON f.country_code = r.country_code
WHERE
    r.country_name = 'World'
    AND f.year = 1990;
```

SELECT
    f.forest_area_sqkm
FROM
    forest_area f
JOIN
    regions r ON f.country_code = r.country_code
WHERE
    r.country_name = 'World'
    AND f.year = 1990;

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
   forest_area_sqkm
FROM
   forest_area
WHERE
   country_name = 'World'

   AND year = 2016;
```

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

```
SELECT
    (fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) AS diff_forest_area_sq_km
FROM
    forest_area fa1990
JOIN
    forest_area fa2016
ON
    fa1990.country_code = fa2016.country_code
    AND fa1990.country_name = 'World'
    AND fa2016.country_name = 'World'
WHERE
    fa1990.year = 1990
    AND fa2016.year = 2016;
```

SELECT
(fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) AS diff_forest_area_sq_km
FROM
forest_area fa1990
JOIN
forest_area fa2016
ON
fa1990.country_code = fa2016.country_code
AND fa1990.country_name = 'World'
AND fa2016.country_name = 'World'
WHERE
fa1990.year = 1990
AND fa2016.year = 2016;

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

```
    SELECT
    ((fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) / fa1990.forest_area_sqkm) * 100 AS perc_change_fa
FROM
    forest_area fa1990
JOIN
    forest_area fa2016
ON
    fa1990.country_code = fa2016.country_code
    AND fa1990.country_name = 'World'
    AND fa2016.country_name = 'World'
WHERE
    fa1990.year = 1990
    AND fa2016.year = 2016;
```

SELECT
((fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) / fa1990.forest_area_sqkm) * 100 AS perc_change_fa
FROM
forest_area fa1990
JOIN
forest_area fa2016
ON
fa1990.country_code = fa2016.country_code
AND fa1990.country_name = 'World'
AND fa2016.country_name = 'World'
WHERE
fa1990.year = 1990
AND fa2016.year = 2016;

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
    l.country_name,
    l.total_area_sq_mi * 2.59 AS total_area_sqkm,
    ABS((l.total_area_sq_mi * 2.59) -
        (SELECT sub1.forest_area_sqkm - sub2.forest_area_sqkm AS diff_forest_area_sq_km
         FROM
            (SELECT f.country_code AS cc, f.forest_area_sqkm
             FROM forest_area f
             WHERE f.country_name = 'World'
             AND f.year = 1990) AS sub1
         JOIN
            (SELECT f.country_code AS cc, f.forest_area_sqkm
             FROM forest_area f
             WHERE f.country_name = 'World'
             AND f.year = 2016) AS sub2
         ON sub1.cc = sub2.cc)) AS diff_fa_la_sqkm
FROM
    land_area l
WHERE
    l.year = 2016
ORDER BY
    diff_fa_la_sqkm
LIMIT 1;
```

```
SELECT
   l.country_name,
   l.total_area_sq_mi * 2.59 AS total_area_sqkm,
   ABS((l.total_area_sq_mi * 2.59) -
      (SELECT sub1.forest_area_sqkm - sub2.forest_area_sqkm AS diff_forest_area_sq_km
       FROM
          (SELECT f.country_code AS cc, f.forest_area_sqkm
           FROM forest_area f
           WHERE f.country_name = 'World'
           AND f.year = 1990) AS sub1
       JOIN
          (SELECT f.country_code AS cc, f.forest_area_sqkm
           FROM forest_area f
           WHERE f.country_name = 'World'
           AND f.year = 2016) AS sub2
       ON sub1.cc = sub2.cc)) AS diff_fa_la_sqkm
FROM
   land_area l
WHERE
   l.year = 2016
ORDER BY
   diff_fa_la_sqkm
LIMIT 1;
```

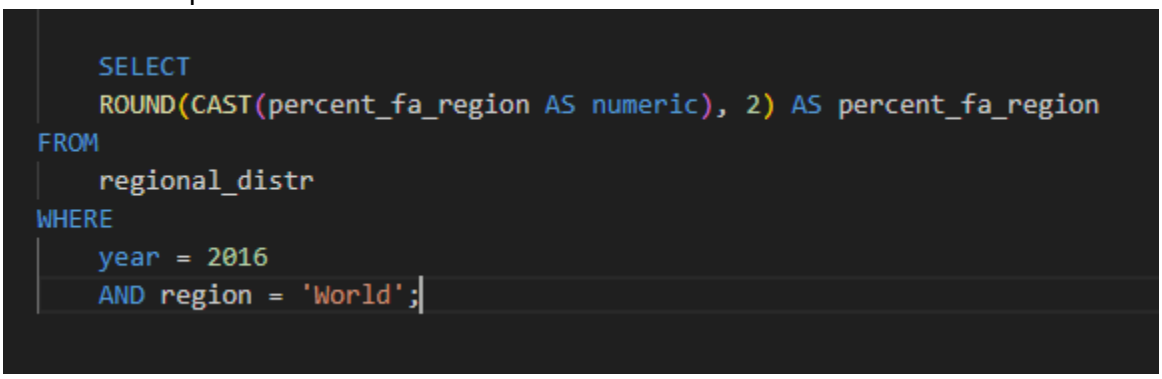
Part 2 - Regional Outlook

Create a table that shows the Regions and their percent forest area (sum of forest area divided by the sum of land area) in 1990 and 2016. (Note that 1 sq mi = 2.59 sq km)

```sql
CREATE OR REPLACE VIEW regional_distr AS
SELECT
    r.region,
    l.year,
    SUM(f.forest_area_sqkm) AS total_forest_area_sqkm,
    SUM(l.total_area_sq_mi * 2.59) AS total_area_sqkm,
    (SUM(f.forest_area_sqkm) / SUM(l.total_area_sq_mi * 2.59)) * 100 AS percent_fa_region
FROM
    forest_area f
JOIN
    land_area l ON f.country_code = l.country_code AND f.year = l.year
JOIN
    regions r ON l.country_code = r.country_code
GROUP BY
    r.region, l.year;
```

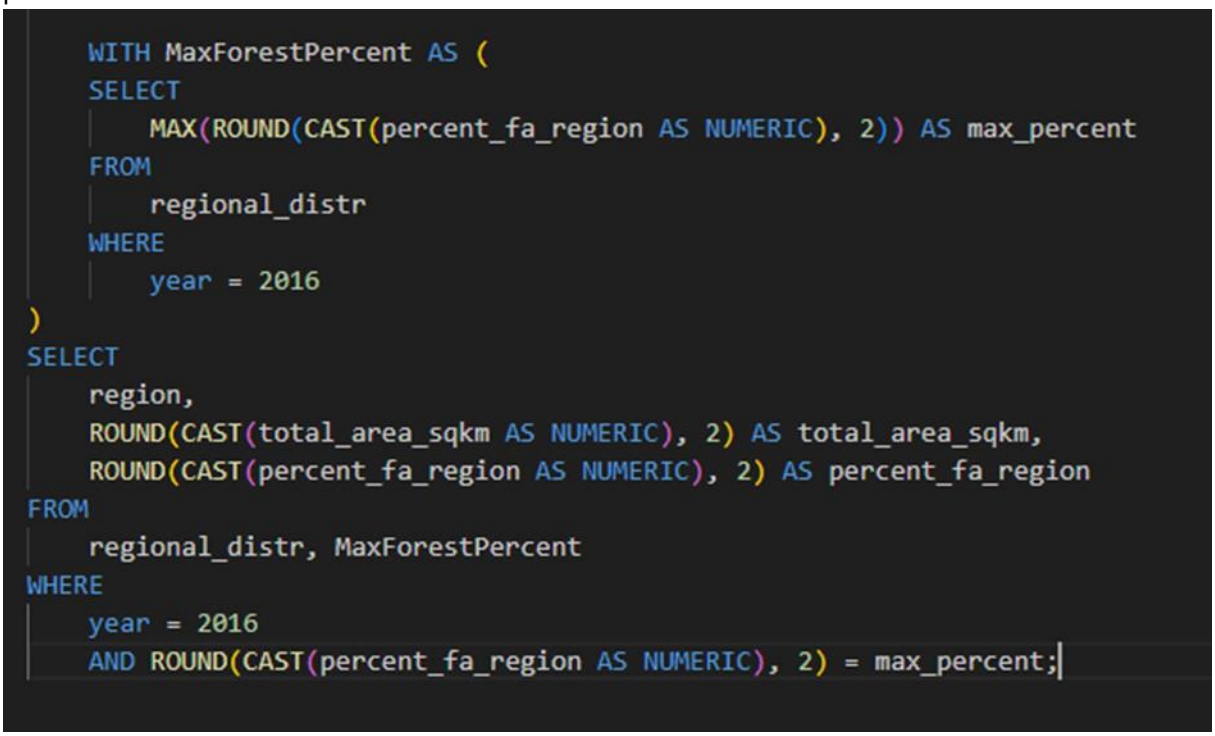
CREATE OR REPLACE VIEW regional_distr AS
SELECT
    r.region,
    l.year,
    SUM(f.forest_area_sqkm) AS total_forest_area_sqkm,
    SUM(l.total_area_sq_mi * 2.59) AS total_area_sqkm,
    (SUM(f.forest_area_sqkm) / SUM(l.total_area_sq_mi * 2.59)) * 100 AS percent_fa_region
FROM
    forest_area f
JOIN
    land_area l ON f.country_code = l.country_code AND f.year = l.year
JOIN
    regions r ON l.country_code = r.country_code
GROUP BY
    r.region, l.year;

What was the percent forest of the entire world in 2016




```
SELECT
   ROUND(CAST(percent_fa_region AS numeric), 2) AS percent_fa_region
FROM
   regional_distr
WHERE
   year = 2016
   AND region = 'World';
```

Which region had the HIGHEST percent forest in 2016, and which had the LOWEST, to 2 decimal places?



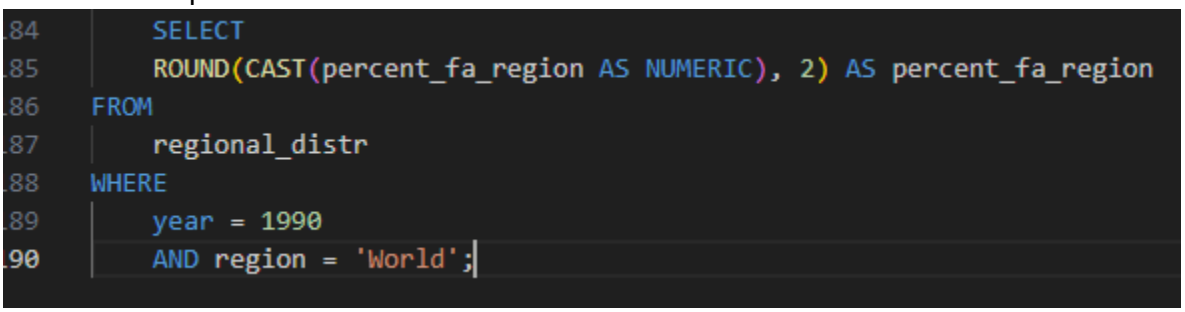
```
WITH MaxForestPercent AS (
    SELECT
        MAX(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS max_percent
    FROM
        regional_distr
    WHERE
        year = 2016
)
SELECT
    region,
    ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr, MaxForestPercent
WHERE
    year = 2016
    AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = max_percent;
```


```
WITH MaxForestPercent AS (
    SELECT
        MAX(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS max_percent
    FROM
        regional_distr
    WHERE
        year = 2016
)
SELECT
    region,
    ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr, MaxForestPercent
WHERE
    year = 2016
    AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = max_percent;
```

```
    SELECT
    region,
    ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr
WHERE
    year = 2016
    AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = (
        SELECT
            MIN(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS min_percent
        FROM
            regional_distr
        WHERE
            year = 2016
    );
```

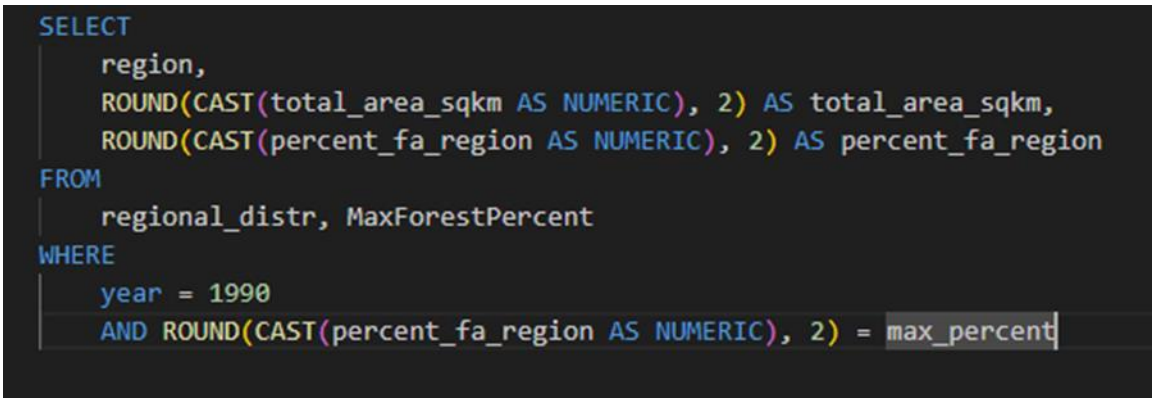
```
SELECT
  region,
  ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
  ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
  regional_distr
WHERE
  year = 2016
  AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = (
    SELECT
      MIN(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS min_percent
    FROM
      regional_distr
    WHERE
      year = 2016
  );
```

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



```
SELECT
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr
WHERE
    year = 1990
    AND region = 'World';
```

Which region had the HIGHEST percent forest in 1990, and which had the LOWEST, to 2 decimal places?



```
WITH MaxForestPercent AS (
    SELECT
        MAX(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS max_percent
    FROM
        regional_distr
    WHERE
        year = 1990
)
SELECT
    region,
    ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr, MaxForestPercent
WHERE
    year = 1990
    AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = max_percent
```

```sql
SELECT
    region,
    ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
    ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
    regional_distr, MinForestPercent
WHERE
    year = 1990
    AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = min_percent;
```

```sql
WITH MinForestPercent AS (
  SELECT
    MIN(ROUND(CAST(percent_fa_region AS NUMERIC), 2)) AS min_percent
  FROM
    regional_distr
  WHERE
    year = 1990
)
SELECT
  region,
  ROUND(CAST(total_area_sqkm AS NUMERIC), 2) AS total_area_sqkm,
  ROUND(CAST(percent_fa_region AS NUMERIC), 2) AS percent_fa_region
FROM
  regional_distr, MinForestPercent
WHERE
  year = 1990
  AND ROUND(CAST(percent_fa_region AS NUMERIC), 2) = min_percent
```

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

```
    WITH table1990 AS (
    SELECT * FROM regional_distr WHERE year = 1990
),
table2016 AS (
    SELECT * FROM regional_distr WHERE year = 2016
)
SELECT
    table1990.region,
    ROUND(CAST(table1990.percent_fa_region AS NUMERIC), 2) AS fa_1990,
    ROUND(CAST(table2016.percent_fa_region AS NUMERIC), 2) AS fa_2016
FROM
    table1990
JOIN
    table2016 ON table1990.region = table2016.region
WHERE
    table1990.percent_fa_region > table2016.percent_fa_region;
```


```
WITH table1990 AS (
   SELECT * FROM regional_distr WHERE year = 1990
),
table2016 AS (
   SELECT * FROM regional_distr WHERE year = 2016
)
SELECT
   table1990.region,
   ROUND(CAST(table1990.percent_fa_region AS NUMERIC), 2) AS fa_1990,
   ROUND(CAST(table2016.percent_fa_region AS NUMERIC), 2) AS fa_2016
FROM
   table1990
JOIN
   table2016 ON table1990.region = table2016.region
WHERE
   table1990.percent_fa_region > table2016.percent_fa_region;
```

Part 3 - Country-Level Detail

a.
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
    fa1990.country_code,
    fa1990.country_name,
    r.region,
    fa1990.forest_area_sqkm AS fa_1990_sqkm,
    fa2016.forest_area_sqkm AS fa_2016_sqkm,
    (fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) AS diff_fa_sqkm
FROM
    forest_area fa1990
JOIN
    forest_area fa2016
    ON fa1990.country_code = fa2016.country_code
    AND fa1990.year = 1990
    AND fa2016.year = 2016
JOIN
    regions r
    ON fa1990.country_code = r.country_code
WHERE
    fa1990.country_name != 'World'
    AND fa2016.country_name != 'World'
    AND fa1990.forest_area_sqkm IS NOT NULL
    AND fa2016.forest_area_sqkm IS NOT NULL
ORDER BY
    diff_fa_sqkm DESC
LIMIT 5;
```

```
SELECT
    fa1990.country_code,
    fa1990.country_name,
    r.region,
    fa1990.forest_area_sqkm AS fa_1990_sqkm,
    fa2016.forest_area_sqkm AS fa_2016_sqkm,
    (fa1990.forest_area_sqkm - fa2016.forest_area_sqkm) AS diff_fa_sqkm
FROM
    forest_area fa1990
JOIN
    forest_area fa2016
    ON fa1990.country_code = fa2016.country_code
    AND fa1990.year = 1990
    AND fa2016.year = 2016
JOIN
    regions r
    ON fa1990.country_code = r.country_code
WHERE
    fa1990.country_name != 'World'
    AND fa2016.country_name != 'World'
    AND fa1990.forest_area_sqkm IS NOT NULL
    AND fa2016.forest_area_sqkm IS NOT NULL
ORDER BY
    diff_fa_sqkm DESC
LIMIT 5;
```

b. 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
   f1990.country_name,
   f1990.region,
   ROUND(SUM(f1990.forest_area_sqkm)::NUMERIC, 2) AS Forest_Area_sqkm_1990,
   ROUND(SUM(f2016.forest_area_sqkm)::NUMERIC, 2) AS Forest_Area_sqkm_2016,
   ROUND((SUM(f1990.forest_area_sqkm) - SUM(f2016.forest_area_sqkm))::NUMERIC, 2) AS
Difference_Land_Area,
   ROUND((CASE
         WHEN SUM(f1990.forest_area_sqkm) > 0 THEN
            (SUM(f1990.forest_area_sqkm) - SUM(f2016.forest_area_sqkm)) /
SUM(f1990.forest_area_sqkm) * 100
         ELSE 0
         END)::NUMERIC, 2) AS Difference_Percentage_Land_Area
FROM
   forestation f1990
JOIN
   forestation f2016
   ON f1990.country_name = f2016.country_name AND f1990.region = f2016.region AND f1990.year =
1990 AND f2016.year = 2016
WHERE
   f1990.country_name != 'World' AND
   f1990.forest_area_sqkm IS NOT NULL AND
   f2016.forest_area_sqkm IS NOT NULL
GROUP BY
   f1990.country_name, f1990.region
ORDER BY
   Difference_Percentage_Land_Area DESC
LIMIT 5;
```

```sql
SELECT
    f1990.country_name,
    f1990.region,
    ROUND(SUM(f1990.forest_area_sqkm)::NUMERIC, 2) AS Forest_Area_sqkm_1990,
    ROUND(SUM(f2016.forest_area_sqkm)::NUMERIC, 2) AS Forest_Area_sqkm_2016,
    ROUND((SUM(f1990.forest_area_sqkm) - SUM(f2016.forest_area_sqkm))::NUMERIC, 2) AS Difference_Land_Area,
    ROUND((CASE
            WHEN SUM(f1990.forest_area_sqkm) > 0 THEN
                (SUM(f1990.forest_area_sqkm) - SUM(f2016.forest_area_sqkm)) / SUM(f1990.forest_area_sqkm) * 100
            ELSE 0
            END)::NUMERIC, 2) AS Difference_Percentage_Land_Area
FROM
    forestation f1990
JOIN
    forestation f2016
    ON f1990.country_name = f2016.country_name AND f1990.region = f2016.region AND f1990.year = 1990 AND f2016.year = 2016
WHERE
    f1990.country_name != 'World' AND
    f1990.forest_area_sqkm IS NOT NULL AND
    f2016.forest_area_sqkm IS NOT NULL
GROUP BY
    f1990.country_name, f1990.region
ORDER BY
    Difference_Percentage_Land_Area DESC
LIMIT 5;
```

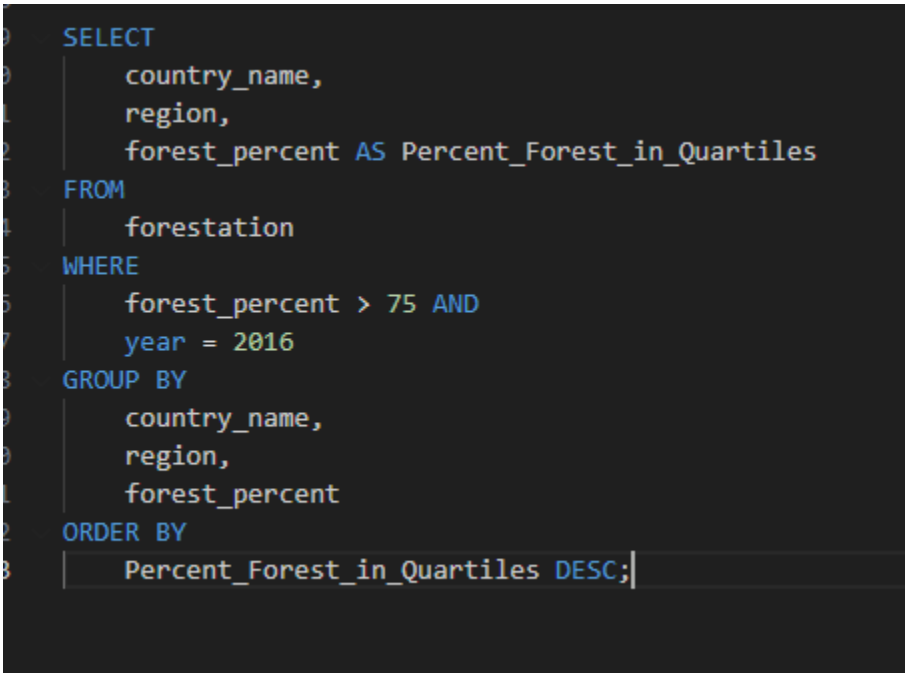
.

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

```sql
WITH ForestationData AS (
    SELECT
        country_name,
        YEAR,
        (SUM(forest_area_sqkm) / SUM(total_area_sq_mi * 2.59)) * 100 AS Percent_Forest
    FROM
        forestation
    WHERE
        YEAR = 2016
    GROUP BY
        country_name, YEAR
),

Quartiles AS (
    SELECT
        country_name,
        Percent_Forest,
        CASE
            WHEN Percent_Forest < 25 THEN '0-25%'
            WHEN Percent_Forest >= 25 AND Percent_Forest < 50 THEN '25-50%'
            WHEN Percent_Forest >= 50 AND Percent_Forest < 75 THEN '50-75%'
            ELSE '75-100%'
        END AS Quartile
    FROM
        ForestationData
)

SELECT
    Quartile,
    COUNT(country_name) AS Country_Count
FROM
    Quartiles
GROUP BY
    Quartile
ORDER BY
    Country_Count DESC;
```

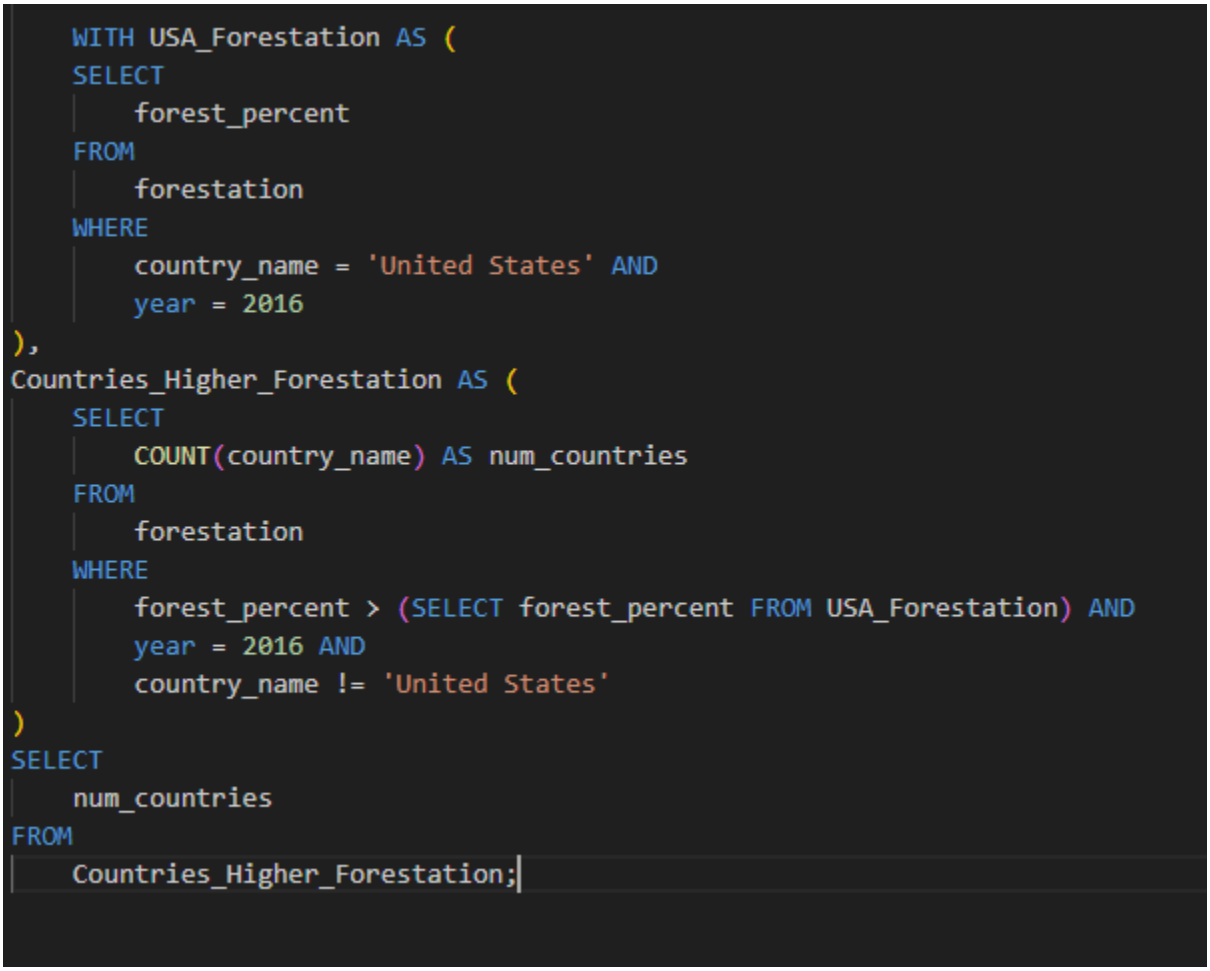
```
WITH ForestationData AS (
    SELECT
        country_name,
        YEAR,
        (SUM(forest_area_sqkm) / SUM(total_area_sq_mi * 2.59)) * 100 AS Percent_Forest
    FROM
        forestation
    WHERE
        YEAR = 2016
    GROUP BY
        country_name, YEAR
),

Quartiles AS (
    SELECT
        country_name,
        Percent_Forest,
        CASE
            WHEN Percent_Forest < 25 THEN '0-25%'
            WHEN Percent_Forest >= 25 AND Percent_Forest < 50 THEN '25-50%'
            WHEN Percent_Forest >= 50 AND Percent_Forest < 75 THEN '50-75%'
            ELSE '75-100%'
        END AS Quartile
    FROM
        ForestationData
)

SELECT
    Quartile,
    COUNT(country_name) AS Country_Count
FROM
    Quartiles
GROUP BY
    Quartile
ORDER BY
    Country_Count DESC;
```

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



```
SELECT
    country_name,
    region,
    forest_percent AS Percent_Forest_in_Quartiles
FROM
    forestation
WHERE
    forest_percent > 75 AND
    year = 2016
GROUP BY
    country_name,
    region,
    forest_percent
ORDER BY
    Percent_Forest_in_Quartiles DESC;
```

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



```
WITH USA_Forestation AS (
    SELECT
        forest_percent
    FROM
        forestation
    WHERE
        country_name = 'United States' AND
        year = 2016
),
Countries_Higher_Forestation AS (
    SELECT
        COUNT(country_name) AS num_countries
    FROM
        forestation
    WHERE
        forest_percent > (SELECT forest_percent FROM USA_Forestation) AND
        year = 2016 AND
        country_name != 'United States'
)
SELECT
    num_countries
FROM
    Countries_Higher_Forestation;
```