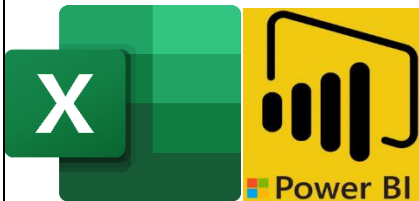


Effects of Deforestation

Deforestation is the permanent removal of standing forests, which occurs for a variety of reasons and has many devastating consequences.



Made By

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Under supervision

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Project of Deforestation

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Summary

From 1990 to 2016, global deforestation caused significant forest loss due to agriculture, logging, and infrastructure. Although deforestation has slowed in recent years, it threatens biodiversity and contributes to climate change.

- **Latin America:** The Amazon suffered the most due to farming.
- **Southeast Asia:** Palm oil production drove forest loss in Indonesia and Malaysia.
- **Sub-Saharan Africa:** Illegal logging and agriculture were key drivers.

Countries like **Brazil** and **Indonesia** made efforts to reduce deforestation, but the results vary. Ongoing policy actions and reforestation are essential for future forest conservation.

Methodology for Analysis

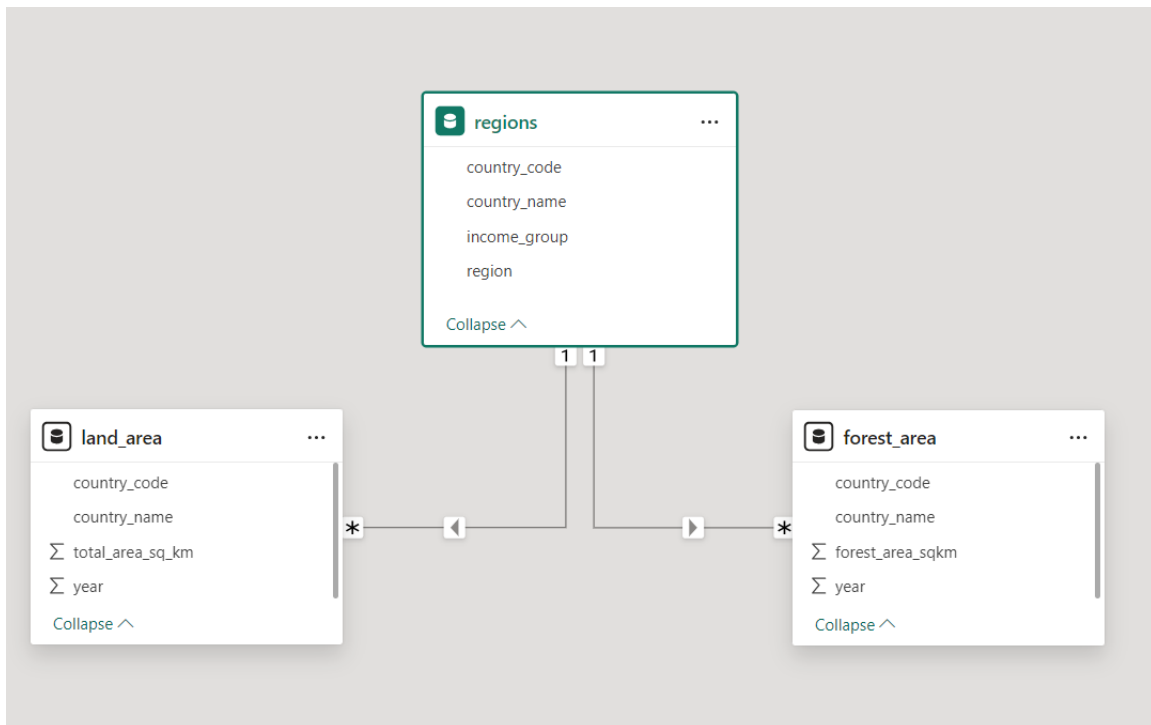
Data sources: From Three Flies Excel (CSV) (land area sq mi, forest sq km, regions)

Analytical tools used:

- 1- **Microsoft Excel** to Convert column land area from sq mi to sq km like other columns in the other tables.
- 2- **Drawing Schema** using the Power BI program drew the Schema and made a relation between the three tables considering a common key between them (Country-Code, Country-Name)
- 3- **TableConvert** Website Helps me to convert the three-file CSV to PostgreSQL files to move on with the process of the analysis on PostgreSQL.
- 4- **Neon Console** uses this site to do all analysis process coding From DDL, DML, and DQL.
- 5- **Visualization** Using Microsoft Excel

Process to Analysis

Drawing the Schema using Power BI



DDL& DML PARTS: -

CREATE the Database named deforestation.

```
1 CREATE DATABASE "deforestation" ;
```

Connected (1 query)

Run Explain Analyze 798ms No result

Statement executed successfully

CREATE the three tables that match the attached datasets.

Create table regions.

```
1 DROP TABLE IF EXISTS "regions";
2
3 CREATE TABLE "regions" (
4     "country_name" VARCHAR(512),
5     "country_code" VARCHAR(512),
6     "region" VARCHAR(512),
7     "income_group" VARCHAR(512)
8 );
9
10 INSERT INTO "regions" ("country_name", "country_code", "region", "income_group")
11 VALUES
```

Connected (2 queries) ⚠ This query will still run OK, but the last 6152 characters will be truncated from query history

Run Explain Analyze 726ms No result

1: DROP 2: CREATE

Statement executed successfully

CREATE table land area NOTICE I convert the unit of total area sq mi to sq km by Excel.

```
1 DROP TABLE IF EXISTS "land_area";
2
3 CREATE TABLE "land_area" (
4     "country_code" VARCHAR(512),
5     "country_name" VARCHAR(512),
6     "year" INT,
7     "total_area_sq_km" NUMERIC
8 );
9
10
11
12
```

CREATE a table forest area.

```
1 DROP TABLE IF EXISTS "forest_area";
2
3 CREATE TABLE "forest_area" (
4     "country_code" VARCHAR(512),
5     "country_name" VARCHAR(512),
6     "year" INT,
7     "forest_area_sqkm" NUMERIC
8 );
9
10 INSERT INTO "forest_area" ("country_code", "country_name", "year", "forest_area_sqkm") VALUES
11 ('ABW', 'Aruba', '2016', '4.1000000000');
```

Connected (2 queries) ⚠ This query will still run OK, but the last 253899 characters will be truncated from query history

Run Explain Analyze 149ms No result

1: DROP 2: CREATE

Statement executed successfully

INSERT the data into created tables.

INSERT records inside the region's table.

```
1 INSERT INTO "regions" ("country_name", "country_code", "region", "income_group")
2 VALUES
3 ('Afghanistan', 'AFG', 'South Asia', 'Low income'),
4 ('Albania', 'ALB', 'Europe & Central Asia', 'Upper middle income'),
5 ('Algeria', 'DZA', 'Middle East & North Africa', 'Upper middle income'),
6 ('American Samoa', 'ASM', 'East Asia & Pacific', 'Upper middle income'),
7 ('Andorra', 'AND', 'Europe & Central Asia', 'High income'),
8 ('Angola', 'AGO', 'Sub-Saharan Africa', 'Lower middle income'),
9 ('Antigua and Barbuda', 'ATG', 'Latin America & Caribbean', 'High income'),
10 ('Argentina', 'ARG', 'Latin America & Caribbean', 'High income'),
11 ('Armenia', 'ARM', 'Europe & Central Asia', 'Upper middle income');
```

Connected (1 query) ⚠ This query will still run OK, but the last 5956 characters will be truncated from query history

Run Explain Analyze 455ms No result

Statement executed successfully

INSERT records inside the land area's table.

```
1 INSERT INTO "land_area" ("country_code", "country_name", "year", "total_area_sqkm") VALUES
2 ('ABW', 'Aruba', '2016', '180.004305'),
3 ('AFG', 'Afghanistan', '2016', '652857.4843'),
4 ('AGO', 'Angola', '2016', '1246695.183'),
5 ('ALB', 'Albania', '2016', '27399.89271'),
6 ('AND', 'Andorra', '2016', '470.0054853'),
7 ('ARE', 'United Arab Emirates', '2016', '71019.72729'),
8 ('ARG', 'Argentina', '2016', '2736679.445'),
9 ('ARM', 'Armenia', '2016', '28469.89528'),
10 ('ASM', 'American Samoa', '2016', '199.9990278'),
11 ('ATG', 'Antigua and Barbuda', '2016', '439.9875012'),
12 ('AUS', 'Australia', '2016', '7691990.296'),
Ready to connect ⚠ This query will still run OK, but the last 269730 characters will be truncated from query history
```

INSERT records inside the forest area's table.

```
1 INSERT INTO "forest_area" ("country_code", "country_name", "year", "forest_area_sqkm")
2 VALUES
3 ('ABW', 'Aruba', '2016', '4.199999869'),
4 ('AFG', 'Afghanistan', '2016', '13500'),
5 ('AGO', 'Angola', '2016', '577311.9922'),
6 ('ALB', 'Albania', '2016', '7705.39978'),
7 ('AND', 'Andorra', '2016', '160'),
8 ('ARE', 'United Arab Emirates', '2016', '3236.600037'),
9 ('ARG', 'Argentina', '2016', '268151.9922'),
10 ('ARM', 'Armenia', '2016', '3322.000122'),
11 ('ASM', 'American Samoa', '2016', '175'),
Connected (1 query) ⚠ This query will still run OK, but the last 253708 characters will be truncated from query history
Run Explain Analyze 7s No result
Statement executed successfully
```

DQL PART: -

Create a View called “forestation” by joining all three tables - forest area, land_area, and regions.

- The forest area and land_area tables join on both country code AND year.
- The region's table joins these based only on the country code.
- In the ‘forestation’ View, include the following:
- All the columns of the origin tables.
- A new column that provides the percentage of the land area that is designated as forest.
- Keep in mind that the column forest_area_sqkm in the forest area table and the land_area_sqmi in the land_area table are in different

units (square kilometers and square miles, respectively), so an adjustment will need to be made in the calculation you write (1 sq mi = 2.59 sq km). I have already converted it into an Excel sheet.

```

1 CREATE OR REPLACE VIEW forestation AS
2 SELECT f.country_code country_code
3       ,f.country_name country_name
4       ,r.region region
5       ,r.income_group income_group
6       ,f.year "year"
7       ,f.forest_area_sqkm forest_area
8       ,l.total_area_sqkm total_area
9       ,(f.forest_area_sqkm / NULLIF (l.total_area_sqkm ,0)) * 100 forest_precent
10 FROM forest_area f
11 JOIN land_area l
12 ON f.country_code = l.country_code
13 AND f.year = l.year
14 LEFT JOIN regions r
15 ON r.country_code = l.country_code
16 GROUP BY 1,2,3,4,5,6,7 ;
17 SELECT * FROM forestation ;

```

Connected (1 query)

Run Explain Analyze 6s 5886 rows

#	region	income_group	year	forest_area	total_area	forest_precent
5401	Latin America & Caribbean	High income	2016	268151.9922	2736679.445	9.79844360982511782600
5402	East Asia & Pacific	Lower middle income	1998	112542.002	325488.7312	34.57631285270130421000
5403	Europe & Central Asia	High income	1990	73.01113908355952935900		

Report Sections: -

Part 1 - Global Situation

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

```

SELECT region
       , year
       , ROUND(SUM(forest_area),2) "Total forest area"
FROM forestation
WHERE year = 1990
AND region = 'World'
GROUP BY 1,2;

```

Connected (1 query)

Run Explain Analyze 186ms 1 row

#	region	year	Total forest area
1	World	1990	41282694.90

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 region
       , year
       , ROUND(SUM(forest_area),2) "Total forest area"
FROM forestation
WHERE year = 2016
AND region = 'World'
GROUP BY 1,2 ;
```

Connected (1 query)

Run Explain Analyze 262ms 1 row

#	region	year	Total forest area
1	World	2016	39958245.90

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

```
WITH total_forest_2016 AS (
  SELECT region
         ,country_name
         ,SUM(forest_area) AS forest_area_2016
  FROM forestation
  WHERE year =2016
  AND region = 'World'
  GROUP BY 1,2 ),
total_forest_1990 AS (
  SELECT region
         ,country_name
         ,SUM(forest_area) AS forest_area_1990
  FROM forestation
  WHERE year =1990
  AND region = 'World'
  GROUP BY 1,2)
SELECT t2016.region
       ,t1990.forest_area_1990
       ,t2016.forest_area_2016
       ,t1990.forest_area_1990 - t2016.forest_area_2016 AS "Difference"
```



```
FROM total_forest_2016 t2016
JOIN total_forest_1990 t1990
ON t1990.region = t2016.region ;
```

#	region	forest_area_1990	forest_area_2016	Difference
1	World	41282694.9	39958245.9	1324449.0

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

```
WITH total_forest_2016 AS (
  SELECT region
        ,country_name
        ,SUM(forest_area) AS forest_area_2016
  FROM forestation
  WHERE year =2016
  AND region = 'World'
  GROUP BY 1 ,2 ),
total_forest_1990 AS (
  SELECT region
        ,country_name
        ,SUM(forest_area) AS forest_area_1990
  FROM forestation
  WHERE year =1990
  AND region = 'World'
  GROUP BY 1 ,2)
SELECT t2016.region
      ,t1990.forest_area_1990
      ,t2016.forest_area_2016
      ,t1990.forest_area_1990 - t2016.forest_area_2016 AS "Difference"
      ,ROUND(((t1990.forest_area_1990 - t2016.forest_area_2016)/ NULLIF
(t1990.forest_area_1990,0))*100,2) AS Percent_of_change
FROM total_forest_2016 t2016
JOIN total_forest_1990 t1990
ON t1990.region = t2016.region ;
```

#	region	forest_area_1990	forest_area_2016	Difference	percent_of_change
1	World	41282694.9	39958245.9	1324449.0	3.21

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?

```
WITH forest_area_1990 AS (
  SELECT SUM(forest_area) AS forest_area1
  FROM forestation
  WHERE year =1990 AND region = 'World'
),
forest_area_2016 AS (
  SELECT SUM(forest_area) AS forest_area2
```

```

FROM forestation
WHERE year = 2016 AND region = 'World'
),
forest_loss AS (
SELECT forest_area1 - forest_area2 AS forest_change
FROM forest_area_1990, forest_area_2016 )

SELECT f.country_name
      ,f.total_area
      ,f_l.forest_change
      ,ABS (total_area - forest_change) AS Difference
FROM forestation f , forest_loss f_l
WHERE f.year = 2016
ORDER BY 4 ASC
LIMIT 5 ;

```

#	country_name	total_area	forest_lost	difference
1	Peru	1279995.047	1324449.0	44453.953
2	Niger	1266695.112	1324449.0	57753.888
3	Chad	1259195.148	1324449.0	65253.852
4	Angola	1246695.183	1324449.0	77753.817
5	Mali	1220185.289	1324449.0	104263.711

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).

```

CREATE OR REPLACE VIEW region_forest_1990_2016 AS
WITH region_forest_area AS (
SELECT regions.region
      ,SUM(forest_area.forest_area_sqkm) AS total_forest_area
      , forest_area.year
FROM forest_area
JOIN regions
ON forest_area.country_code = regions.country_code
WHERE forest_area.year IN (1990, 2016)
GROUP BY regions.region, forest_area.year
), region_land_area AS (
SELECT
      regions.region,
      land_area.year,
      SUM(land_area.total_area_sqkm) AS total_land_area
FROM land_area
JOIN regions

```

```

ON land_area.country_code = regions.country_code
WHERE land_area.year IN (1990, 2016)
GROUP BY regions.region, land_area.year
)
SELECT
    rfa.region
    ,rfa.year
    , (rfa.total_forest_area / NULLIF(rla.total_land_area, 0)) * 100 AS
percent_forest_area
FROM region_forest_area rfa
JOIN region_land_area rla
ON rfa.region = rla.region AND rfa.year = rla.year;

SELECT *
FROM region_forest_1990_2016;

```

#	region	year	forest_precent
1	Europe & Central Asia	1990	27.65005470300743882100
2	East Asia & Pacific	1990	0.000000000000000000
3	Sub-Saharan Africa	2016	10.92683140539113144200
4	Latin America & Caribbean	2016	37.74895003543950333800
5	Sub-Saharan Africa	2016	12.53964789893009399000
6	Europe & Central Asia	1990	25.80677165240826212400
7	Middle East & North Africa	2016	0.35073081443101408600
8	East Asia & Pacific	2016	46.29740956895094791000

What was the percentage of forest of the entire world in 2016? Which region had the HIGHEST percent forest in 2016, and which had the LOWEST, to 2 decimal places?

```

SELECT region, ROUND (percent_forest_area,2)
FROM region_forest_1990_2016
WHERE year = 2016
AND region = 'World';

```

#	region	total_precentage
1	World	31.38

```

SELECT region, ROUND (percent_forest_area,2) AS "percentage of forest"
FROM region_forest_1990_2016
WHERE year = 2016
ORDER BY 2 DESC;

```

#	region	percentage
1	Latin America & Caribbean	46.16
2	Europe & Central Asia	38.04
3	North America	36.04
4	Sub-Saharan Africa	28.79
5	East Asia & Pacific	26.36
6	South Asia	17.51
7	Middle East & North Africa	2.07

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

```

SELECT region, ROUND (percent_forest_area,2) Perecentage
FROM region_forest_1990_2016
WHERE year = 1990
AND region = 'World';

```

```

SELECT region, ROUND (percent_forest_area,2) AS "percentage of forest"
FROM region_forest_1990_2016
WHERE year = 1990
ORDER BY 2 DESC;

```

#	region	percentage
1	World	32.42


```

1 SELECT region ,ROUND(percent_forest_area,2) percent_forest_area
2 FROM region_forest_1990_2016
3 WHERE year = 1990
4 AND region !='World'
5 ORDER BY 2 DESC ;

```

Connected (1 query)

Run Explain Analyze 158ms 7 rows

#	region	percent_forest_area
1	Latin America & Caribbean	51.03
2	Europe & Central Asia	37.28
3	North America	35.65
4	Sub-Saharan Africa	30.67
5	East Asia & Pacific	25.78
6	South Asia	16.51
7	Middle East & North Africa	1.78

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

```

WITH region_changes AS (
  SELECT region
        ,year
        ,percent_forest_area
        ,LAG(percent_forest_area) OVER (PARTITION BY region ORDER BY year) AS
previous_year_forest
  FROM region_forest_1990_2016
)
SELECT region
      ,ROUND(percent_forest_area - previous_year_forest, 2) AS change_in_forest_area
FROM region_changes
WHERE year = 2016
AND (percent_forest_area - previous_year_forest) < 0;

```

#	region	change_in_forest_area
1	Latin America & Caribbean	-4.87
2	Sub-Saharan Africa	-1.89
3	World	-1.05

Part 3 - Country-Level Detail

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

```
WITH forest_1990 AS (  
  SELECT country_name, year, forest_area AS forest_area1990  
  FROM forestation  
  WHERE year = 1990),  
  forest_2016 AS (  
  SELECT country_name, year, forest_area AS forest_area2016  
  FROM forestation  
  WHERE year = 2016)  
SELECT  
  f1.country_name,  
  f1.forest_area1990,  
  f2.forest_area2016,  
  ROUND(f1.forest_area1990 - f2.forest_area2016) AS "decrease in forest area"  
FROM  
  forest_1990 f1  
JOIN forest_2016 f2 ON f1.country_name = f2.country_name  
WHERE f1.forest_area1990 > f2.forest_area2016  
ORDER BY 4 DESC  
LIMIT 5;
```

#	country_name	forest_area1990	forest_area2016	decrease in forest area
1	World	41282694.9	39958245.9	1324449
2	Brazil	5467050	4925540	541510
3	Indonesia	1185450	903256.0156	282194
4	Myanmar	392180	284945.9961	107234
5	Nigeria	172340	65833.99902	106506

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?

```
WITH forest_1990 AS (  
  SELECT country_name, year, forest_area AS forest_area1990  
  FROM forestation  
  WHERE year = 1990  
)  
forest_2016 AS (  
  SELECT country_name, year, forest_area AS forest_area2016  
  FROM forestation  
  WHERE year = 2016  
)
```

```

SELECT
    f1.country_name,
    f1.forest_area1990,
    f2.forest_area2016,
    ROUND(f1.forest_area1990 - f2.forest_area2016) AS "decrease in forest area",
    ROUND((((f1.forest_area1990 - f2.forest_area2016) / NULLIF(f1.forest_area1990, 0)) *
100), 2) AS "Percent of change"
FROM forest_1990 f1
JOIN forest_2016 f2 ON f1.country_name = f2.country_name
WHERE f1.forest_area1990 > f2.forest_area2016
ORDER BY 4 DESC
LIMIT 5;

```

#	country_name	forest_area1990	forest_area2016	decrease in forest area	Percent of change
1	World	41282694.9	39958245.9	1324449	3.21
2	Brazil	5467050	4925540	541510	9.90
3	Indonesia	1185450	903256.0156	282194	23.80
4	Myanmar	392180	284945.9961	107234	27.34
5	Nigeria	172340	65833.99902	106506	61.80

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

```

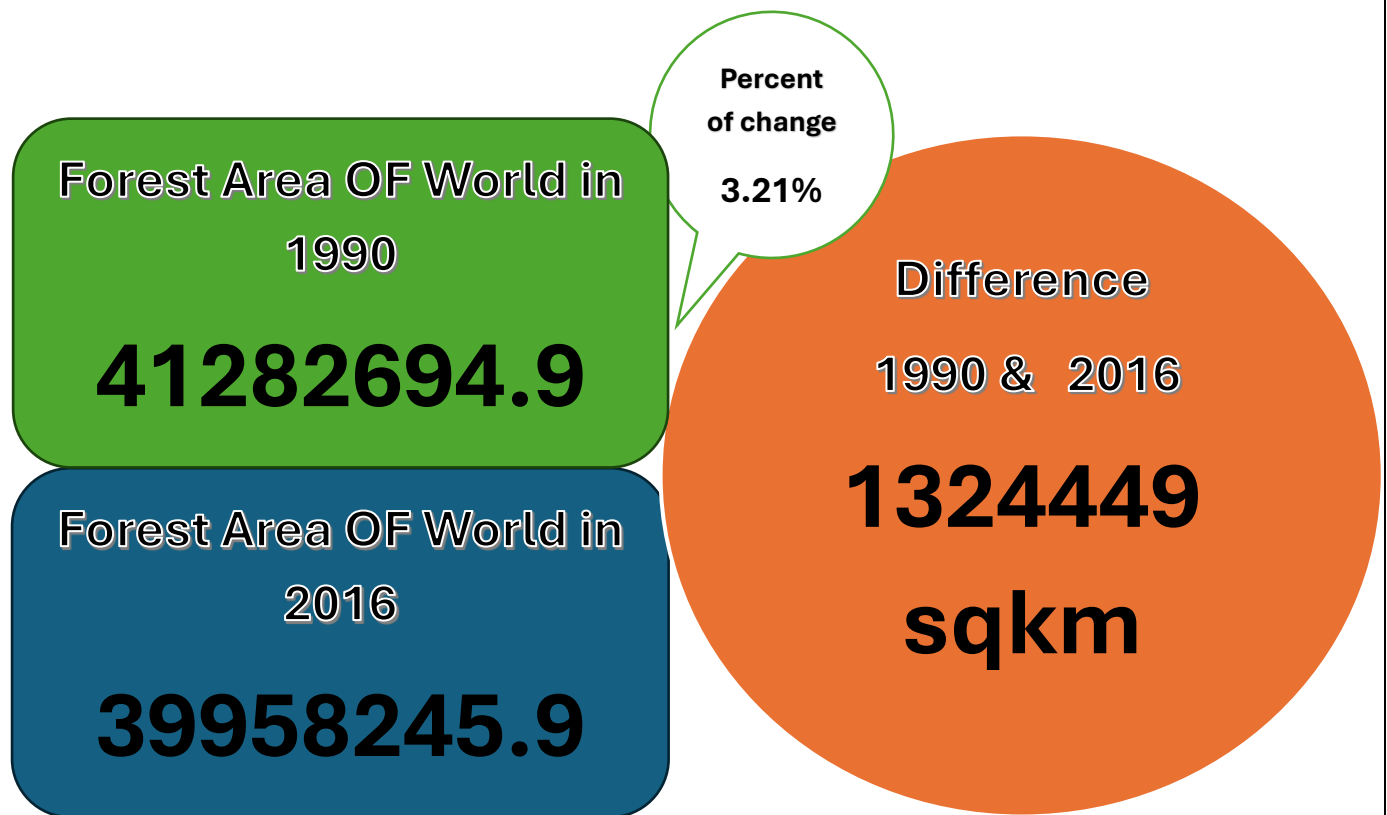
WITH percent_of_countries AS (
    SELECT forest_percent AS "forest percent"
    FROM forestation
    WHERE country_name = 'United States'
    AND year = 2016
)
SELECT COUNT(*) AS "num of countries"
FROM forestation
WHERE year = 2016
AND forest_percent > (SELECT "forest percent"
    FROM percent_of_countries);

```

#	num of countries
1	94

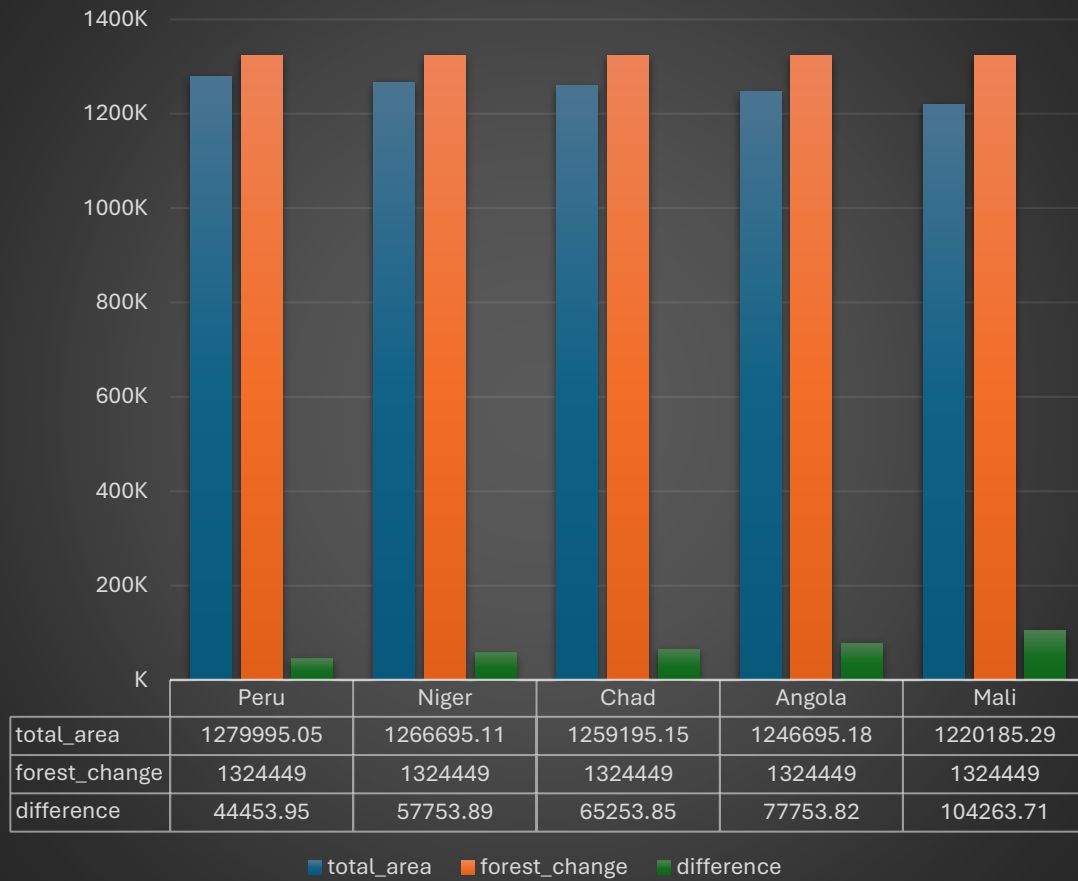
Visualization

Overview of the Analysis

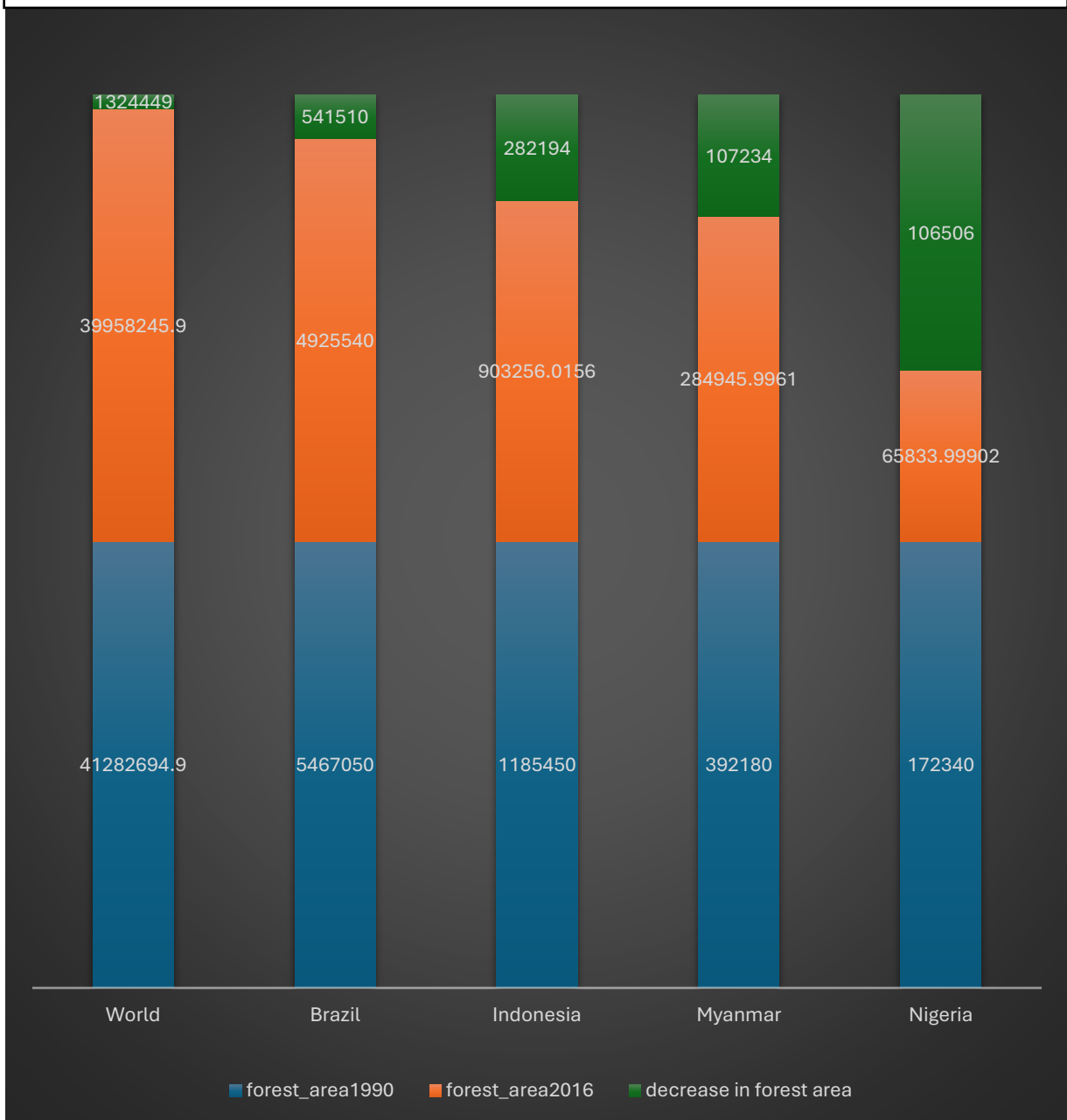


The Difference of Forest Area Between 1990 -2016

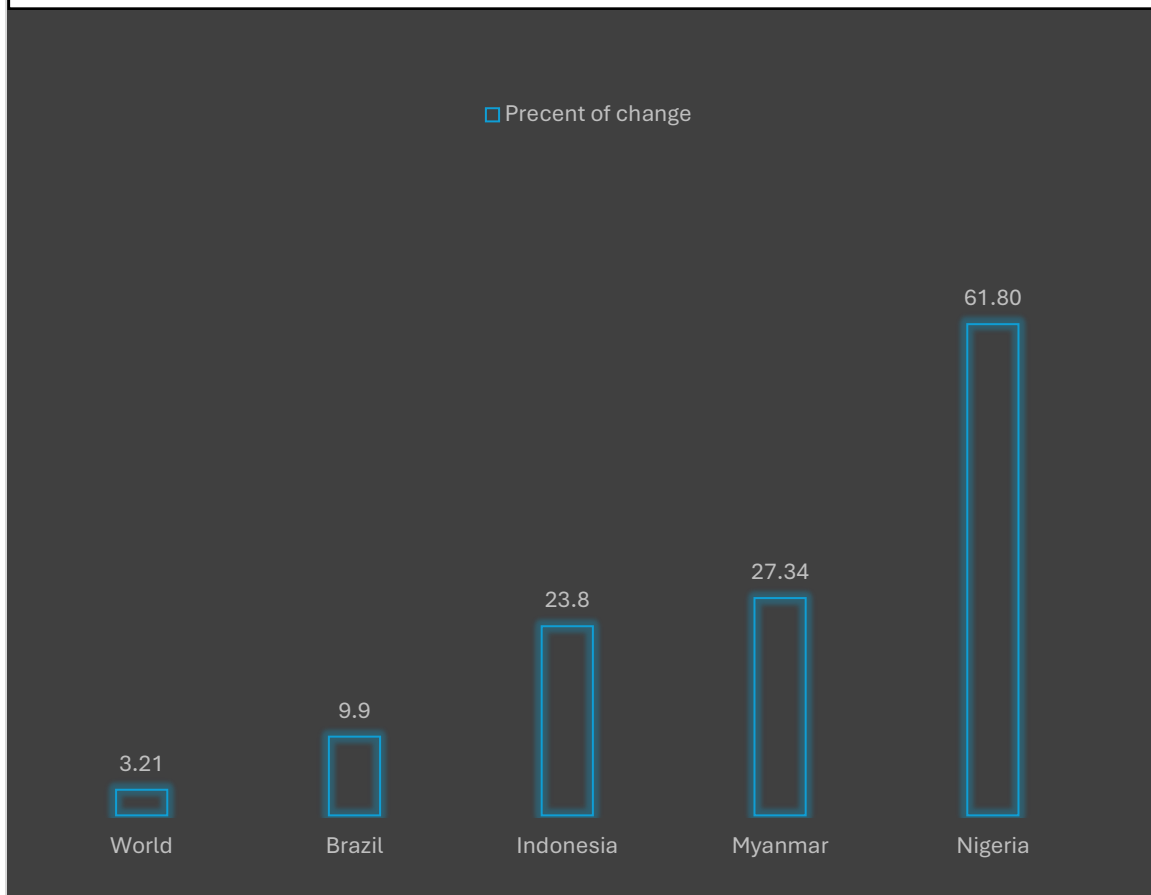
The Lost area between 1990 - 2016



Closest total area for Countries to the total Loss of forest Between 2016-1990

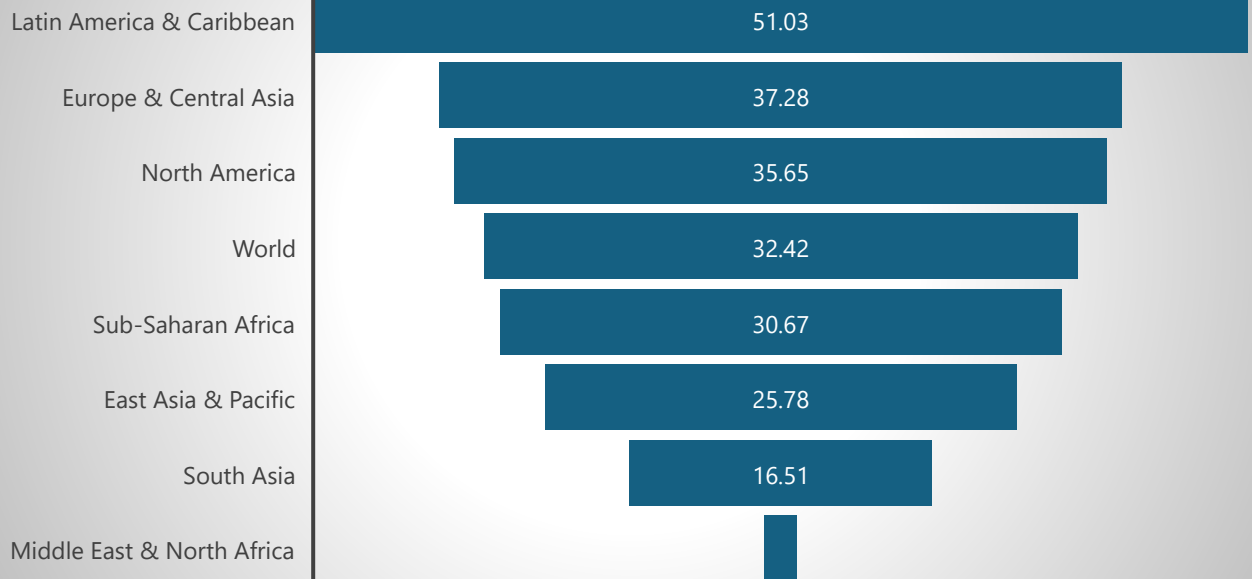


The largest % decreases in forest area by Countries from 1990 to 2016

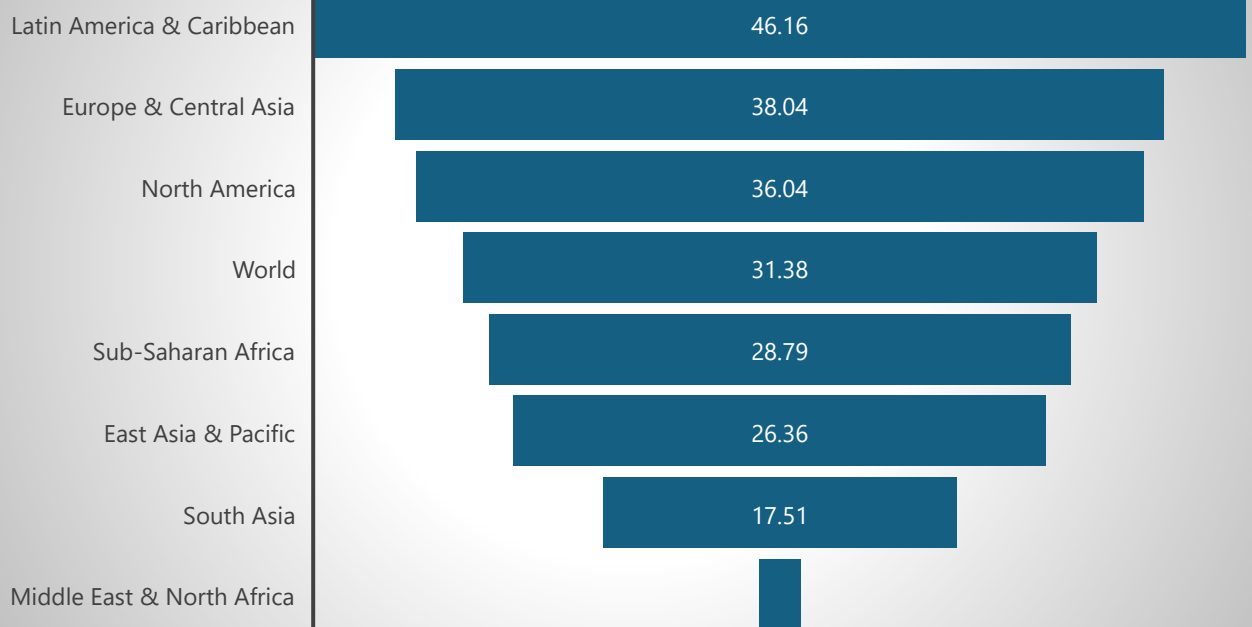


Percentage Of Forest BY Regions

YEAR 1990



YEAR 2016



Conclusion

- 1- First, we see that South Asia Has increased by 1 % of forest area during this Duration from Year 1990 to 2016 (16.51% to 17.51%).
- 2- Europe, East Asia, and North America all showed an increase in forest areas with positive ratios ranging from 0.76, 0.58, and 0.39, in that order.
- 3- Sub-Saharan Africa, Latin America, Caribbean are decreasing in forest areas with negative ratios ranging from (-4.87,-1.88) in that order.
- 4- **The most common reason** for deforestation across countries globally is **agricultural expansion**. This primary driver manifests in various forms, but the underlying trend remains consistent: as populations grow and economies develop, the demand for agricultural land increases, leading to forest clearing.
- 5- One of the most country % decreases in forest area Countries from 1990 to 2016 was Nigeria with 61.80 %
→**The primary driver** of deforestation in Nigeria between 1990 and 2016 was agricultural expansion. Nigeria's rapidly growing population, which more than doubled during this period, led to increased demand for farmland to produce food, particularly for subsistence farming. This resulted in large-scale conversion of forests into agricultural lands.
→**From 1990 to 2016**, Nigeria's population grew from about 95.2 million to 186 million, nearly a 2x increase in 26 years.
This represents a growth rate of approximately 1.95 (almost doubling).

Impacts of Deforestation

1. Environmental:

- Deforestation leads to the loss of habitats, putting many species at risk of extinction. It also contributes significantly to climate change by increasing carbon emissions and reduces soil quality, leading to erosion and lower agricultural productivity.

2. Economic:

- While deforestation can bring short-term economic benefits from logging and agriculture, it often results in long-term resource depletion that harms local economies.

3. Social:

- Indigenous communities that depend on forests for their livelihoods are displaced, which threatens their cultural heritage. Additionally, rural populations face reduced income opportunities when forests are cut down.

Efforts to Combat Deforestation

1. International Initiatives:

- Programs like REDD+ (Reducing Emissions from Deforestation and Forest Degradation) provide financial incentives to countries for lowering deforestation rates. The UN's Sustainable Development Goals also focus on promoting forest conservation globally.

2. National Policies:

- Countries such as Brazil and Indonesia have introduced stricter regulations on logging and land use, although the enforcement of these policies varies. Some nations are investing in reforestation projects to restore lost forest areas.

3. Conservation Efforts:

- Non-governmental organizations, like the World Wildlife Fund (WWF), play a vital role in promoting forest conservation and sustainable land use. Many governments are also expanding protected areas to safeguard forests from degradation.

4. Corporate Responsibility:

- Companies are increasingly adopting sustainable practices in their supply chains for products like palm oil and timber to minimize their environmental impact.

5. Community-Based Approaches:

- Local communities are being empowered to manage their forests sustainably, ensuring that economic development does not come at the expense of environmental health.

At the END

"In conclusion, by working together to adopt sustainable practices, improve governance, and collaborate on an international level, we can take meaningful steps to fight deforestation and protect our precious forests for generations to come."