Report for Forest Query into Global Deforestation, 1990 to 2016

Forest Query 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 Forest Query 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 sqkm*** in 1990. As of 2016, the most recent year for which data was available, that number had fallen to ***39958245.90 sqkm,*** a loss of ***1324449***, 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***)

## 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 and*** ***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 and 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 |
| ***Europe & Central Asia*** | ***37.29%*** | ***38.04%*** |
| ***East Asia & Pacific*** | ***25.78%*** | ***26.36%*** |
| ***Sub-Saharan Africa*** | ***30.67%*** | ***28.79%*** |
| ***Latin America & Caribbean*** | ***51.03%*** | ***46.16%*** |
| ***North America*** | ***35.65%*** | ***36.04%*** |
| ***Middle East & North Africa*** | ***1.78%*** | ***2.07%*** |
| ***South Asia*** | ***16.51%*** | ***17.50%*** |

The only regions of the world that decreased in percent forest area from 1990 to 2016 were ***Sub-Saharan Africa*** (dropped from ***30.67%*** to ***28.79%***) and ***Latin America & Caribbean*** (***51.03%*** to ***46.16%).*** 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 ***32.43%*** to ***31.37%.***

## 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 ***527229.06*** 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 ***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 sqkm*** |
| ***Indonesia*** | ***East Asia & Pacific*** | ***-282193.98 sqkm*** |
| ***Myanmar*** | ***East Asia & Pacific*** | ***-107234.0039 sqkm*** |
| ***Nigeria*** | ***Sub-Saharan Africa*** | ***-106506.00098 sqkm*** |
| ***Tanzania*** | ***Sub-Saharan Africa*** | ***-102320 sqkm*** |

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 | Absolute Forest Area Change |
| ***Togo*** | ***Sub-Saharan Africa*** | ***Decrease of 75.44%*** |
| ***Nigeria*** | ***Sub-Saharan Africa*** | ***Decrease of 61.80 %*** |
| ***Uganda*** | ***Sub-Saharan Africa*** | ***Decrease of 59.12%*** |
| ***Mauritania*** | ***Sub-Saharan Africa*** | ***Decrease of 46.74%*** |
| ***Honduras*** | ***Latin America & Caribbean*** | ***Decrease of 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 ***Nigeria***, ***Togo***, ***Mauritania,*** and ***Uganda***. 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.

### QUARTILES

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

|  |  |
| --- | --- |
| Quartile | Number of Countries |
| ***0 to 25 percentiles*** | ***85*** |
| ***25 to 50 percentiles*** | ***72*** |
| ***50 to 75 percentiles*** | ***38*** |
| ***Above 75 percentiles*** | ***9*** |

The largest number of countries in 2016 were found in the ***0 to 25 percentile*** 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*** | ***88.42%*** |
| ***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*** | ***77.87%*** |

## 

## 5. 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?*

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

***A: I’ve learned that data is essential to identify problems. Data allows us to find trends, and find relationships between different attributes.***

*Which countries should we focus on over others?*

***I noticed that deforestation is a really important subject that needs to be considered and can cause climate change, flooding, and increasing greenhouse gases. I think the regions that should be considered more than other regions are East Asia and Sub-Saharan Africa.***

6. APPENDIX

drop view v\_forestation

create view v\_forestation

as

with t1 as (select l.country\_code, l.country\_name, r.region, l.year, r.income\_group, 2.59\*(l.total\_area\_sq\_mi) as "total\_area\_sqkm", f.forest\_area\_sqkm

from land\_area as l

left join forest\_area as f

on l.country\_code = f.country\_code and l.year = f.year

left join regions as r

on r.country\_code = l.country\_code)

select t1.\*,

t1.total\_area\_sqkm - t1.forest\_area\_sqkm as "land\_area\_sqkm",

(t1.forest\_area\_sqkm / t1.total\_area\_sqkm)\*100 as "percent\_forest"

from t1;

select \* from v\_forestation;

*-- 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.*

with t1 as (

select country\_name,year, forest\_area\_sqkm

from forest\_area

where year = '1990' and country\_name = 'World')

select country\_name, year, forest\_area\_sqkm

from t1

*-- 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.”*

with t1 as (

select country\_name,year, forest\_area\_sqkm

from forest\_area

where year = '2016' and country\_name = 'World')

select country\_name, year, forest\_area\_sqkm

from t1

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

select (previous\_year.forest\_area\_sqkm - current\_year.forest\_area\_sqkm) as "Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990' and current\_year.country\_name = 'World' and previous\_year.country\_name = 'World');

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

select ((previous\_year.forest\_area\_sqkm - current\_year.forest\_area\_sqkm) / previous\_year.forest\_area\_sqkm)\*100 as "Percent\_Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990' and current\_year.country\_name = 'World' and previous\_year.country\_name = 'World');

*-- 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 \*

from v\_forestation

where year = '2016' and total\_area\_sqkm between 1000000 and 1400000

order by total\_area\_sqkm desc

*-- What was the percent 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 \*

from v\_forestation

where year = '2016' and country\_name = 'World';

with t1 as(select region,

sum(forest\_area\_sqkm) as "total\_forest\_area\_2016",

sum(total\_area\_sqkm) as "total\_land\_area\_2016"

from v\_forestation

where year = '2016' and country\_name <> 'World'

group by region)

select region,

round(cast((total\_forest\_area\_2016 / total\_land\_area\_2016)\*100 as numeric),2) as "percent\_forest\_2016"

from t1

group by 1,2

order by 2 desc

*-- b. What was the percent forest of the entire world in 1990? Which region had the HIGHEST percent forest in 1990,*

*-- and which had the LOWEST, to 2 decimal places?*

select \*

from v\_forestation

where year = '1990' and country\_name = 'World'

with t1 as(select region,

sum(forest\_area\_sqkm) as "total\_forest\_area\_1990",

sum(total\_area\_sqkm) as "total\_land\_area\_1990"

from v\_forestation

where year = '1990' and country\_name <> 'World'

group by region)

select region,

round(cast((total\_forest\_area\_1990 / total\_land\_area\_1990)\*100 as numeric),2) as "percent\_forest\_1990"

from t1

group by 1,2

order by 2 desc

select current\_year.country\_name,(current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) as "Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990') and current\_year.country\_name = previous\_year.country\_name

where (current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) is not null

order by 2 desc

limit 2;

*-- 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 current\_year.country\_name,

(current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) as "Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990') and current\_year.country\_name = previous\_year.country\_name

where (current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) is not null

order by 2 desc

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 current\_year.country\_name ,

(current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) / (previous\_year.forest\_area\_sqkm)\*100 as "Percent\_Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990') and current\_year.country\_name = previous\_year.country\_name

where (current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) / (previous\_year.forest\_area\_sqkm)\*100 is not null

order by 2 desc

limit 5;

*-- Top 5 Amount Decrease in Forest Area by Country, 1990 & 2016:*

select current\_year.country\_name,

r.region,

(current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) as "Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990') and current\_year.country\_name = previous\_year.country\_name

join regions as r

on current\_year.country\_name = r.country\_name and current\_year.country\_code = r.country\_code

where (current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) is not null and

current\_year.country\_name <> 'World'

order by 3;

*-- Top 5 Percent Decrease in Forest Area by Country, 1990 & 2016:*

select current\_year.country\_name,

r.region,

(current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) / (previous\_year.forest\_area\_sqkm)\*100 as "Percent\_Difference"

from forest\_area as "current\_year"

join forest\_area as "previous\_year"

on (current\_year.year = '2016' and previous\_year.year = '1990') and current\_year.country\_name = previous\_year.country\_name

join regions as r

on current\_year.country\_name = r.country\_name and current\_year.country\_code = r.country\_code

where (current\_year.forest\_area\_sqkm - previous\_year.forest\_area\_sqkm) / (previous\_year.forest\_area\_sqkm)\*100 is not null

order by 3;

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

select quartile\_range, count(s2.country\_name)

from

(select country\_name,

case when percent\_forest <= 25 then '0 to 25 percentile'

when percent\_forest between 25 and 50 then '25 to 50 percentile'

when percent\_forest between 50 and 75 then '50 to 75 percentile'

else 'above 75 percentile' end as "quartile\_range"

from (select \*

from v\_forestation

where year = '2016' and percent\_forest is not null and country\_name <> 'World') as s1) as s2

group by 1

order by 1;

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

select s2.country\_name

from (select country\_name, percent\_forest,

case when percent\_forest <= 25 then '0 to 25 percentile'

when percent\_forest between 25 and 50 then '25 to 50 percentile'

when percent\_forest between 50 and 75 then '50 to 75 percentile'

else 'above 75 percentile' end as "quartile\_range"

from (select \*

from v\_forestation

where year = '2016' and percent\_forest is not null and country\_name <> 'World') as s1) as s2

where quartile\_range = 'above 75 percentile'

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

select country\_name, region, percent\_forest

from v\_forestation

where year = 2016 and percent\_forest >

(select percent\_forest

from v\_forestation

where country\_name = 'United States' and year = 2016)