Report for ForestQuery into Global Deforestation, 1990 to 2016

ForestQuery is on a mission to combat deforestation around the world and to raise awareness about this topic and its impact on the environment. The data analysis team at ForestQuery has obtained data from the World Bank that includes forest area and total land area by country and year from 1990 to 2016, as well as a table of countries and the regions to which they belong.

The data analysis team has used SQL to bring these tables together and to query them in an effort to find areas of concern as well as areas that present an opportunity to learn from successes.

## **1. GLOBAL SITUATION**

According to the World Bank, the total forest area of the world was \_ 41282694.9\_ in 1990. As of 2016, the most recent year for which data was available, that number had fallen to\_39958245.9\_, a loss of \_ 1324449\_, or \_ 3.20824258980244\_%.

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 \_31.37%\_. 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 Percent | 2016 Percent |
| Latin America & Caribbean | 51.03 | 46.16 |
| Europe & Central Asia | 37.29 | 38.04 |
| North America | 35.65 | 36.04 |
| Sub-Suharan Africa | 30.65 | 28.72 |
| East Asia & Pacific | 25.57 | 26.29 |
| South Asia | 16.51 | 17.51 |
| Middle East & North Africa | 1.78 | 2.07 |

The only regions of the world that decreased in percent forest area from 1990 to 2016 were \_\_ Latin America & Caribbean \_\_ (dropped from \_\_\_\_51.03\_\_\_\_% to \_\_46.16\_\_\_\_%) and Sub-Suharan Africa \_ (\_\_30.65\_\_% to \_\_\_28.72\_\_%). 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**

### 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\_\_. 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\_\_, 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 |
| Indonesia | East Asia & Pacific | 282193.9844 |
| Myanmar | East Asia & Pacific | 107234.0039 |
| Nigeria | Sub-Saharan Africa | 106506.00098 |
| Tanzania | Sub-Saharan Africa | 102320 |

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 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.

### 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 | 91.85 |
| 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 | 83.91 |
| Lao PDR | East Asia & Pacific | 82.11 |
| Solomon Islands | East Asia & Pacific | 77.86 |

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

-- 94 countries

## **4. RECOMMENDATIONS**

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

* *What have you learned from the World Bank data?*
* *Which countries should we focus on over others?*

The overall forest coverage is 33% which is relatively low and didn't change much from the past decades. The main reason that the world coverage doesn't improve much is that about half of the countries' coverage is decreasing, while the rest of countries are increasing their coverage.

The countries we should focus on more should be those decreases in forest area over the past decades, especially those decreased by more than 50%. The World Bank should let those countries with a significant increase to help the decrease countries, for example, China, USA, and Iceland. The experts from these countries should consider the soil environment and provide different plants for countries to grow, for instance, cactus for Sub-Saharan Africa.

**5. APPENDIX: SQL QUERIES USED**

**/\* create forestation view \*/**

DROP VIEW IF EXISTS forestation;

CREATE VIEW forestation AS

SELECT F.country\_name, F.country\_code,

F.year, F.forest\_area\_sqkm FAKM,

L.total\_area\_sq\_mi Total\_mi,

R.region, R.income\_group,

(F.forest\_area\_sqkm/(L.total\_area\_sq\_mi \* 2.59)) \* 100

as Percent\_KM

FROM forest\_area F

Join land\_area L

On F.country\_code = L.country\_code and

F.country\_name = L.country\_name and

F.year = L.year

left Join regions R

On R.country\_name = F.country\_name and

R.country\_code = F.country\_code;

select \*

from forestation

order by country\_name;

**/\* 1. Global Situation \*/**

select \*

from forest\_area

Where country\_name = 'World'

and (year = '2016' or year = '1990');

/\* 2016: 39958245.9

1990: 41282694.9 \*/

with Y1 as (select \*

from forest\_area

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

Y2 as (select \*

from forest\_area

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

select (Y2.forest\_area\_sqkm-Y1.forest\_area\_sqkm) as difference, ((Y2.forest\_area\_sqkm- Y1.forest\_area\_sqkm)/

Y2.forest\_area\_sqkm)\*100 as Per\_loss

from Y1

join Y2

on Y1.country\_name = Y2.country\_name;

/\* difference = 1324449

Percentage = 3.20824258980244\_% \*/

select country\_name, year,

(total\_area\_sq\_mi \* 2.59) as Total\_km

from land\_area

where year = '2016' and (total\_area\_sq\_mi \* 2.59) > 1000000

order by 3;

/\* 1279999.9891 - Peru\*/

**/\* 2. REGIONAL OUTLOOK \*/**

select country\_name, region, year, percent\_km

from forestation

where (year = '2016' or year = '1990')

and country\_name = 'World'

order by percent\_km desc;

/\* world: 2016: 31.38%

1990: 32.42%\*/

select country\_name, region, year, percent\_km

from forestation

where year = '2016'

order by percent\_km desc;

select region, year,

round(cast((forest/land)\*100 AS NUMERIC),2) as per\_for

from

(

select region, year, sum(fakm)Forest, sum(total\_mi\*2.59)Land

from forestation

group by 1,2) sub

where (year = '2016' or year = '1990')

group by 1,2,3

order by 2,3 desc;

/\* Region 1990 Percent 2016 Percent

Latin America & Caribbean 51.03 46.16

Europe & Central Asia 41.17 38.04

North America 37.29 36.04

Sub-Suharan Africa 30.65 28.72

East Asia & Pacific 25.57 26.29

South Asia 16.51 17.51

Middle East & North Africa 1.78 2.07 \*/

**/\* 3. COUNTRY-LEVEL DETAIL \*/**

select f1.country\_name, r.region,

(f1.forest\_area\_sqkm - f2.forest\_area\_sqkm) as Decrease,

round(cast(((f1.forest\_area\_sqkm - f2.forest\_area\_sqkm) /f1.forest\_area\_sqkm)\*100 As Numeric),2) as Decrease\_Percentage

from forest\_area f1

join forest\_area f2

on f1.year = '1990' and f2.year = '2016'

and f1.country\_name = f2.country\_name

join regions r

on r.country\_name = f1.country\_name

order by 3, 4 desc;

/\* Top 5 decrease

Country Region Absolute Forest Area Change

Brazil Latin America & Caribbean 541510

Indonesia East Asia & Pacific 282193.9844

Myanmar East Asia & Pacific 107234.0039

Nigeria Sub-Saharan Africa 106506.00098

Tanzania Sub-Saharan Africa 102320

Top 5 pct decrease

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% \*/

select quartiles, count(quartiles)

from (

select country\_name, year, percent\_km,

case when percent\_km >= 75 then '75-100'

when percent\_km between 50 and 75 then '50-75'

when percent\_km between 25 and 50 then '25-50'

else '0-25' end as quartiles

from forestation ) sub

where percent\_km IS NOT NULL and year = '2016'

group by 1

order by 2;

/\* Quartile Number of Countries

0-25 85

25-50 73

50-75 38

75-100 9 \*/

select percent\_km, region, country\_name

from forestation

where percent\_km IS NOT NULL and year = '2016'

and percent\_km >= 75

order by 1 desc;

/\* Country Region Pct Designated as Forest

Suriname Latin America & Caribbean 98.26

Micronesia East Asia & Pacific 91.85

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 83.91

Lao PDR East Asia & Pacific 82.11

Solomon Islands East Asia & Pacific 77.86 \*/

/\* How many countries had a percent forestation higher than the United States in 2016? \*/

select count(country\_name)

from forestation

where year = '2016' and

percent\_km > (

select percent\_km

from forestation

where year = '2016' and

country\_name = 'United States'

and percent\_km is not null)

/\* there are 94 countries that had a percent forestation higher than the United States in 2016 \*/