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 41282694.98 sqkm in 1990. As of 2016, the most recent year for which data was available, that number had fallen to39958245.9 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 1279999.98 sqkm).

## 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 2.07% forestation.

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

|  |  |  |
| --- | --- | --- |
| Region | 1990 Forest Percentage | 2016 Forest Percentage |
| Latin America & Caribbean | 51.02% | 46.16% |
| Sub Saharan Africa | 30.67% | 28.78% |
| World | 32.42% | 31.37% |

The only regions of the world that decreased in percent forest area from 1990 to 2016 were Latin America & Caribbean (dropped from 51.02% to 46.16%) and Sub Saharan Africa (30.67% to 28.78%). 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 31.37%.

## 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 527,229.062 sqkm. 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 79,200 sqkm, much lower than the figure for China.

China and Unites 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 2.14% 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 3 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 |
| Nigeria | Sub-Saharan Africa | 106502.00 sqkm |

The second way to consider which countries are of concern is to analyze the data by percent decrease.

Table 3.2: Top 3 Percent Decrease in Forest Area by Country, 1990 & 2016:

|  |  |  |
| --- | --- | --- |
| Country | Region | Pct Forest Area Change |
| Togo | Sub-Saharan Africa | 75.44% |
| Nigeria | Sub Saharan Africa | 61.79% |
| Uganda | Sub-Saharan Africa | 59.12% |

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 Amera & 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 |
| 1st | 85 |
| 2nd | 73 |
| 3rd | 38 |
| 4th | 9 |

The largest number of countries in 2016 were found in the quartile.

There were 94 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 |
| Gabon | Sub Saharan Africa | 90.03% |
| Micronesia | East Asia & Pacific | 91.85% |
| Suriname | Latin America & Caribbean | 98.25% |

## 4. RECOMMENDATIONS

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

* *What have you learned from the World Bank data?*
* *From the world bank data I have learned that the amount of area designated as forest has been decreased though the amount forested in many regions has increased. This shows that there are some regions that have a lot less forest now, and this impacts the relative amount forested in the whole world. The data shows that the amount forested in lot of countries have decreased*
* *Which countries should we focus on over others?*
* *Countries that we need to focus are from Sub Saharan Africa region, especially Nigeria and Togo, as these countries have lost the most forested area proportional to their total land area. Brazil should also be focused as it has lost most forest overall and is in the region(Latin America & Caribbean) that has lost a significant amount of forest.*

## 5. APPENDIX: SQL Queries Used

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Create Forestation View\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**CREATE** **VIEW**

forestation **AS**

**SELECT**

f**.**country\_code**,**

f**.**country\_name**,**

f**.year,**

f**.**forest\_area\_sqkm**,**

l**.**total\_area\_sq\_mi**\*2.59** **AS** total\_area\_sqkm**,**

f**.**forest\_area\_sqkm**/(**l**.**total\_area\_sq\_mi**\*2.59)\*100** **AS** percentage\_forest**,**

r**.**region **AS** region**,**

r**.**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** f**.**country\_code**=**r**.**country\_code**;**

**Global Situation**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Forest area of the world in 1990\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **1990;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Forest area of world in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **2016;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Abs Change in forest area of world from 1990 to 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **(SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **1990)** **-**

**(SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **2016)** **AS** absolute\_loss**;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Change in forest area of world from 1990 to 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **((SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **1990)** **-**

**(SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **2016))** **/**

**(SELECT** forest\_area\_sqkm

**FROM** forest\_area

**WHERE** country\_name **=** 'World' **AND** **year** **=** **1990)** **\*** **100** **AS** percent\_loss

**\_\_\_\_\_\_\_\_Country having total area close to amt of forest area lost in world\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** f**.**country\_name**,** f**.**total\_area\_sqkm

**FROM** forestation **AS** f

**WHERE** f**.year** **=**'2016' **AND** f**.**total\_area\_sqkm **<=** **((SELECT**

**((SELECT** forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forestation

**WHERE** country\_name **=** 'World' **AND** **year=**'1990'**)** **-**

**(SELECT** forest\_area\_sqkm **as** forest\_area\_2016

**FROM** forestation

**WHERE** country\_name **=** 'World' **AND** **year=**'2016'**))** **AS** forest**))**

**ORDER BY** f**.**total\_area\_sqkm **DESC**

**LIMIT** **1;**

**Regional Outlook**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Create Region and their percent forest View\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **year,** region**,** **((SUM(**forest\_area\_sqkm**)** **/** **SUM(**total\_area\_sqkm**))** **\*** **100)** **AS** forest\_percent

**FROM** forestation

**WHERE** **year** **IN** **(**'1990'**,** '2016'**)**

**GROUP** **BY** region**,** **year**

**ORDER BY** region**,** **year;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Percent forest of the entire world in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** percentage\_forest

**FROM** forestation **AS** f

**WHERE** f**.**country\_name**=**'World' **AND** f**.year=**'2016'

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Region had the HIGHEST percent forest in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** region**,** **((SUM(**forest\_area\_sqkm**)** **/** **SUM(**total\_area\_sqkm**))** **\*** **100)** **AS** net\_forest\_percent

**FROM** forestation

**WHERE** **year** **IN** **(**'2016'**)**

**GROUP** **BY** region**,** **year**

**ORDER BY** net\_forest\_percent **DESC**

**LIMIT** **1;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Region had the LOWEST percent forest in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** region**,** **((SUM(**forest\_area\_sqkm**)** **/** **SUM(**total\_area\_sqkm**))** **\*** **100)** **AS** net\_forest\_percent

**FROM** forestation

**WHERE** **year** **IN** **(**'2016'**)**

**GROUP** **BY** region**,** **year**

**ORDER BY** net\_forest\_percent **ASC**

**LIMIT** **1;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Percent forest of the entire world in 1990\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** percentage\_forest

**FROM** forestation **AS** f

**WHERE** f**.**country\_name**=**'World' **AND** f**.year=**'1990'

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Region had the HIGHEST percent forest in 1990\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** region**,** **((SUM(**forest\_area\_sqkm**)** **/** **SUM(**total\_area\_sqkm**))** **\*** **100)** **AS** net\_forest\_percent

**FROM** forestation

**WHERE** **year** **IN** **(**'1990'**)**

**GROUP** **BY** region**,** **year**

**ORDER BY** net\_forest\_percent **DESC**

**LIMIT** **1;**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Region had the LOWEST percent forest in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** region**,** **((SUM(**forest\_area\_sqkm**)** **/** **SUM(**total\_area\_sqkm**))** **\*** **100)** **AS** net\_forest\_percent

**FROM** forestation

**WHERE** **year** **IN** **(**'1990'**)**

**GROUP** **BY** region**,** **year**

**ORDER BY** net\_forest\_percent **ASC**

**LIMIT** **1;**

**\_\_\_\_\_\_\_\_\_\_\_\_Regions of world DECREASED in forest area by 1990 to 2016\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **final.**region **FROM** **(SELECT** t1990**.**region**,** t1990**.**net\_forest\_area1990**,** t2016**.**net\_forest\_area2016**,**

**(**t1990**.**net\_forest\_area1990**-**t2016**.**net\_forest\_area2016**)** **as** diff

**FROM**

**(SELECT** **year,** region**,** **(SUM(**forest\_area\_sqkm**)/SUM(**total\_area\_sqkm**)\*100)** **AS** net\_forest\_area1990

**FROM** forestation

**WHERE** **year** **IN** **(**'1990'**)**

**GROUP** **BY** region**,** **year)** **AS** t1990

**JOIN**

**(SELECT** **year,** region**,** **(SUM(**forest\_area\_sqkm**)/SUM(**total\_area\_sqkm**))\*100** **AS** net\_forest\_area2016

**FROM** forestation

**WHERE** **year** **IN** **(**'2016'**)**

**GROUP** **BY** region**,** **year)** **AS** t2016

**ON** t1990**.**region**=**t2016**.**region

**ORDER BY** diff **DESC**

**LIMIT** **3)** **AS** **final**

**Country Level Detail**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2 Countries that increased in forest Area\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **final.**country\_name **FROM** **(****SELECT** t1**.**country\_name**,**

t2**.**forest\_area\_2016 **-** t1**.**forest\_area\_1990 **AS** forest\_increase

**FROM** **(****SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forest\_area

**WHERE** **year** **=** '1990'**)** t1

**JOIN** **(SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_2016

**FROM** forest\_area

**WHERE** **year** **=** '2016'**)** t2

**ON** t1**.**country\_name **=** t2**.**country\_name

**WHERE** t2**.**forest\_area\_2016 **>** t1**.**forest\_area\_1990

**ORDER** **BY** forest\_increase **DESC**

**LIMIT** **2)** **AS** **final**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_China and Us increased by forest Area\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** **final.**country\_name **FROM** **(SELECT** t1**.**country\_name**,**

t2**.**forest\_area\_2016 **-** t1**.**forest\_area\_1990 **AS** forest\_increase

**FROM** **(SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forest\_area

**WHERE** **year** **=** '1990'**)** t1

**JOIN** **(SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_2016

**FROM** forest\_area

**WHERE** **year** **=** '2016'**)** t2

**ON** t1**.**country\_name **=** t2**.**country\_name

**WHERE** t2**.**forest\_area\_2016 **>** t1**.**forest\_area\_1990

**ORDER** **BY** forest\_increase **DESC**

**LIMIT** **2)** **AS** **final**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Countries that increased by percentage\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** t1**.**country\_name**,**

**(**t2**.**forest\_area\_2016 **-** t1**.**forest\_area\_1990**)** **/** t1**.**forest\_area\_1990 **AS** percent\_forest\_increase

**FROM** **(SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forest\_area

**WHERE** **year** **=** '1990'**)** t1

**JOIN** **(SELECT** country\_name**,** forest\_area\_sqkm **AS** forest\_area\_2016

**FROM** forest\_area

**WHERE** **year** **=** '2016'**)** t2

**ON** t1**.**country\_name **=** t2**.**country\_name

**WHERE** t2**.**forest\_area\_2016 **>** t1**.**forest\_area\_1990

**ORDER** **BY** percent\_forest\_increase **DESC**

**LIMIT** **5;**

**\_\_\_\_\_\_5 countries saw the largest amount decrease in forest area from 1990 to 2016\_\_\_\_**

**SELECT** **final.**country\_name**,** **final.**region **from** **(SELECT** t1990**.**region**,** t1990**.**country\_name **AS** country\_name**,**t1990**.**forest\_area\_1990**,**t2016**.**forest\_area\_2016**,**

**(**t1990**.**forest\_area\_1990**-**t2016**.**forest\_area\_2016**)** **AS** forest\_area\_diff

**FROM**

**(SELECT** f**.**region**,** f**.**country\_name**,** f**.**forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forestation **AS** f

**WHERE** **year** **IN** **(1990)**

**ORDER BY** country\_name**)** **AS** t1990

**JOIN**

**(SELECT** f**.**region**,** f**.**country\_name**,** f**.**forest\_area\_sqkm **AS** forest\_area\_2016

**FROM** forestation **AS** f

**WHERE** **year** **IN** **(2016)**

**ORDER BY** country\_name**)** **AS** t2016

**ON** t1990**.**country\_name**=**t2016**.**country\_name

**WHERE** **(**t1990**.**forest\_area\_1990**-**t2016**.**forest\_area\_2016**)** **IS** **NOT** **NULL** **and**

t1990**.**region **!=** 'World'

**ORDER BY** forest\_area\_diff **DESC**

**LIMIT** **5)** **AS** **final**

**\_\_\_\_\_5 countries saw the largest percent decrease in forest area from 1990 to 2016\_\_\_\_\_**

**SELECT** **final.**country\_name**,** **final.**region **FROM** **(SELECT** t1990**.**region**,** t1990**.**country\_name **AS** country\_name**,**t1990**.**forest\_area\_1990**,**t2016**.**forest\_area\_2016**,**

**(**t1990**.**forest\_area\_1990**-**t2016**.**forest\_area\_2016**)** **AS** forest\_area\_diff**,**

**((**t1990**.**forest\_area\_1990 **-** t2016**.**forest\_area\_2016**)** **/** t1990**.**forest\_area\_1990**)** **\*** **100** **AS** percentage\_decrease

**FROM**

**(SELECT** f**.**region**,** f**.**country\_name**,** f**.**forest\_area\_sqkm **AS** forest\_area\_1990

**FROM** forestation **AS** f

**WHERE** **year** **IN** **(1990)**

**ORDER BY** country\_name**)** **AS** t1990

**JOIN**

**(SELECT** f**.**region**,** f**.**country\_name**,** f**.**forest\_area\_sqkm **AS** forest\_area\_2016

**FROM** forestation **AS** f

**WHERE** **year** **IN** **(2016)**

**ORDER BY** country\_name**)** **AS** t2016

**ON** t1990**.**country\_name**=**t2016**.**country\_name

**WHERE** **(**t1990**.**forest\_area\_1990**-**t2016**.**forest\_area\_2016**)** **IS** **NOT** **NULL**

**ORDER BY** percentage\_decrease **DESC**

**LIMIT** **5)** **AS** **final**

**\_\_\_ If countries were grouped by percent forestation in quartiles, which group had the\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_most countries in it in 2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SELECT** t1**.**quartile**,** **COUNT(\*)** **AS** country

**FROM** **(SELECT** country\_name**,** percentage\_forest**,**

**CASE** **WHEN** percentage\_forest **<** **25** **THEN** **1**

**WHEN** percentage\_forest **<=** **50** **THEN** **2**

**WHEN** percentage\_forest **<=** **75** **THEN** **3**

**ELSE** **4** **END** **AS** quartile

**FROM** forestation

**WHERE** **year** **=** '2016' **AND** percentage\_forest **IS** **NOT** **NULL)** **AS** t1

**GROUP** **BY** t1**.**quartile

**ORDER** **BY** country **DESC**

**LIMIT** **1;**

**\_\_\_\_\_ All of the countries and region that were in the 4th quartile (percent forest > 75%) in 2016.\_\_\_\_**

**SELECT** t1**.**quartile**,** t1**.**country\_name**,** t1**.**region

**FROM** **(SELECT** region**,** country\_name**,** percentage\_forest**,**

**CASE** **WHEN** percentage\_forest **<** **25** **THEN** **1**

**WHEN** percentage\_forest **<=** **50** **THEN** **2**

**WHEN** percentage\_forest **<=** **75** **THEN** **3**

**ELSE** **4** **END** **AS** quartile

**FROM** forestation

**WHERE** **YEAR** **=** '2016' **AND** percentage\_forest **IS** **NOT** **NULL)** **AS** t1

**WHERE** t1**.**quartile**=**'4'

**ORDER BY** country\_name;

**\_\_\_\_\_\_\_Countries had a percent forestation higher than the United States in 2016\_\_\_\_\_\_\_**

**WITH** t1 **AS** **(**

**SELECT** percentage\_forest

**FROM** forestation

**WHERE** **year** **=** '2016' **AND** country\_name **=** 'United States'

**)**

**SELECT** **count(\*)**

**FROM** forestation

**WHERE** percentage\_forest **>** **(SELECT** percentage\_forest **FROM** t1**)** **AND** **year** **=**'2016'