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 sqkm in 1990. As of 2016, the most recent year for which data was available, that number had fallen to 39958245.9 sqkm , a loss of 1324449 sqkm, or 3.2%. 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 1279999.98sqkm).

**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 |
| Sub-Saharan Africa | 30.67 | 28.79 |
| Latin America & Caribbean | 51.03 | 46.16 |
| World | 32.42 | 31.38 |

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 32.42% to 31.38%.

**3. COUNTRY-LEVEL DETAIL**

1. 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 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 79200 sqkm, much lower than the figure for 527229.06 sqkm.

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.

1. 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 sqkm |
| Nigeria | Sub-Saharan Africa | -106506 sqkm |
| Tanzania | Sub-Saharan Africa | -102320 sqkm |

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 & Caribbeanregion.

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.

1. 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 | 91.86 |
| 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 | 83.90 |
| Lao PDR | East Asia & Pacific | 82.11 |
| Solomon Islands | East Asia & Pacific | 77.86 |

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?*

*Every day we see a decrease in the amount of forest in the world.The forest areas in Latin America and the Caribbean region with the highest percentage of forests should be protected and increased in afforestation and afforested with plants that can adapt to the Middle East and North Africa with the least forests.The underlying causes of regions with significant reductions in forest percentage, such as Sub-Saharan Africa and Latin America and the Caribbean, need to be thoroughly investigated.*

*It can be an example for other countries in the application phase, based on the methods used by countries such as China.   which increased their forest area to a great extent and doubled the forest area as a percentage, such as  Iceland.It is necessary to thoroughly investigate the factors causing the decrease in the countries of Brazil, Myanmar, Nigeria, Indonesia and Tanzania, which are high in forest area loss.Nigeria plays a critical role here because it is the only country among the top 5 countries to decline in terms of both percentage and area, the reasons for the decline in Nigeria can serve as an example for other countries to take steps towards protection.It can be an example to the world in how they increased their forest land by 75% - 100% to countries such as Suriname, Micronesia, Gabon.*

*6. APPENDIX*

*DROP VIEW IF EXISTS forestation;*

*CREATE VIEW forestation*

*AS*

*(SELECT f.\*,l.total\_area\_sq\_mi\*2.59 as land\_area\_sq\_km, r.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 l.country\_code=r.country\_code)*

*1. GLOBAL SITUATION*

*with*

*total\_world\_forest\_area1990 as (select country\_name,year,forest\_area\_sqkm from  forestation*

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

*total\_world\_forest\_area2016 as (select country\_name,year,forest\_area\_sqkm from  forestation*

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

*total\_land\_area as (select country\_name,land\_area\_sq\_km from forestation)*

*--Q1a*

*select \*from total\_world\_forest\_area1990*

*--Q1b*

*select \*from total\_world\_forest\_area2016*

*--Q1c*

*select f.country\_name,(l.forest\_area\_sqkm-f.forest\_area\_sqkm) as lost\_forest*

*from total\_world\_forest\_area2016 f*

*JOIN total\_world\_forest\_area1990 l*

*on f.country\_name=l.country\_name*

*--Q1d*

*select f.country\_name,((l.forest\_area\_sqkm-f.forest\_area\_sqkm)/l.forest\_area\_sqkm)\*100 as percantage\_lost\_forest*

*from total\_world\_forest\_area2016 f*

*JOIN total\_world\_forest\_area1990 l*

*on f.country\_name=l.country\_name*

*--Q1e*

*select distinct  \* from total\_land\_area*

*where land\_area\_sq\_km between 1270000 and 1350000*

*2. REGIONAL OUTLOOK*

*WITH total\_forest\_land\_area1990 as(*

*select region, year,*

*sum(forest\_area\_sqkm)as total\_forest\_area,*

*sum(land\_area\_sq\_km) total\_land\_area*

*from forestation*

*group by 1,2*

*HAVING year=1990*

*order by 2),*

*total\_forest\_land\_area2016 as(*

*select region, year,*

*sum(forest\_area\_sqkm)as total\_forest\_area,*

*sum(land\_area\_sq\_km) total\_land\_area*

*from forestation*

*group by 1,2*

*HAVING year=2016*

*order by 2),*

*percantage\_totalforest\_1990 as*

*(SELECT \*, round((total\_forest\_area/total\_land\_area\*100)::numeric,2) as percantage\_totalforest1990*

*from total\_forest\_land\_area1990*

*),*

*percantage\_totalforest\_2016 as(*

*SELECT \*,round((total\_forest\_area/total\_land\_area\*100)::numeric,2) as percantage\_totalforest2016*

*from total\_forest\_land\_area2016)*

*--Q2a1*

*select \**

*from percantage\_totalforest\_2016*

*where region='World'*

*--Q2a2*

*select \* from percantage\_totalforest\_2016 order by percantage\_totalforest2016 desc*

*--Q2b1*

*select \**

*from percantage\_totalforest\_1990*

*where region='World'*

*--Q2b2*

*select \* from percantage\_totalforest\_1990 order by percantage\_totalforest1990 desc*

*--Q2c*

*select o.region, percantage\_totalforest1990, percantage\_totalforest2016,*

*round(((n.total\_forest\_area-o.total\_forest\_area)\*100/o.total\_forest\_area)::numeric,2) as forest\_change\_prt*

*from percantage\_totalforest\_1990 o*

*join percantage\_totalforest\_2016 n on o.region=n.region*

*order by 4*

*3. COUNTRY-LEVEL DETAIL*

*WITH total\_forest\_land\_area1990 as(*

*select country\_name, max(region) as region, year,*

*sum(forest\_area\_sqkm)as total\_forest\_area,*

*sum(land\_area\_sq\_km) total\_land\_area*

*from forestation*

*group by 1,3*

*HAVING year=1990),*

*total\_forest\_land\_area2016 as(*

*select country\_name, max(region) as region,year,*

*sum(forest\_area\_sqkm)as total\_forest\_area,*

*sum(land\_area\_sq\_km) total\_land\_area*

*from forestation*

*group by 1,3*

*HAVING year=2016),*

*percantage\_totalforest\_1990 as*

*(SELECT \*, round((total\_forest\_area/total\_land\_area\*100)::numeric,2) as percantage\_totalforest1990*

*from total\_forest\_land\_area1990*

*),*

*percantage\_totalforest\_2016 as(*

*SELECT \*,*

*round((total\_forest\_area/total\_land\_area\*100)::numeric,2) as percantage\_totalforest2016,*

*case when round((total\_forest\_area/total\_land\_area\*100)::numeric,2) < 25 then '1st'*

*when round((total\_forest\_area/total\_land\_area\*100)::numeric,2) between 25 and 50 then '2nd'*

*when round((total\_forest\_area/total\_land\_area\*100)::numeric,2) between 50 and 75 then '3rd'*

*when round((total\_forest\_area/total\_land\_area\*100)::numeric,2) > 75 then '4th'*

*else 'no information available'*

*end as quartiles*

*from total\_forest\_land\_area2016)*

*--Q3a&b*

*select o.country\_name,o.region, n.total\_forest\_area,o.total\_forest\_area,*

*(n.total\_forest\_area-o.total\_forest\_area) change\_in\_amount,*

*round(((n.total\_forest\_area-o.total\_forest\_area)\*100/o.total\_forest\_area)::numeric,2) change\_in\_ptc*

*from total\_forest\_land\_area1990 o*

*join total\_forest\_land\_area2016 n on o.country\_name=n.country\_name and o.region = n.region*

*order by 5 desc*

*--order by 6 desc*

*--Q3c*

*select quartiles, count(1)*

*from percantage\_totalforest\_2016*

*group by 1*

*--Q3d*

*select country\_name,region,percantage\_totalforest2016*

*from percantage\_totalforest\_2016*

*where quartiles='4th'*

*order by 3 desc*

*--Q3e*

*select count(1)*

*from percantage\_totalforest\_2016*

*where percantage\_totalforest2016>(select percantage\_totalforest2016 from percantage\_totalforest\_2016 where country\_name='United States')*