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.

*(Note Answers - **Bold Blue**)*

1. GLOBAL SITUATION

According to the World Bank, the total forest area of the world was **41,282,694.9 km2** in 1990. As of 2016, the most recent year for which data was available, that number had fallen to **39,958,245.9 km2**, a loss of **1,324,449**, or **3.2%** decrease.

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 **1.3 km2** rounded to 1 decimal place).

2. REGIONAL OUTLOOK

In 2016, the percent of the total land area of the world designated as forest was **31.4%**. The region with the highest relative forestation was **Latin America & Caribbean**, with **46.2%**, and the region with the lowest relative forestation was **Middle East & North Africa**, with **2.1%** forestation.

In 1990, the percent of the total land area of the world designated as forest was **32.4%**. The region with the highest relative forestation was **Latin America & Caribbean**, with **51.0%**, and the region with the lowest relative forestation was **Middle East & North Africa**, with **2.1%** forestation.

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

Region	1990 Forest Percentage	2016 Forest Percentage	Percentage Change
Latin America & Caribbean	**51.0%**	**46.2%**	**-4.8%**
Europe and Central Asia	**37.3%**	**38.0%**	**+0.7%**
North America	**35.7%**	**36.0%**	**+0.3%**
Sub-Saharan Africa	**30.7%**	**28.8%**	**-1.9%**
East Asia & Pacific	**25.8%**	**26.4%**	**+0.6%**
South Asia	**16.5%**	**17.5%**	**+1.0%**
Middle East North Africa	**1.8%**	**2.1%**	**+0.3%**
World	**32.4%**	**31.4%**	**-1.0%**

The only regions of the world that decreased in percent forest area from 1990 to 2016 were **Latin America & Caribbean** (dropped from **51.0%** to **46.2%**) and **Sub-Saharan Africa** (**30.7%** to **28.8%**). 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 **32.4%** to **31.4%**.

3. COUNTRY-LEVEL DETAIL

A. 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 **527,229.06 km2**. 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 km2**, much lower than the figure for China.

China and the **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** forest area increased by **213.7%** from 1990 to 2016.

B. 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 5 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**	-541,510 km2
Indonesia	**East Asia & Pacific**	-282,192 km2
Myanmar	**East Asia & Pacific**	-107,234 km2
Nigeria	**Sub-Saharan Africa**	-106,506 km2
Tanzania	**Sub-Saharan Africa**	-102,320 km2

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**	-75.5%
Nigeria	**Sub-Saharan Africa**	-61.2%
Uganda	**Sub-Saharan Africa**	-59.1%
Mauritania	**Sub-Saharan Africa**	-46.8%
Honduras	**Latin America & Caribbean**	-45.0%

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 & 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.

C. QUARTILES

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

Quartile	Number of Countries
1st (0-25)	85
2nd (26-50)	72
3rd (51-75)	38
4th (76-100)	9

The largest number of countries in 2016 were found in the **first** 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	98.3%
Micronesia, Fed. Sts.	East Asia & Pacific	91.9%
Gabon	Sub-Saharan Africa	90.0%
Seychelles	Sub-Saharan Africa	88.4%
Palau	East Asia & Pacific	87.6%
American Samoa	East Asia & Pacific	87.5%
Guyana	Latin America & Caribbean	83.9%

Lao PDR	**East Asia & Pacific**	**82.1%**
Solomon Islands	**East Asia & Pacific**	**77.9%**

4. RECOMMENDATIONS

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

In summary, the data highlights the global forestation challenges between 1991 and 2016. Despite this, some countries like China and the United States have demonstrated improvements in their forestation statistics. To address forestation issues, it is recommended that countries and regions more affected, such as Latin America & the Caribbean and Sub-Saharan Africa, learn from the experiences of successful countries, adopt effective forest management practices, promote knowledge sharing and collaboration, invest in research and innovation, and consider policy reforms and incentives to support forestation efforts. Based on the forestation summary and data provided, here are five key recommendations:

1. ***Learn from Successful Countries:*** *Countries and regions more affected by unfavorable forestation trends, such as Latin America & the Caribbean and Sub-Saharan Africa, should study the experiences of countries like China and the United States. Analyze their strategies, initiatives, and policies that have led to improved forestation statistics.*

2. ***Adopt Effective Forest Management:*** *Emphasize the importance of effective forest management techniques. Learn from China and the United States on how they have successfully managed their designated forested lands, including sustainable logging practices, reforestation efforts, and biodiversity conservation measures.*

3. ***Promote Knowledge Sharing and Collaboration:*** *Establish platforms for knowledge sharing and collaboration between countries in Latin America & the Caribbean and Sub-Saharan Africa. Facilitate information exchange and cooperation on forestation efforts, enabling countries to learn from each other's successes and challenges.*

4. ***Invest in Research and Innovation:*** *Allocate resources to research and development in the field of forestation. Support studies and projects that focus on region-specific challenges and innovative solutions for forest management and restoration.*

5. ***Policy Reforms and Incentives:*** *Review and revise existing policies and regulations related to forestation. Identify areas where policy reforms are necessary, such as providing financial incentives for reforestation projects and strengthening legal protections for forests.*

Which countries should we focus on over others?

In prioritizing our efforts and allocation of resources, it is advisable to focus on countries that have witnessed significant declines in their forest area, considering both the percentage decrease and the amount decrease. After analyzing the data provided, the countries that stand out in terms of percentage decrease ***(according to Table 3.2)*** *are* ***Togo, Nigeria, Uganda, Mauritania****, and* ***Honduras****. On the other hand, considering the amount decrease* ***(as per Table 3.1)****, the countries that require attention are* ***Brazil, Indonesia, Myanmar, Nigeria,*** *and* ***Tanzania****.*

In particular, ***Nigeria*** *deserves special consideration among the aforementioned countries.* ***Nigeria*** *has experienced declines in both the percentage and the amount of forest area, making it a critical area for targeted interventions. By focusing on these countries and tailoring our efforts to address their specific challenges, we can maximize the impact of our forestation initiatives and prioritize areas that are most in need of support.*

It is essential to adopt a strategic approach that combines comprehensive analysis, effective policy reforms, knowledge sharing, and collaboration to ensure the success of forestation endeavors in these countries. By directing our attention and resources towards these priority nations, we can contribute to reversing the negative trends and promote sustainable forest management practices on a significant scale.

5. APPENDIX

Please click on the **link** or see **README.md** to review SQL queries to calculate and return answers submitted in this report.