

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.

2. 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 & 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.

3. 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
percentage_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) as 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),
percentage_totalforest_1990 as
(SELECT *, round((total_forest_area/total_land_area*100)::numeric,2) as
percentage_totalforest1990
from total_forest_land_area1990
),
percentage_totalforest_2016 as(
SELECT *,round((total_forest_area/total_land_area*100)::numeric,2) as
percentage_totalforest2016
from total_forest_land_area2016)
--Q2a1
select *
from percentage_totalforest_2016
where region='World'
--Q2a2
select * from percentage_totalforest_2016 order by percentage_totalforest2016 desc
--Q2b1
select *
from percentage_totalforest_1990
where region='World'
--Q2b2
select * from percentage_totalforest_1990 order by percentage_totalforest1990 desc
--Q2c
select o.region, percentage_totalforest1990, percentage_totalforest2016,
round(((n.total_forest_area-o.total_forest_area)*100/o.total_forest_area)::numeric,2) as
forest_change_prt
from percentage_totalforest_1990 o
join percentage_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),
percentage_totalforest_1990 as
(SELECT *, round((total_forest_area/total_land_area*100)::numeric,2) as
percentage_totalforest1990

```

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from total_forest_land_area1990
),
percentage_totalforest_2016 as(
  SELECT *,
    round((total_forest_area/total_land_area*100)::numeric,2) as percentage_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 percentage_totalforest_2016
group by 1
--Q3d
select country_name,region,percentage_totalforest2016
from percentage_totalforest_2016
where quartiles='4th'
order by 3 desc
--Q3e
select count(1)
from percentage_totalforest_2016
where percentage_totalforest2016>(select percentage_totalforest2016 from
percentage_totalforest_2016 where country_name='United States')

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