

# 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.

Task: create a view of the whole dataset

```
CREATE VIEW together
AS
SELECT f.country_code, f.country_name, f.year, f.forest_area_sqkm,
l.total_area_sq_mi, l.total_area_sq_mi * 2.59 AS total_area_sqkm,
r.region, r.income_group,
f.forest_area_sqkm/(l.total_area_sq_mi * 2.59)*100 AS percent_forestation
FROM forest_area f
JOIN land_area l
ON f.country_code = l.country_code AND f.year = l.year
JOIN regions r
ON r.country_code = f.country_code;
```

## 1. GLOBAL SITUATION

According to the World Bank, the total forest area of the world was (1) 41282695 km sq in 1990. As of 2016, the most recent year for which data was available, that number had fallen to (2) 39958246, a loss of (3) 1324449, or (4) 3.2 %.

The forest area lost over this time period is slightly more than the entire land area of (5) Peru listed for the year 2016 (which is (6) 494209 km sq).

```
(1), (2)
SELECT country_name, year, forest_area_sqkm
FROM forest_area
WHERE country_name = 'World'
AND (year = '1990' OR year = '2006');
```

```
(3)
SELECT year,
        forest_area_sqkm,
```

```

        forest_area_sqkm - LAG(forest_area_sqkm)
        OVER () AS difference_forest_area_sqkm
FROM(
    SELECT country_name, year, forest_area_sqkm
    FROM forest_area
    WHERE country_name = 'World'
    AND (year = '1990' OR year = '2016')) t2

(4)
    SELECT MAX(difference_forest_area_sqkm) / MAX(forest_area_sqkm) * 100 as perc_forest_area_sqkm
    FROM(

        SELECT year,
        forest_area_sqkm,
        forest_area_sqkm - LAG(forest_area_sqkm)
        OVER () AS difference_forest_area_sqkm

        FROM(
            SELECT country_name, year, forest_area_sqkm
            FROM forest_area
            WHERE country_name = 'World'
            AND (year = '1990' OR year = '2016')) t2) t3

(5,6)
SELECT country_name, year, total_area_sq_mi
FROM land_area
WHERE year = '2016'
AND total_area_sq_mi * 2.59 <

(SELECT MAX(difference_forest_area_sqkm) as forest_area_lost
FROM (
    SELECT year,
        forest_area_sqkm,
        forest_area_sqkm - LAG(forest_area_sqkm)
        OVER () AS difference_forest_area_sqkm
    FROM(
        SELECT country_name, year, forest_area_sqkm
        FROM forest_area
        WHERE country_name = 'World'
        AND (year = '1990' OR year = '2016')) t2) t3)

ORDER BY total_area_sq_mi DESC
LIMIT 1

```

## 2. REGIONAL OUTLOOK

In 2016, the percent of the total land area of the world designated as forest was (7) 31.4 %. The region with the highest relative forestation was (8) Latin America & Caribbean, with (9) 46,2%, and the region with the lowest relative forestation was (10) Middle East & North Africa, with (11) 2.1% forestation.

(7)  
WITH together AS

```

(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT per_forest_area
FROM (
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2) t2
WHERE region = 'World' and year = '2016'

(8), (9)
WITH together AS
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT region, per_forest_area
FROM (
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2) t2
WHERE year = '2016'
ORDER BY per_forest_area DESC
LIMIT 1

(10), (11)
WITH together AS
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT region, per_forest_area
FROM (
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area

```

```

FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2) t2
WHERE year = '2016'
ORDER BY per_forest_area
LIMIT 1

```

In 1990, the percent of the total land area of the world designated as forest was (12) 32.4. The region with the highest relative forestation was (13) Latin America & Caribbean, with 51.0%, and the region with the lowest relative forestation was (14) Middle East & North Africa, with 1.8% forestation.

```

(12)
WITH together AS
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT region, per_forest_area
FROM (
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2) t2
WHERE year = '1990'
AND region = 'World'

(13)
WITH together AS
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT region, per_forest_area
FROM (
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2) t2
WHERE year = '1990'
ORDER BY per_forest_area DESC

```

LIMIT 1

(14)

WITH together AS

(

SELECT r.country\_name, r.region, f.year, f.forest\_area\_sqkm, l.total\_area\_sq\_mi \* 2.59 as land\_area\_sqkm

FROM forest\_area f

FULL JOIN land\_area l

ON f.country\_name = l.country\_name

AND f.year = l.year

JOIN regions r

ON r.country\_name = f.country\_name

)

SELECT region, per\_forest\_area

FROM (

SELECT region, year, SUM(forest\_area\_sqkm) AS region\_forest\_area, SUM(land\_area\_sqkm) AS region\_land\_area,  
SUM(forest\_area\_sqkm) / SUM(land\_area\_sqkm) \* 100 AS per\_forest\_area

FROM together

WHERE year = '1990' OR year = '2016'

GROUP BY 1,2) t2

WHERE year = '1990'

ORDER BY per\_forest\_area

LIMIT 1

Table 2.1: Percent Forest Area by Region, 1990 & 2016 (15):

region	percent forest area 1990	percent forest area 2016
Middle East & North Africa	1.78	2.07
South Asia	16.51	17.51
East Asia & Pacific	25.57	26.29
Sub-Saharan Africa	30.65	28.72
World	32.42	31.38
North America	35.65	36.04
Europe & Central Asia	37.29	38.04
Latin America & Caribbean	51.03	46.16

(15)

Create a table that shows the Regions and their percent forest area (sum of forest area divided by sum of land area) in 1990 and 2016. (Note that 1 sq mi = 2.59 sq km).

WITH together AS

```
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
)

SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2
```

region	year	region_forest_area	region_land_area	per_forest_area
South Asia	1990	789187.09961	4779833.0601	16.510767001421
Sub-Saharan Africa	1990	6408115.1999664	20905231.0761	30.6531660742679
Europe & Central Asia	1990	10190727.6023103	27331785.0484	37.2852617721975
South Asia	2016	835310.48464	4771604.0344	17.5058634081534
Sub-Saharan Africa	2016	6004842.9194454	20906201.057	28.7227837476231
Europe & Central Asia	2016	10428629.3073239	27414893.6159	38.0400137729353
Latin America & Caribbean	1990	10242341.7963048	20070780.4472	51.0311087466139
Latin America & Caribbean	2016	9250585.88413525	20038920.4428	46.1630950157247
North America	2016	6573934.063	18240983.9864	36.0393609681438
World	1990	41282694.9	127328467.4396	32.4222035575689
East Asia & Pacific	1990	6198242.8421379	24244229.9645	25.5658474251967
World	2016	39958245.9	127354641.4357	31.3755709643095
East Asia & Pacific	2016	6372286.3921158	24240928.4397	26.2873033430508
North America	1990	6507240	18252523.9904	35.6511790009015
Middle East & North Africa	1990	199292.595698698	11226230.0066	1.77524062469353
Middle East & North Africa	2016	232131.004009593	11223465.9845	2.06826486871501

(15)

WITH together AS

```
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 as land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
),
```

together\_per AS

```
(
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
```

```

WHERE year = '1990' OR year = '2016'
GROUP BY 1,2
ORDER BY 2
)

```

```

SELECT t1.region,
       ROUND(CAST(t1.per_forest_area AS NUMERIC), 2) AS per_f_1990,
       ROUND(CAST(t2.per_forest_area AS NUMERIC), 2) AS per_f_2016
FROM together_per t1
LEFT JOIN together_per t2
ON t1.region = t2.region
WHERE (t1.year = '1990' AND t2.year = '2016')
ORDER BY per_f_1990, per_f_2016

```

region	per_f_1990	per_f_2016
Middle East & North Africa	1.78	2.07
South Asia	16.51	17.51
East Asia & Pacific	25.57	26.29
Sub-Saharan Africa	30.65	28.72
World	32.42	31.38
North America	35.65	36.04
Europe & Central Asia	37.29	38.04
Latin America & Caribbean	51.03	46.16

The only regions of the world that decreased in percent forest area from 1990 to 2016 were (16) Latin America & Caribbean (dropped from (17) 51.03 % to (18) 46.16 %) and Sub-Saharan 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%.

```

(16), (17), (18)
WITH together AS
(
SELECT r.country_name, r.region, f.year, f.forest_area_sqkm, l.total_area_sq_mi * 2.59 AS land_area_sqkm
FROM forest_area f
FULL JOIN land_area l
ON f.country_name = l.country_name
AND f.year = l.year
JOIN regions r
ON r.country_name = f.country_name
),
together_per AS(
SELECT region, year, SUM(forest_area_sqkm) AS region_forest_area, SUM(land_area_sqkm) AS region_land_area,
SUM(forest_area_sqkm) / SUM(land_area_sqkm) * 100 AS per_forest_area
FROM together
WHERE year = '1990' OR year = '2016'
GROUP BY 1,2
ORDER BY 2
)

```

```

SELECT t1.region,
       ROUND(CAST(t1.per_forest_area AS NUMERIC) ,2) AS per_f_1990 ,
       ROUND(CAST(t2.per_forest_area AS NUMERIC) ,2) per_f_2016,
       ROUND(CAST(t2.per_forest_area AS NUMERIC) ,2) - ROUND(CAST(t1.per_forest_area AS NUMERIC) ,2) AS diff_2016_1990
FROM together_per t1
LEFT JOIN together_per t2
ON t1.region = t2.region
WHERE (t1.year = '1990' AND t2.year = '2016')
      AND ROUND(CAST(t2.per_forest_area AS NUMERIC) ,2) - ROUND(CAST(t1.per_forest_area AS NUMERIC) ,2) < 0
ORDER BY diff_2016_1990

```

### 3. COUNTRY-LEVEL DETAIL

#### A. SUCCESS STORIES

There is one particularly bright spot in the data at the country level, (19) China. This country actually increased in forest area from 1990 to 2016 by (20) 527229.06 km sq. 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 (21) United States, but it only saw an increase of (22) 79200.00 , much lower than the figure for (23) China.

(24) China and (25) 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. (26) Iceland increased in forest area by (27) 313.66 % from 1990 to 2016.

```

(19 - 25)
WITH forest_2016 AS
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '2016'
),

forest_1990 AS
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '1990'
),

forest_difference AS
(
  SELECT f1.country_name,
  f1.year as year1, f2.year as year2, f1.forest_area_sqkm as forest_area1, f2.forest_area_sqkm as forest_area2,
  (f2.forest_area_sqkm - f1.forest_area_sqkm) as difference
  FROM forest_2016 f2
  FULL JOIN forest_1990 f1
  ON f1.country_name = f2.country_name

```



```

WHERE (f2.forest_area_sqkm - f1.forest_area_sqkm) > 0
AND f1.country_name != 'World'
ORDER BY (f2.forest_area_sqkm - f1.forest_area_sqkm) DESC
LIMIT 5
),

abs_forest_diff AS
(
SELECT country_name,
        ROUND(CAST(ABS(difference) AS NUMERIC), 2) as absolute_forest_diff
FROM forest_difference
)

SELECT a.country_name, r.region, a.absolute_forest_diff
FROM abs_forest_diff a
LEFT JOIN regions r
ON a.country_name = r.country_name
ORDER BY a.absolute_forest_diff DESC

(26), (27)
WITH forest_2016 AS
(
SELECT country_name, year, forest_area_sqkm
FROM forest_area
WHERE year = '2016'
),

forest_1990 AS
(
SELECT country_name, year, forest_area_sqkm
FROM forest_area
WHERE year = '1990'
)

SELECT f1.country_name,
(f2.forest_area_sqkm / f1.forest_area_sqkm) * 100 as per_difference,
f2.forest_area_sqkm - f1.forest_area_sqkm as difference,
f2.forest_area_sqkm as area_2016, f1.forest_area_sqkm as area_1990
FROM forest_2016 f2
FULL JOIN forest_1990 f1
ON f1.country_name = f2.country_name
WHERE (f2.forest_area_sqkm - f1.forest_area_sqkm) > 0
AND f1.country_name != 'World'
ORDER BY (f2.forest_area_sqkm / f1.forest_area_sqkm) DESC
LIMIT 5

```

## 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 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 (28):

Country	Region	Absolute Forest Area Change
Brazil	Latin America & Caribbean	541510.00
Indonesia	East Asia & Pacific	282193.98
Myanmar	East Asia & Pacific	107234.00
Nigeria	Sub-Saharan Africa	106506.00
Tanzania	Sub-Saharan Africa	102320.00

(28)

WITH forest\_2016 AS

```
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '2016'
),
```

forest\_1990 AS

```
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '1990'
),
```

forest\_difference AS

```
(
  SELECT f1.country_name,
  f1.year as year1, f2.year as year2, f1.forest_area_sqkm as forest_area1, f2.forest_area_sqkm as forest_area2,
  (f2.forest_area_sqkm - f1.forest_area_sqkm) as difference
  FROM forest_2016 f2
  FULL JOIN forest_1990 f1
  ON f1.country_name = f2.country_name
  WHERE (f2.forest_area_sqkm - f1.forest_area_sqkm) < 0
  AND f1.country_name != 'World'
  ORDER BY (f2.forest_area_sqkm - f1.forest_area_sqkm)
  LIMIT 5
),
```

abs\_forest\_diff AS

```
(
  SELECT country_name,
  ROUND(CAST(ABS(difference) AS NUMERIC), 2) as absolute_forest_diff
  FROM forest_difference
)
```

```
SELECT a.country_name, r.region, a.absolute_forest_diff
FROM abs_forest_diff a
LEFT JOIN regions r
ON a.country_name = r.country_name
```

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 (29):

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

```
(29), (30), (31)
WITH forest_2016 AS
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '2016'
),

forest_1990 AS
(
  SELECT country_name, year, forest_area_sqkm
  FROM forest_area
  WHERE year = '1990'
),

forest_difference AS
(
  SELECT f1.country_name,
  f1.year as year1, f2.year as year2, f1.forest_area_sqkm as forest_area1, f2.forest_area_sqkm as forest_area2,
  (f2.forest_area_sqkm - f1.forest_area_sqkm) as difference,
  (1 - (f2.forest_area_sqkm / f1.forest_area_sqkm)) * 100 as per_difference
  FROM forest_2016 f2
  FULL JOIN forest_1990 f1
  ON f1.country_name = f2.country_name
  WHERE (f2.forest_area_sqkm - f1.forest_area_sqkm) < 0
  AND f1.country_name != 'World'
  ORDER BY (1 - (f2.forest_area_sqkm / f1.forest_area_sqkm)) * 100 DESC
  LIMIT 5
),

per_forest_diff AS
(
  SELECT country_name,
  ROUND(CAST(per_difference AS NUMERIC), 2) as per_difference
  FROM forest_difference
)
```

```

SELECT a.country_name, r.region, per_difference
FROM per_forest_diff a
LEFT JOIN regions r
ON a.country_name = r.country_name
ORDER BY per_difference DESC

```

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 (29) Sub-Saharan Africa. The countries are (30) 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 (31) 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 (32):

Quartile	Number of Countries
1 (0-25%)	85
2 (25-50%)	72
3 (50-75%)	38
4 (75-100%)	9

```

(32), (33)
WITH t1 AS(
SELECT 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) as deforest_per
FROM forest_area f
JOIN land_area l
ON f.country_code = l.country_code AND f.year = l.year
WHERE f.year = '2016' AND f.country_name != 'World' AND f.forest_area_sqkm IS NOT NULL AND l.total_area_sq_mi IS NOT NULL
),

t2 AS(
SELECT *,
CASE WHEN deforest_per >0.75 THEN 4
      WHEN deforest_per >0.5 THEN 3
      WHEN deforest_per >0.25 THEN 2

```

```
ELSE 1 END AS quarties
FROM t1)
```

```
SELECT quarties, COUNT(1)
FROM t2
GROUP BY 1
ORDER BY quarties
```

The largest number of countries in 2016 were found in the (32) first (0-25 %) quartile.

There were (33) 9 countries in the top quartile (75- 100%) 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 (34):

Country	Region	Pct Designated as Forest
Suriname	Latin America & Caribbean	0.982576939676578
Micronesia, Fed. Sts.	East Asia & Pacific	0.918572390715248
Gabon	Sub-Saharan Africa	0.900376418700565
Seychelles	Sub-Saharan Africa	0.884111367385789
Palau	East Asia & Pacific	0.876068085491204
American Samoa	East Asia & Pacific	0.875000875000875
Guyana	Latin America & Caribbean	0.839014489110682
Lao PDR	East Asia & Pacific	0.821082317640861
Solomon Islands	East Asia & Pacific	0.778635177945066

```
(34)
WITH t1 AS(
  SELECT 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) as forest_per,
  r.region
  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
  WHERE f.year = '2016' AND f.country_name != 'World' AND f.forest_area_sqkm IS NOT NULL AND l.total_area_sq_mi IS NOT NULL
),
t2 AS(
```

```

SELECT *,
CASE WHEN forest_per >0.75 THEN 4
      WHEN forest_per >0.5 THEN 3
      WHEN forest_per >0.25 THEN 2
      ELSE 1 END AS quartiles
FROM t1)

SELECT country_name, region, forest_per
FROM t2
WHERE quartiles = 4
ORDER BY forest_per DESC

```

## D. RECOMMENDATIONS

From 1990 to 2016 we saw an overall forest area decline - we lost 1324449 km sq of forest. On average a single m sq of forest takes 0.5 kg of CO<sub>2</sub> [1], therefore from 1990 to 2016 due to deforestation we failed to absorb 8.608918500 billion tonnes of CO<sub>2</sub>. In 2016 the global CO<sub>2</sub> emission (including land use) was 36.7 billion tonnes [2]. If the deforestation did not occur between 1990 and 2016, with the trees available we would have reduced the emission of the 2016's CO<sub>2</sub> by **only 23.4%** (while the emission of CO<sub>2</sub> in 1990-2015 would have stayed unchanged). Even though it would be easy to say that by stopping the forestation we can save the planet and reduce the emission of CO<sub>2</sub>, the data show the opposite. In order to stop the CO<sub>2</sub> emission we have to move to renewable sources of energy or hope for E.Musk to success in his new project of removing the CO<sub>2</sub> from the atmosphere trough the power of engineering [3].

[1] Carbon Storage and Accumulation in United States Forest Ecosystems United States Department of Agriculture (1992) [https://www.nrs.fs.fed.us/pubs/gtr/gtr\\_wo059.pdf](https://www.nrs.fs.fed.us/pubs/gtr/gtr_wo059.pdf). The amount of carbon taken up is given as 0.14 kg per square metre per year. To convert from weight of carbon to weight of CO<sub>2</sub>, we multiply by 3.67, to give 0.5 kg per square metre per year.

[2] The World Resource Institute's Climate Data Explorer [provides data](#) from CAIT on the breakdown of emissions by sector. In 2016, global CO<sub>2</sub> emissions (including land use) were 36.7 billion tonnes CO<sub>2</sub>; emissions from transport were 7.9 billion tonnes CO<sub>2</sub>. Transport therefore accounted for 7.9 / 36.7 = 21% of global emissions.

[3] <https://www.xprize.org/prizes/elonmusk>