

# **Analysis of the Effect of Forest and Land Areas on Global Temperature Change and Global Warming**

## **Introduction:**

The increase in global temperature and the increasing speed of climate change have raised many concerns in today's world. This project aims to understand how changes in forest and land cover affect global temperature changes and global warming. This report examines this question and the relationship between forest area and global temperature changes.

## **Used Data:**

To answer the main question of this project, two datasets provided by the International Monetary Fund are used.

### **Data source 1: Annual Surface Temperature Change**

- **Data URL:**  
[https://opendata.arcgis.com/datasets/4063314923d74187be9596f10d034914\\_0.csv](https://opendata.arcgis.com/datasets/4063314923d74187be9596f10d034914_0.csv)
- **Data Type:** CSV
- **Description:**  
This dataset represents annual estimates of mean surface temperature change from 1961 to 2021. It shows the temperature data for different countries presents in Degree Celsius.

### **Data source 2: Forest and Carbon**

- **Data URL:**  
[https://opendata.arcgis.com/datasets/66dad9817da847b385d3b2323ce1be57\\_0.csv](https://opendata.arcgis.com/datasets/66dad9817da847b385d3b2323ce1be57_0.csv)
- **Data Type:** CSV
- **Description:**

This dataset contains the data on land area, forest area, and carbon stocks in forests from 1992 to 2020. It includes six different indicators such as 'forest area', 'land area', 'carbon stock in forests', 'share of forest area', 'index of forest extent' and 'index of carbon stocks in forests'.

Both datasets are provided by the International Monetary Fund and are licensed under the Creative Commons BY-NC-SA 3.0 IGO license, which allows sharing and adaptation with attribution for non-commercial purposes.

## **Analysis:**

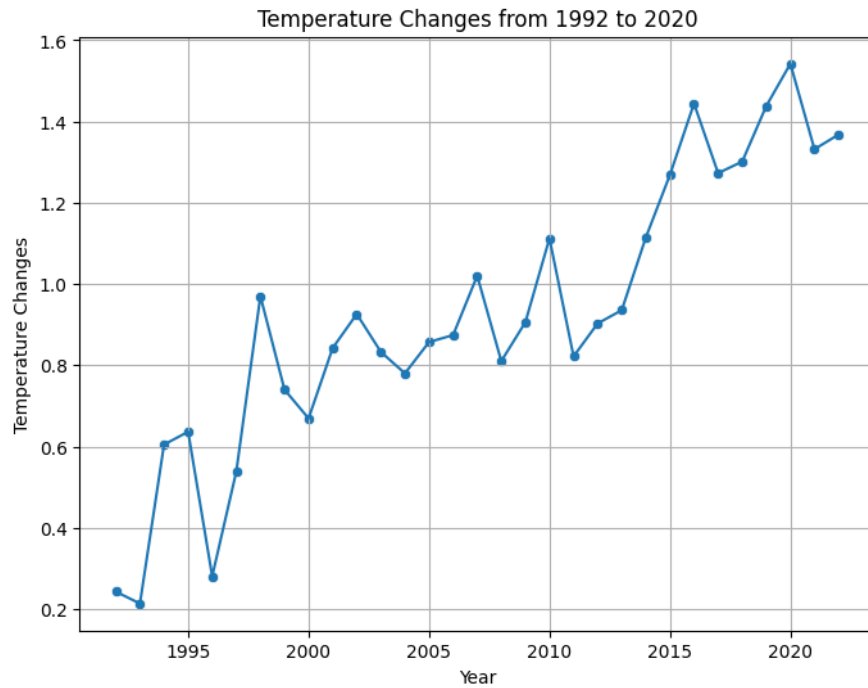
The analysis of this project was performed by an ETL data pipeline that included three main steps: Extraction, Transformation and Data Loading.

In the first step, to carry out this project, it is necessary to extract data. In such a way that the data is extracted from the mentioned sources and stored in the relevant data frames according to their indicators. Each data frame is related to specific indicator. The main data frames used to answer the main question of this project are the ones which include indicators related to temperature and forest area.

In the next step, the data is preprocessed using the preprocessor class written for this purpose. Using it, missing data were managed and additional and unnecessary columns were removed from the data set, and standardization techniques were also applied on the data. The datasets were then filtered using dataset merging to include only common countries in both datasets. To analyze the global temperature, then it is necessary to calculate the average global temperature as well as the forest area by year.

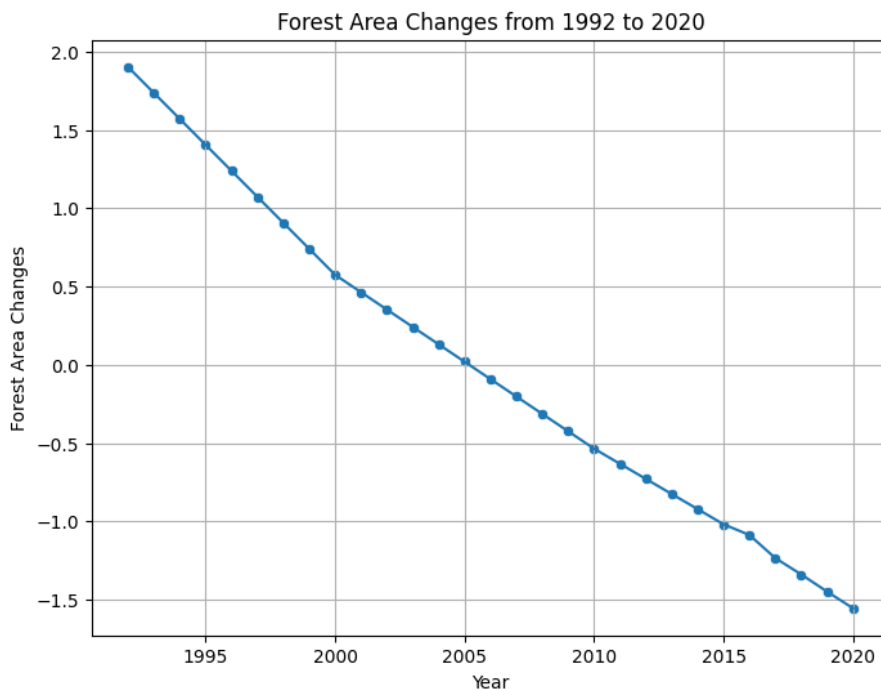
Now the data is ready for analysis and the relationship between the average annual change in the forest area and the average annual temperature changes can be seen by drawing related plots.

In the first figure below, it is obvious that the annual mean surface temperature has increased from the year 1992 to 2020 in a fluctuating manner, which indicates the global warming.



*Figure 1 - Temperature Changes from 1992 to 2020*

Also, by looking at the plot related to the changes in the level of forest area in the world, it can be seen that the average area of forest has decreased significantly from the year 1992 to 2020.



*Figure 2 - Forest Area Changes from 1992 to 2020*

From these two graphs, it is clear that there is a significant relationship between the changes in the annual mean surface temperature and the trend of deforestation.

## **Conclusions:**

By using the advanced method of data engineering and then analyzing the processed data, the main question and goal of this project can be answered.

By paying close attention to the graphs obtained above, the relationship between the changes in the mean surface temperature and the change in the area of forests can be understood. As it can be seen, with the decrease in forest area from 1992 to 2020, the global temperature has increased accordingly and caused Earth global warming. However, due to the fluctuating increase in the mean surface temperature over the years, it can be concluded that probably other factors have been influential in increasing the global temperature, and in this context, other influential factors can be investigated by collecting more data and wider analysis and research.

With the results obtained from this data analysis project, it is concluded that to fight against global warming and to reduce the climate change, more emphasis should be considered on preserving forest areas.