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IS GLOBAL DEFORESTATION REALLY THE MAIN CAUSE OF GLOBAL CLIMATE CHANGE?

By
PASPI Monitor

RESUME

Global deforestation is not a major contributor to global GHG emissions, so it is not a major contributor to global warming and global climate change. The share of deforestation is smaller compared to the share of fossil energy in the increase of global GHG emissions. Therefore, linking deforestation to international commodity trade with argument of controlling global climate change, as done by the European Union in RED II or EUDR, does not have a strong scientific basis and data.

INTRODUCTION

The issue of global deforestation is one of the topics used by developed countries to address developing countries. In fact, the issue of deforestation has been used by the European Union and the United States to hinder their trade with other countries.

The global trade in palm oil (and other tropical commodities) has been linked to deforestation. For example, the European Union with policies such as the Renewable Energy Directives policy phase two or RED II ([PASPI Monitor, 2019](#)) and the European Union Deforestation-free Regulation or EUDR ([PASPI Monitor, 2022](#), [2023^a](#), [2023^b](#), [2023^c](#), [2023^e](#)) linking palm oil with the issue of deforestation in international trade. The argument linking deforestation to international trade is because deforestation is considered the main cause of global warming and climate change. Is it true that global deforestation is the main cause of climate change?

Global climate change is the impact of global warming. The cause of global warming is the increase in Green House Gas (GHG) emissions in Earth's atmosphere. Thus, the link between deforestation and global climate change lies in how much deforestation contributes to global GHG emissions. Therefore, this article further discusses the correlation between global deforestation and the main cause of global climate change.

GLOBAL CLIMATE CHANGE AND ITS CAUSES

Global climate change is a direct impact of global warming through a mechanism called the greenhouse effect. The term greenhouse effect was adopted from sub-tropical agricultural greenhouse technology. To maintain a comfortable temperature for plant growth, plants are kept in a "house" of which the roof and walls are made of glass. Sunlight can still enter through the glass walls, but the reflected heat is trapped in the greenhouse and warms the room; hence, this mechanism has a greenhouse effect. With this greenhouse, the plants are isolated from the influence of cold air from outside so that the plants can grow optimally.

Naturally, Earth's atmosphere is filled with carbon dioxide (CO₂), methane (CH₄), nitrogen (N₂), and water vapor (H₂O) gases with certain natural concentrations. The function of greenhouse gases is to form a natural greenhouse effect mechanism to maintain comfortable living on planet Earth. With such a function, these gases are also called Greenhouse Gases (GHGs). In global measurements, various types of GHGs are measured as equivalent to carbon dioxide gas (CO₂ eq).

With the natural greenhouse effect mechanism in Earth's atmosphere (Figure 1), some of the sun's heat that enters Earth's atmosphere is trapped in Earth's atmosphere at a level sufficient to protect and maintain the temperature of Earth's atmosphere so that it is comfortable for life. Under normal/natural conditions, around 34 percent of the solar heat emitted by the sun is reflected into space by Earth's surface, clouds, and atmosphere. Meanwhile, 19 percent of it is absorbed by clouds and the atmosphere and the remaining 47 percent reaches Earth's surface.

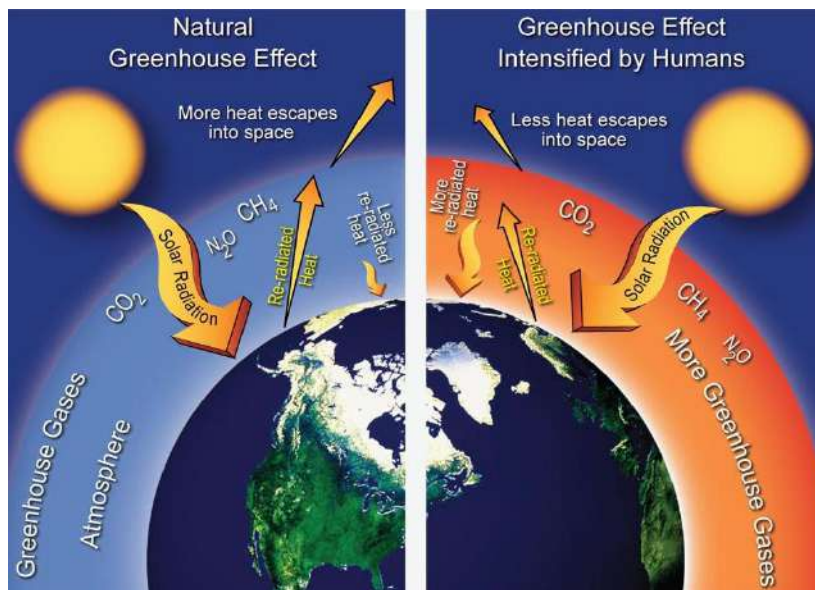


Figure 1. Mechanism of the Greenhouse Gas Effect in the Global Warming Phenomenon (Source: US Global Change Research Program)

When the GHG concentration in Earth's atmosphere increases, the intensity of the greenhouse effect in Earth's atmosphere also increases. IPCC (2018) revealed that the concentration of GHG emissions in Earth's atmosphere has increased from the pre-industrial period (1800s) to the present. CO₂ concentrations in Earth's atmosphere had increased from 280 ppmv (parts per million volume) in the 1800s to 407 ppmv in 2018 (IEA, 2013, 2016, 2019). The United States Aeronautics and Space Administration (NASA) also revealed that the concentration level of carbon dioxide (CO₂) in Earth's atmosphere in May 2022 had increased to 417.6 ppmv. This means that the GHG concentration in Earth's atmosphere has now increased above the natural GHG concentration of GHG in Earth's atmosphere in the pre-industrial era.

The increase in global GHG concentrations in Earth's atmosphere has increased the intensity of the greenhouse effect in Earth's atmosphere. As a result, more of the sun's heat is trapped in Earth's atmosphere and heats up Earth's air, which is known as global warming (PASPI, 2023; PASPI Monitor, 2023^d). In fact, currently a new terminology has emerged, namely "global boiling" which refers to conditions that are "hotter" than global warming. Global boiling is a continuation of global warming, where not only an increase in Earth's average temperature but also heat waves with significant frequency and severity occur (Amnuaylojaroen, 2023; Kamal, 2023). The increase in Earth's temperature, both in the global warming and global boiling phenomena, gives rise to various changes, anomalies and dynamics of Earth's global air/atmosphere which are then referred to as global climate change (PASPI, 2023).

Thus, it seems quite clear that the cause of world climate change is the increase in global GHG emissions in Earth's atmosphere, which exceeds its natural concentration. Therefore, what needs to be asked is which sector is the main contributor to global GHG emissions?

The significant increase in the concentration of GHG emissions in Earth's atmosphere is caused by human activities (IPCC, 2020) with the main contributor being the burning of fossil energy (Liu *et al.*, 2017; Mikhaylov *et al.*, 2020). Various empirical studies (IEA, 2016; Olivier *et al.*, 2022) also revealed the same thing, namely that the energy sector (fossil energy) is the main contributor to global GHG emissions (PASPI, 2023).

Even from the pre-industrial era to the present, the fossil energy combustion has contributed to the increase in global GHG emissions since the pre-industrial era to the present (Ritchie and Roser, 2017). Of the approximately 58.8 Gt CO₂ eq global GHG emissions, around 73 percent is contributed by emissions from fossil energy (Figure 2).

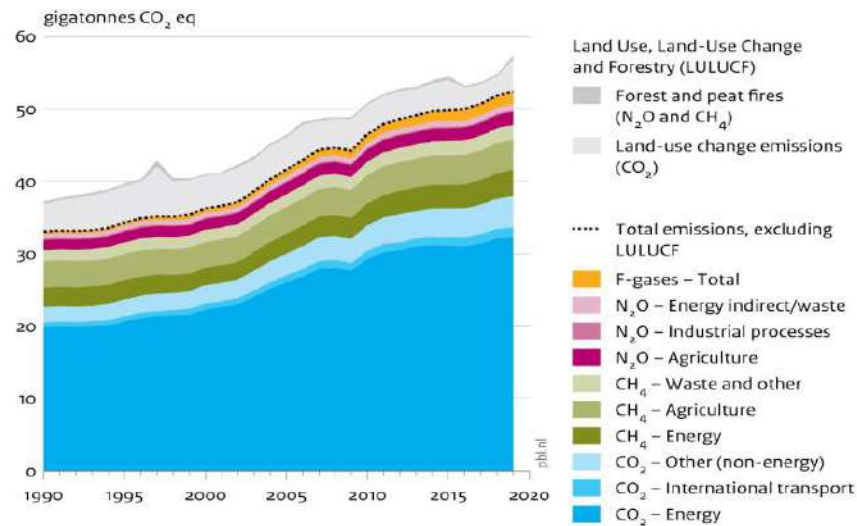


Figure 2. Contributors to global GHG emissions (Source: Oliver *et al.*, 2022)

Fossil energy that contribute to increasing global GHG emissions come from coal, petroleum, natural gas and methane (PASPI Monitor, 2023^f). In the period 2000-2022 (Figure 3), emissions from coal consumption almost doubled from only 8.9 Gt CO₂ eq to 15.5 Gt CO₂ eq. The contribution of emissions from petroleum (oil) also increased from 9.7 Gt CO₂ eq to 11.2 Gt CO₂ eq. Likewise, natural gas emissions increased from 4.6 Gt CO₂ eq to 7.3 Gt CO₂ eq in the same period. These three fossil energy sources contribute around 82 percent of fossil energy GHG emissions.

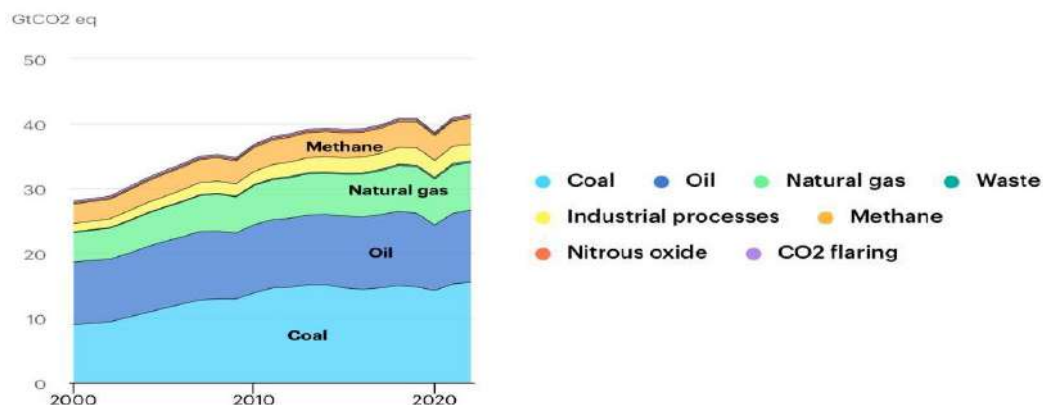


Figure 3. Contribution of Fossil Energy in Global GHGs for the Period 2000-2022 (Source: IEA, 2023)

In addition to fossil energy consumption, there are other sectors that contribute to the increase in global GHG emissions (Figure 2), namely the agricultural sector (16 percent) and Land Use Change Land Use Change Forestry/LULUCF (12 percent). This shows that the share of emissions from the agricultural sector and LULUCF is smaller than that of the energy sector. This means that reducing emissions in the agricultural sector and LULUCF will not have a large contribution if fossil energy emissions are not reduced significantly.

DEFORESTATION CONTRIBUTION TO GLOBAL EMISSIONS

The results of the Joint Research Center European Union study (Crippa *et al.*, 2023) revealed how global deforestation contributes to global GHG emissions (Figure 4). The contribution of deforestation, LULUCF, peatlands (organic soil), and forest and land fires are only around 16 percent of global GHGs with a decreasing trend from year to year. Of the total global GHGs, which is around 58.8 Gt CO₂ eq, the contribution of emissions from deforestation and global LULUCF is only around 7-9 Gt CO₂ eq.

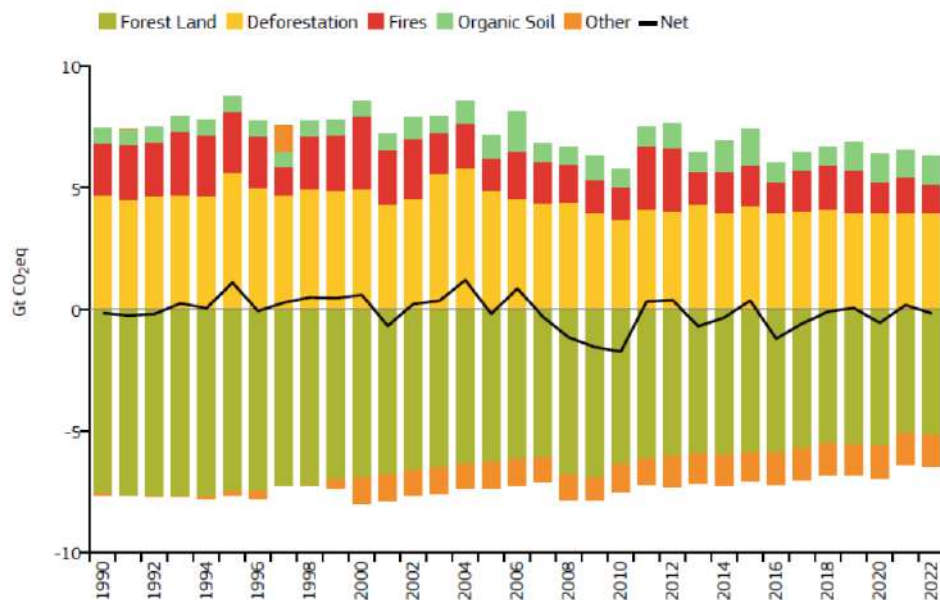


Figure 3. Contribution of Global Deforestation and LULUCF to Global GHG emissions (Source: Crippa *et al.*, 2023)

The interesting thing is that the forestry sector where deforestation, LULUCF, peatlands, and forest fires also absorb CO₂ (carbon sink) from Earth's atmosphere. Thus, on a net basis, it tends to be part of net zero emissions.

The empirical data also reveals that deforestation is not a major contributor to global GHGs. Its contribution to global GHGs is relatively small and is not a major contributor to global GHG emissions.

Meanwhile, the main contributor to global GHGs is fossil energy. Therefore, the fossil energy sector must be most responsible for the increase in global GHG emissions and its impact on global warming and global climate change.

Fossil energy producers should no longer finance multilateral NGOs to divert the issue of emissions and global warming or shift responsibility by blaming other sectors such as deforestation. Linking global deforestation with trade between countries with the aim of preventing global climate change is just making it up and does not have a strong basis. The link between fossil energy emissions and world trade should be more reasonable in the context of controlling global climate change.

If fossil energy GHG emissions can be reduced significantly, it will have a significant impact on reducing global GHG emissions. That being the case, global warming and global climate change can be reduced. As reminded by the IPCC (2023) "new warning from the scientific community to stop fossil fuels before it's too late". Before it is too late, the global community must be willing and strongly committed to reducing or even stopping the use of fossil energy.

CONCLUSION

Global deforestation is not a major contributor to global GHG emissions. This also shows that deforestation is not the main driver of global warming and global climate change. Therefore, linking

deforestation with international commodity trade with arguments for controlling global climate change as carried out by the European Union, does not have a strong scientific basis and data.

Around 73 percent of global GHG emissions are contributed by fossil energy. Consequently, what is most responsible for global warming and global climate change is fossil energy. This data provides a strong basis for linking fossil energy emissions with international trade with the aim of mitigating global climate change.

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