Donovan Singh
A0233022B

Deforestation, the longstanding challenge for Science and Society

Deforestation is a pressing environmental issue that has been unfolding on a massive scale for decades, and has led to widespread environmental degradation, loss of biodiversity, and even the displacement of indigenous communities. Globally, more than 50% of all deforestation (National Geographic, 2022) is attributed to farming, grazing of livestock, mining, and drilling. Climate scientists around the world note that deforestation is a key driver of climate change because it is responsible for the removal of trees, resulting in rising carbon dioxide levels, contributing to rising global temperatures (Dunne, 2018). According to the UN Food and Agriculture Organisation, between 1990 and 2020, around 420 million hectares of forests were lost, contributing to between 12 to 20% of global greenhouse gas emissions (Grantham Research Institute, 2023). Indeed, it sounds like a serious and urgent problem. But how did this problem begin?

To understand the history of deforestation, we must go back to the early days of human civilization. It is believed that cutting down trees played an essential role in human survival from the earliest days of our species. Early humans used wood to ignite fires, which provided warmth and protection from predators (Gowlett, 2016), and may have also used branches and leaves to construct shelters or create tools for hunting. When the First Agricultural Revolution began about 12,000 years ago, humans began transitioning from hunting to agriculture, which involved growing their own crops for food (Blakemore, 2019). This meant that trees and vegetation had to be cleared to create arable land for agricultural purposes, as well as to build shelters where humans have settled down. Over time, as human populations grew and technology advanced, the demand for wood and land increased, and trees were cleared on larger scales. Deforestation accelerated during the medieval period, which spanned from the 5th to the 15th century. During this time, the world saw an increase in urban populations, a rise in demand for food, and the invention of the metal saw. This in turn made it necessary and easier to clear forests to make way for land for increased agricultural activities (Williams, 2000). Not long later, deforestation was exacerbated by the process of urbanization that accompanied the Industrial Revolution, which began in the 18th century. This was because wood was needed to build steam engines, land was required for constructing rail stations and buildings, and paper was needed for work. Peoples' lives improved, they were able to make a living, and there was no reason to look back. It came as no surprise then that global deforestation peaked in the 1980s, where 151 million hectares of global tropical forests were lost, equivalent to an area half the size of India (Ritchie & Roser, 2021). Since then, deforestation became a convenient and practical process for facilitating many countries' economic development (Miller, 2016) and it gradually became very hard to reverse.

Initially, scientists and researchers had limited knowledge of the impacts of deforestation on climate change. However, scientific concerns began forming in the 17th century when British environmentalist John Evelyn published Sylva, or *A Discourse of Forest-Trees, and the Propagation of Timber*, under the newly established Royal Society (Evelyn, 1670). In his book, Evelyn argued that the massive growth of glassworks, iron industries and shipbuilding had threatened the forests of Britain. Such concerns, coupled with the environmental costs of deforestation, gradually established the domain for scientific study. During the 19th century, a growing number of scientists began to study the environmental impacts of deforestation. Some of the earliest studies in Europe and America linked the effects of extensive forest clearance to changes in water cycles such as lower rainfall and higher water evaporation rates (Deforestation in 19th Century Singapore, 2021). Furthermore, this was also the period where scientists Eunice Foote, John Tyndall, and Svante Arrhenius made significant progress in discovering how atmospheric carbon dioxide levels could increase the Earth's surface temperature through the greenhouse effect, thus contributing to global

warming (NASA, 2018). As deforestation released significant carbon dioxide greenhouse gas into the atmosphere, it was thought to be a significant contributor to climate change. Gradually, the negative impacts of deforestation became more widely recognized and scientists began to advocate for the conservation of forests, proper forest management practices, and reforestation efforts. They argue that safeguarding forests is not only crucial for their socioeconomic benefits, but also as carbon sinks to mitigate the effects of climate change.

However, despite the scientific community presenting compelling arguments, many locals were not immediately receptive to the idea of halting deforestation. More than 250 million people around the world live in forests and savannah areas depend on them for subsistence and income (FAO, 2020). To them, cutting down trees was a necessary means of survival, providing food, fuel, shelter, and a source of income through foreign exchange (Deforestation: The Human Costs, 2018). Furthermore, deforestation was a long-standing practice which has been deeply ingrained in their way of life for generations, so the thought of suddenly changing their livelihoods to accommodate the scientists was understandably disruptive. Yet, the science seemed credible, and the scientific community thought it was outrageous not to do anything to address the problem of deforestation and its impact on climate change. As a result, the topic of deforestation became a delicate and difficult issue to handle. On one hand, scientists were concerned about the environmental impact that deforestation had on climate change, and on the other, many locals were worried that halting deforestation could significantly impact their livelihoods.

Given the sensitivity and complexity of the issue, effective resolution required empathy and compromise among the stakeholders involved, including the local community, scientific community, governments, and international organisations. At the international level, the United Nations Reducing Emissions from Deforestation and forest Degradation (UN-REDD+) Programme has been a vital climate change mitigation solution developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC). Its primary objective was to reduce deforestation in developing countries by promoting the conservation and sustainable management of forests through the provision of financial incentives to encourage countries to reduce carbon emissions (UNFCCC, 2020). The UN-REDD+ Programme allows countries, the private sector, and multilateral funds to provide financial support to developing countries to preserve their forests. This financial assistance can be in the form of direct payments or through the exchange of "carbon credits," which are used to offset emissions made elsewhere. Costa Rica is one such country to receive payments from a World Bank trust fund for reducing up to 3.28 million tons of carbon emissions under the UN-REDD+ Programme (Costa Rica Receives First Emission Reduction Payment from Forest Carbon Partnership Facility, 2022). Since its inception, the UN-REDD+ Programme has supported over 65 partner countries in their nationally led efforts to reduce deforestation. As of today, these countries have submitted forest carbon emissions reductions equivalent to taking 150 million cars off the road for a year. (U.N. Environment, 2017). However, while international efforts have made strides towards mitigating deforestation, they tend to be less targeted and focused as an approach as compared to national efforts. Often, change requires not just the general provision of financial incentives, but also specific policies and laws tailored to that environmental context.

In Brazil, the Brazilian Forest Code was enacted to combat rapid deforestation in the Amazon Rainforest, one of the world’s largest tropical rainforests home to around 10% of the world’s biodiversity (The Nature Conservancy, 2019). This law aimed to preserve and sustainably manage the Amazon Rainforest by mandating that private landowners in ecologically sensitive areas keep around 80% of that land undeveloped, maintain between 35 to 80% of their property under native vegetation, and imposes penalties for non-compliance.

It also offers incentives for reforestation and restoration efforts, encouraging the adoption of sustainable practices. However, enforcement remains a challenge particularly in rural areas where illegal deforestation activities still occur, and some businesses have criticised the law as a barrier to Brazil's modernization and economic growth (Ro, 2023). Apart from Brazil, European countries have also taken several national efforts to combat deforestation to address climate change. One of the most significant initiatives is the EU Timber Regulation (EUTR), which prohibits the import of illegally harvested timber and wood products into the EU market (Timber Regulation, n.d.). The EUTR requires companies to carry out due diligence checks on their supply chains to ensure that the wood and wood products they sell are legally sourced. This regulation has helped to reduce demand for illegally harvested wood and wood products, which is a significant driver of deforestation in many countries. In Germany, the National Forest Strategy is its largest expenditure plan on the environment which aims to invest over 1.5 billion euros for forest repair and restructuring to increase the area of forest cover in the country and promote sustainable forest management practices by 2050 (2050 Strategy Aims to Make Germany's Forests Resilient to Warming Climate, 2021).

Besides Europe, deforestation is also major issue in Southeast Asia, where some of the most biodiverse tropical rainforests on the planet are disappearing at an alarming rate due to unsustainable land use practices such as illegal logging and land clearance for agriculture. To combat this problem, there have been regional efforts such as those by the Association of Southeast Asian Nations (ASEAN). One of ASEAN's efforts to combat deforestation is the ASEAN Agreement on Transboundary Haze Pollution, signed in 2002. The agreement aims to control transboundary haze pollution caused by forest fires that often result from unsustainable land use practices. It requires ASEAN member states to take preventive measures, share information and technology, and establish a monitoring system to identify and respond to forest fires that contribute to transboundary haze pollution (ASEAN Agreement on Transboundary Haze Pollution – ASEAN Haze Portal, n.d.). Another of ASEAN's effort is the ASEAN Working Group on Forest and Climate Change (AWG-FCC), which was established in 2009. The group aims to promote regional cooperation and address the challenges of deforestation and climate change in Southeast Asia. It works towards combating deforestation through various measures, including promoting sustainable forest management, enhancing forest law enforcement and governance, developing forest-related policies, and supporting forest rehabilitation and restoration efforts. The AWG-FCC also collaborates with other regional and international organizations to promote sustainable land use (ASEAN Forestry Cooperation, n.d.). However, while regional efforts aimed at reducing deforestation rates have shown some positive results, enforcement of these agreements continues to be difficult, particularly in rural areas due to accessibility and evasion. Additionally, there are also critics who contend that addressing the underlying causes of deforestation, such as the demand for agricultural products like palm oil, should be of higher priority and necessitates more action.

Deforestation is a longstanding, complex issue that lies at the intersection of science and society. On one hand, scientific evidence shows that the protection and preservation of forests is crucial in the fight against climate change. On the other hand, society is often driven by competing interests and pressures, such as the need for economic development and basic survival. Therefore, balancing these interests requires careful consideration, empathy, and thoughtfulness in the design and enactment of laws and policies targeted at reducing deforestation. It is only through collaborative efforts between both science and society that we can create a more sustainable and liveable world not just for ourselves but for future generations as well. (1884 words)

References

Nunez, C. (2022, December 7). Deforestation and Its Effect on the Planet. *National Geographic*. https://www.nationalgeographic.com/environment/article/deforestation

Dunne, D. (2018, April 23). Deforestation has driven up hottest day temperatures, study says. *Carbon Brief*. https://www.carbonbrief.org/deforestation-has-driven-up-hottest-day-temperatures

Grantham Research Institute. (2023, February 10). What is the role of deforestation in climate change and how can "Reducing Emissions from Deforestation and Degradation" (REDD+) help? *Grantham Research Institute on Climate Change and the Environment*. https://www.lse.ac.uk/granthaminstitute/explainers/whats-redd-and-will-it-help-tackle-climate-change

Gowlett, J. A. J. (2016). The discovery of fire by humans: a long and convoluted process. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), 20150164. https://doi.org/10.1098/rstb.2015.0164

Blakemore, E. (2019, April 5). What was the Neolithic Revolution? *National Geographic*. https://www.nationalgeographic.com/culture/article/neolithic-agricultural-revolution

Williams, M. (2000). Dark ages and dark areas: global deforestation in the deep past. *Journal of Historical Geography*, 26(1), 28–46. https://doi.org/10.1006/jhge.1999.0189

Ritchie, H., & Roser, M. (2021). Deforestation and Forest Loss. *Our World in Data*. https://ourworldindata.org/deforestation

Miller, K. (2016, March 25). 16 Advantages and Disadvantages of Important Deforestation. *FutureofWorking*. https://futureofworking.com/16-advantages-and-disadvantages-of-important-deforestation

Evelyn, J. (1670). *Sylva, Or, A Discourse of Forest-trees, and the Propagation of Timber in His Majesties Dominions*.

Deforestation in 19th-century Singapore. (2021, April 1). *BiblioAsia National Library Board*. https://biblioasia.nlb.gov.sg/vol-17/issue-1/apr-jun-2021/deforestation

NASA. (2018, September 21). Climate Change Evidence: How Do We Know? Climate Change: Vital Signs of the Planet. *National Aeronautics and Space Administration*. https://climate.nasa.gov/evidence

FAO. (2020). The State of the World's Forests 2020. *Food and Agriculture Organisation of the United Nations*. https://www.fao.org/state-of-forests/en

Deforestation: The Human Costs. (2018). *Culturalsurvival.org*. https://www.culturalsurvival.org/publications/cultural-survival-quarterly/deforestation-human-costs

UNFCCC. (2020). *What is REDD+?* Unfccc.int. https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd

Costa Rica Receives First Emission Reductions Payment from Forest Carbon Partnership Facility. (2022). World Bank. https://www.worldbank.org/en/news/press-release/2022/08/16/-costa-rica-receives-first-emission-reductions-payment-from-forest-carbon-partnership-facility

Environment, U. N. (2017, September 14). *REDD+*. UNEP - UN Environment Programme. https://www.unep.org/explore-topics/climate-action/what-we-do/redd

The Nature Conservancy. (2019). Brazilian Amazon: The Forest Code. *Nature.org*. https://www.nature.org/en-us/about-us/where-we-work/latin-america/brazil/stories-in-brazil/brazils-forest-code

Ro, C. (2023). Brazil Already Has Its Best Tool Against Deforestation. *Forbes*. Retrieved 1 April 2023 from https://www.forbes.com/sites/christinero/2023/01/06/brazil-already-has-its-best-tool-against-deforestation

Timber regulation. (n.d.). *Environment.ec.europa.eu*. https://environment.ec.europa.eu/topics/forests/deforestation/illegal-logging/timber-regulation_en

2050 strategy aims to make Germany's forests resilient to warming climate. (2021, September 7). *Clean Energy Wire*. https://www.cleanenergywire.org/news/2050-strategy-aims-make-germanys-forests-resilient-warming-climate

ASEAN Agreement on Transboundary Haze Pollution – ASEAN Haze Portal. (n.d.). *Hazeportal.asean.org*. Retrieved 1 April 2023 from https://hazeportal.asean.org/action/asean-agreement-on-transboundary-haze-pollution

ASEAN Forestry Cooperation (n.d.). ASEAN. https://asean.org/our-communities/economic-community/enhanced-connectivity-and-sectoral-development/asean-food-agriculture-and-forestry/forestry-cooperation/