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Analysis of Legal Protection of the Nature of the Archipelago: Related to the Impact of Global Warming Studied from the Perspective of Sociology

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ABSTRACT
Global Warming is an urgent environmental crisis that demands serious attention worldwide. The worsening climate change has triggered this research, which aims to explore the complex relationship between societal ethics and the growing impacts of climate change. It applies an inclusive research method, combining in-depth literature analysis with careful case studies, to gain a deeper understanding of the ethical implications of global warming. The results of this study confirm the important role of ethics in shaping environmental policy and guiding individual behavior in the face of climate change challenges. In addition, the results deepen understanding of the looming impacts of climate change on depleting natural resources, serious threats to public health, and increasing social inequality. As part of the solution to the climate change challenge, the research emphasizes the importance of collective consciousness among the global community and strong social responsibility in reducing carbon emissions and mitigating environmental impacts.

Keywords: Legal Protection, Nature of the Archipelago, Impact Related, Global Warming, Sociological Perspective

I. Introduction

Indonesia is a country rich in nature, and the potential of its natural wealth is extraordinary, including biological and non-biological natural resources. Natural wealth ranging from marine, land, earth, and other wealth contained in the beloved Indonesian earth known as the archipelago, when viewed geographically, from Sabang to Merauke, there are many islands in Indonesia (Surtani, 2015). Consisting of 17,508 islands, it has a land area of 1.9 million km2, a coastline of 80,791 km, and a sea coverage of 3.1 million km2. The country also has no less than 200 volcanoes, ranging in size from low to high, wide and long rivers, and lakes of varying nature. This situation provides various natural habitat environments for plants, animals, and microbes. The system of reciprocal relationships between the physical/chemical environment and plants, animals, or microbes is known as a natural ecosystem. Indonesia is estimated to have no less than 47 types of natural ecosystems. Regarding plant, animal, and microbial species richness, 28,000 plant species, 350,000 animal species, and 10,000 microbial species are believed to live naturally in Indonesia. Indonesia's land area, which is only 1.32% of the total land area on earth, is the habitat of 10% of flowering plants, 12% of lactating animals,

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16% of reptiles and amphibians, 17% of birds, 25% of fish, and 15% of insects in the world(Tia Putri Maharani, Prangky Arikyanto Tahik, Agung Muhamad Qa'bah Budiman, 2023).

Thus, the link between Indonesia's natural wealth and global warming is strong. While Indonesia's natural wealth offers excellent potential for climate change mitigation, poor management and overexploitation accelerate environmental degradation and exacerbate the climate crisis. Global warming refers to the increase in the average temperature of the Earth's atmosphere, oceans, and land due to the greenhouse effect. This phenomenon is caused by the accumulation of greenhouse gases, such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), which are trapped in the atmosphere and prevent heat from the Earth from reflecting into space. The increase in emissions of these gases comes mainly from society's activities, including burning fossil fuels, deforestation, and using certain chemicals, from which several impacts will occur(Riyanto, 2007).

The impacts of global warming are far-reaching, including extreme climate change, sea level rise, and ecosystem disruption. Drastic temperature changes can trigger natural disasters like floods, droughts, and forest fires. In addition, global warming also has the potential to threaten food security and public health. Therefore, a deep understanding of the causes and impacts of global warming is essential to formulate effective mitigation strategies for the sustainability of the environment and life (Ainurrohmah & Sudarti, 2022). In this context, sociological analysis is crucial in understanding the interaction between people's social behavior and environmental conditions. Environmental sociology, as a field of study that focuses on the reciprocal relationship between people's social behavior and environmental conditions, can help understand how social norms, values, and structures influence the management of the archipelago's natural resources.

The leading cause of this warming is burning fossil fuels, such as oil, natural gas, and coal, which release carbon dioxide (CO2) and other greenhouse gases into the atmosphere. It is estimated that 18.35 billion tons of carbon dioxide, or 18,350,000,000,000 kg of carbon dioxide (CO2), are released yearly. As the atmosphere becomes richer in these greenhouse gases, it becomes an insulator that retains more heat from the sun that is radiated to the earth, which is called the greenhouse effect. The greenhouse gases (GHGs) are substances that are transparent to short-wavelength solar radiation (ultraviolet), and absorb the long-wavelength infrared radiation from the sun that the Earth reflects into the atmosphere. As a result of the trapping of hot infrared radiation by substances called GHGs, the Earth's temperature rises and is hotter than usual. This occurrence process is scientifically referred to as global warming and can have complex consequences on the world climate system and the archipelago's climate (Defa Hakim & Hayqal Rafi Khamid, 2024).

A further cause of global warming is deforestation, which is the massive forest removal process that significantly impacts the environment and human life. Climate change has already had a significant impact on ecosystems in Indonesia. Rising global temperatures, changing rainfall patterns, and increased frequency of natural disasters such as floods, droughts, and storms have disrupted the balance of ecosystems. Tropical rainforests, which are rich in biodiversity, are being destroyed, and there has been an increase in the frequency of natural disasters such as floods, droughts, and storms. The average air temperature in Indonesia has increased by about 0.5-1 degrees Celsius compared to the previous decade, with the highest temperature anomalies recorded in 2021, 2022, and 2023(Wahyuni & Suranto, 2021). From the above statement regarding several factors that cause global warming in the archipelago, we need to have a sense of alertness to global warming, which is one of the main challenges faced by the world community today. This phenomenon not only causes unstable climate change but also has a significant impact on ecosystems and human life. Legal protection of the archipelago's nature is critical in Indonesia, which is known as the "archipelago" and has abundant natural resources.

Environmental damage caused by human efforts to fulfill unlimited needs has long been a concern of environmentalists. Long before the problem of global warming which has an impact on climate change received serious attention from the international community, an expert environmentalist Garrett Hardin in his writing entitled "The Tragedy of the Commons" (1968) warned that if the exploitation of natural resources, both on land and in the oceans, has exceeded its carrying capacity sustainably and sustainably, sooner or later

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it will destroy the natural environment which is a common property or common heritage of humanity (Yanuarsi, 2019).

The concept of legal protection of the archipelago's nature, rooted in local wisdom values, offers a unique perspective in facing the challenges of climate change. Values such as cooperation, deliberation, and balance between humans and nature are highly relevant in the context of climate change adaptation and mitigation. However, implementing the archipelago's natural law often faces various challenges, including threats to biodiversity, ecosystem damage, and increased risk of natural disasters. In this context, legal protection of the archipelago's nature is becoming increasingly urgent. Due to the lack of public awareness (Subhani, Hadi, Agustina, & Murdi, 2024). Observing the impact of climate change that has threatened the safety of living things on earth, prompted the emergence of the climate change convention or UNFCCC (United Nation Framework Climate Change Convention)1 which agreed on efforts to reduce emissions in a monumental agreement on climate change mitigation called the "Kyoto Protocol." (W. S. Nugroho, Ismail, & Hariz, 2018).

The Kyoto Protocol initiated the emergence of various Cop of the Parties that oversaw emission reduction efforts. Referring to the IPCC (Intergovernmental Panel on Climate Change) findings, one-fifth of carbon emissions are from land use activities, deforestation, and forest degradation (Muhamad Iqbal & Ruhaeni, 2022). The IPCC findings eventually initiated a monumental agreement on global climate change called the Bali Action Plan. Until now, the Bali Action Plan has become the primary reference for all parties in negotiating climate change, for current interests until 2020 and until 2050. The core of the Bali Road Map agreement is the approval of an incentive policy mechanism in climate change mitigation through the Reducing Emissions from Deforestation and Forest Degradation (REDD) scheme(W. S. Nugroho et al., 2018). To anticipate that the environmental impact is not too severe and does not endanger the next generation, it is necessary to have rules that regulate it and enforce them on everyone who violates the laws and regulations. To anticipate this, in Indonesia there have been many legal provisions governing environmental protection, namely Law No. 18 of 2008 concerning Waste Management, Law No. 19 of 2009 concerning Ratification of the Stockholm Convention on Persistent Organics Pollutants, Law No. 32 of 2009 concerning Environmental Protection and Management(Defa Hakim & Hayqal Rafi Khamid, 2024).

Environmental protection and management based on Article 1 point (2) Law Number 32 of 2009 concerning Environmental Protection and Management (UUPPLH) is a systematic and integrated effort carried out to preserve environmental functions and prevent pollution and/or environmental damage which includes planning, utilization, control, maintenance, supervision, and law enforcement (Thani, 2016). Environmental impact control is an effort to take supervisory action against an activity carried out by everyone, especially companies that have a significant environmental impact. In this case, environmental impact is the effect of environmental changes caused by a business or activity. Therefore, environmental protection and management efforts are an obligation for the state, government, and all stakeholders in the implementation of sustainable development so that the Indonesian environment can remain a source and support of life for the Indonesian people and other living things, the provisions of Article 1 point (3) of Law Number 32 of 2009 concerning Environmental Protection and Management, stipulates that sustainable development is a conscious and planned effort that integrates environmental, social and economic aspects into development strategies to ensure the integrity of the environment as well as the safety, ability, welfare and quality of life of present and future generations (Aditya, 2019). Environmental management yields economic, social, and cultural advantages and must be conducted by prudence, environmental democracy, decentralization, and acknowledgment and respect for local and environmental wisdom (Ma'Ruf, 2021; Nofita, 2021). Consequently, Indonesia's environment must be safeguarded and effectively managed based on state responsibility, sustainability, and justice (Salim & Palullungan, 2021; Saputra, Usada, & Islam, 2024).

Various academic studies have reviewed the issue of law enforcement and the impact of climate change caused by the exploitation of natural resources and environmental pollution in Indonesia. One is research conducted by Hidayat et al. (2021) on " Law Enforcement Against Environmental Pollution Due to Industrial Hazardous and Toxic Waste about Law No. 32 of 2009 Concerning Environmental Protection and

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Management". This research uses a normative juridical approach and examines the application of Law Number 32 of 2009 concerning Environmental Protection and Management. The study highlights weak government supervision and the lack of strict sanctions against environmental violators as the main pollution factors, as seen in the case of pollution of the Barugbug Reservoir in Karawang by factories in Subang and Purwakarta. The research underlines that regulations alone are insufficient without adequate law enforcement and collective public awareness in environmental conservation. The strength of this research is its focus on concrete regulative aspects, but its weakness lies in the lack of a multidisciplinary approach in linking social and ecological aspects (Zola et al., 2023).

Meanwhile, research by Nugroho et al. (2023) on " Building Community Legal Awareness in the Struggle for Mining Environmental Justice in Trenggalek Regency" highlighted the dynamics of social conflicts that arose due to community rejection of the PT Sumber Mineral Nusantara (SMN) gold mine. This research emphasises that environmental damage, threatened agricultural land, and unclear legal information are the primary conflict factors. The approach used is qualitative with a case study. The research emphasises the importance of legal advocacy and community education on environmental rights as a form of community empowerment against the impacts of natural resource exploitation. The strength of this research lies in efforts to bridge legal aspects with the local socio-political context. However, it is still weak in exploring criminal law enforcement mechanisms against mining companies that do not comply with regulations (T. Nugroho, Maulana, Cakraningrat, & Ratnasari, 2023). Further research was conducted by Lubis (2022) with a focus on " Sociology of Law: Mitigating the Impact of Global Warming as a Role Model for Natural Resource Conservation at Tambling Wildlife Nature Conservation (TWNC)". As a response to environmental degradation, Lubis raised the Tambing Wildlife Nature Conservation (TWNC) conservation model based on ecotourism and community participation. This research highlights the importance of a holistic approach involving the government, community, and private sector in environmental conservation. The strength lies in the integrative idea between conservation and the local economy. However, the weakness is the lack of legal evaluation of the sustainability of the conservation programme in terms of formal regulations (Lubis, 2022).

Overall, the three studies contribute significantly to understanding Indonesia's environmental degradation's complexity from legal, social, and ecological perspectives. Hidayat et al.'s research asserts the importance of strict implementation of environmental law; Nugroho et al.'s research broadens the scope by analysing social conflicts due to exploitation of natural resources; while Lubis' research offers solutions based on conservation and community participation. These studies become an important foothold for the author to formulate a more integrative legal study, not only limited to regulations and sanctions, but also including participatory, preventive, and collaborative aspects across sectors. Strong and collaborative law enforcement is urgently needed to achieve the Sustainable Development Goals in the increasingly evident context of climate change and environmental degradation. Thus, the purpose of this research is to examine the legal protection of the environment in Indonesia in the context of global warming through a sociological approach, by highlighting the role of society in supporting and strengthening efforts to preserve the environment sustainably.

II. Literature Review and Hypothesis Development

Climate change is one of the most significant challenges humanity faces today. The increasingly evident phenomenon of global warming has triggered various negative impacts on the environment and human life. To fully understand the complexity of this issue, we must consider the contributions of experts who have dedicated themselves to researching and analyzing climate change. Scientists play a crucial role in providing a comprehensive understanding of the issue. Through rigorous research and in-depth data analysis, they have supplied strong evidence regarding the causes and consequences of climate change. This knowledge is essential for developing effective policies and mitigation strategies.

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a. Svante Arrhenius: A Swedish scientist who, in the late 19th century, first proposed the theory that increasing carbon dioxide concentrations in the atmosphere could lead to a rise in global temperatures.
b. Charles David Keeling: An American scientist famous for the Keeling Curve, a graph that tracks increased atmospheric carbon dioxide concentrations since 1958.
c. James Hansen: A NASA climatologist who, in 1988, testified before the U.S. Congress, presenting strong evidence of global warming caused by human activity. His testimony marked a turning point in public awareness of the issue.
d. Michael Mann: A climatologist renowned for the "Hockey Stick Graph," which illustrates the sharp rise in global temperatures over recent decades.
e. Rajendra Pachauri: An Indian scientist who served as the chairman of the Intergovernmental Panel on Climate Change (IPCC), a UN body responsible for evaluating the risks of climate change.
f. Katharine Hayhoe: An American climate scientist known for her work in climate science communication and advocating for behavior change to address climate change.

III. Research Method

This research uses normative juridical qualitative methods with sociological analysis. This approach is suitable for exploring an in-depth understanding of global warming in the context of legal protection of the archipelago's nature. This type of research can be categorized as legal sociology research. The focus is on studying how social norms, cultural values, and legal policies play a role in efforts to mitigate climate change and protect nature. Primary Data: In-depth interviews with stakeholders such as legal experts, sociologists, and environmental experts. Direct observations of affected areas can also be made to obtain empirical data related to nature protection and the impacts of global warming. Secondary Data: Literature review of environment-related laws and regulations in Indonesia, such as Law No. 32 of 2009 on Environmental Protection and Management. References from journals, books, and articles that discuss related topics will also support the analysis. In-depth Interviews: Aim to understand the views of experts and the public regarding the effectiveness of legal policies in protecting the archipelago's nature. Documentation Study: Analyzing policy documents, legal regulations, and previous research results that address climate change and environmental management in Indonesia. The analysis method used to evaluate qualitative data from interviews and documentation focuses on the relationship between legal policies, social norms, and environmental conditions. Data validation was conducted using source triangulation and method triangulation techniques, confirming data from different sources and methods to ensure the accuracy and reliability of the research results. This research method is expected to provide a comprehensive understanding of the effectiveness of the law in protecting the archipelago's nature and identify the obstacles to its implementation.

IV. Results and Discussion

Climate change, often called Global Warming, is one of the world's most pressing challenges today. In recent decades, we have all witnessed an alarming rise in global temperatures, changes in extreme weather patterns, and increasingly pronounced impacts on the environment and society. These impacts stimulate questions about the role of societal ethics in dealing with this environmental crisis, which is the crux of this research. Climate change has reached a crisis level that requires deep attention. Recent research shows a faster-than-expected increase in global temperatures, with serious consequences such as ecosystem damage, rising sea levels, and threats to the availability of natural resources (Maharani, Tahik, Budiman, & Maulida, 2022). The sociological perspective is a unique and distinctive way of understanding various phenomena that occur in society. Let us look at the world through the lens of sociology. We will try to dig deeper into the root

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causes of a problem, how social interactions shape individual behavior, and how social structures affect our daily lives.

Indonesian forests are the world's lungs that contribute oxygen needed by living things, and can absorb carbon dioxide ($CO2$) (Shafitri et al., 2018). Forests are natural resources that have a role in life, the economy, society, culture, and the environment. If forests begin to disappear, the Earth will get warmer because the Earth is no longer balanced, leading to an increase in carbon dioxide ($CO2$) and a reduction in forests. Forests in Indonesia are starting to decrease due to several factors, such as forest fires. Almost every year, Indonesia experiences forest fires; in 2015, there were 1.7 million hectares burned. Global warming is the long-term global average temperature increase (Andarini & Sudarti, 2023).

Global climate change is a change in global and regional climate patterns from the middle to the end of the 20th century. It is related to the increase in carbon dioxide ($CO2$) levels in the atmosphere due to the use of fossil fuels. People have a negative view of global warming rather than climate change. The negative views are conveyed in the form of descriptions. The volume of global warming is more than climate change. Global warming is an increase in the Earth's oceans, land, and atmosphere temperature. Climate change is a long-term change in a region's global or average weather. In the last ten years, industrial and human activities have caused a gradual acceleration of climate change, increasing the average surface temperature every year. Climate change has obvious negative impacts, such as ecosystem change and desertification, rising sea levels, flooding, and drought (Setiani, 2020). Global warming is a serious threat that will significantly impact nature, including society. However, it is also caused by increased human activity, especially in the industrial and transport sectors. The use of fossil fuels such as oil, coal and natural gas causes the release of greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFCs) resulting from the combustion of fossil fuels, motor vehicles, industrial waste, and the use of air conditioners and refrigerators. These gases form a layer that traps the sun's heat, causing the greenhouse effect and drastically raising the Earth's temperature, resulting in global warming (Dhea, Mardhatillah, & Jingga, 2022).

Greenhouse gases from factories, vehicles, and human activities accumulate in the atmosphere, causing the sun's heat energy to be trapped in the Earth's atmosphere and causing an increase in the Earth's temperature (Kholida Qothrunnada, 2024). There are six types of greenhouse gases, namely carbon dioxide, nitrogen oxides, chlorofluorocarbons, and hydrofluorocarbons. These gases are naturally present in the air (atmosphere). These gases are similar to glass in a greenhouse; the higher the amount of these gases in the Earth's atmosphere, the greater the heat effect on the Earth's surface. The effect is necessary for all life on Earth. If there were no effect, the temperature on Earth would be cold around -18 °C, and the Earth's surface would be covered with ice. The global temperature range is 15°C, but the greenhouse effect warms the planet to 33°C. However, when these gases become too much in the atmosphere, the opposite happens, causing global warming. Global climate change due to global warming can cause instability in the lower layers of the atmosphere near the Earth's surface. The main factor causing global warming is increased gas emissions from industrial activities (Wunanto, 2021).

The greenhouse effect, by nature, actually functions to keep the Earth's temperature stable. However, the increase in artificial greenhouse gas emissions has caused an excessive greenhouse effect, which traps the sun's heat in extremes and disrupts the balance of the Earth's climate. In Indonesia alone, the tangible impacts are increased floods, landslides, and droughts. The Ministry of Environment and Forestry (MoEF) reported 329 hotspots across Indonesia from the fourth week of April to early May 2025, with the highest concentration in West Kalimantan. This data confirms the direct link between human activities, such as land burning, and the release of greenhouse gas emissions into the atmosphere, exacerbating the greenhouse effect and triggering climate anomalies that are increasingly difficult to control (Fadhlurrahman, 2025).

The transport and energy sectors are among the most significant contributors to greenhouse gas emissions. According to data from the Ministry of Energy and Mineral Resources in 2024, more than 40% of national carbon emissions come from fuel combustion in motor vehicles and coal-based power plants. In Indonesia, the 11 million vehicles on the road produce more than 35 million tonnes of CO2 emissions, while trucks emit more than 50 million tonnes. One of the concrete events that can currently be seen is the air quality

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of Jakarta, which is included in the category of unhealthy and unfit for life, even some international media highlight the Indonesian capital as the 3rd most polluted city in the world (Adi, 2024; Iblam, 2023) In the legal context, Indonesia has several regulations that form the basis and regulate the control of the impact of global warming, one of which is Law No. 32 of 2009 concerning Environmental Protection and Management. Article 3 letter d explicitly explains that the purpose of the environment is to "ensure the survival of living things and the preservation of ecosystems". Furthermore, in Article 69 paragraph (1) letter a, it has also been explained that every person is prohibited from carrying out actions that result in pollution and/or destruction of the environment. In addition, with Indonesia's ratification of the Paris Agreement to the UNFCCC, based on the principle of pacta sunt servanda, Indonesia is legally bound to implement the provisions of the agreement. The principle of Common but Differentiated Responsibilities (CBDR) affirms that all countries have responsibilities in combating climate change, but adjusted to their respective capacities and conditions. As a form of implementation, Indonesia established a Nationally Determined Contribution (NDC), a national commitment to reduce greenhouse gas emissions. Indonesia's first NDC was submitted to the UNFCCC Secretariat in November 2016, with a target of reducing emissions by 29% through its efforts and up to 41% with international support by 2030. This commitment covers five main sectors, namely forestry (17.2%), energy (11%), agriculture (0.32%), industry (0.10%), as well as waste (0.38%) (Sofia, 2019).

This commitment was strengthened through ratifying the Paris Agreement in Law No. 16/2016, which made emission reduction a legal obligation for Indonesia. However, the Climate Action Tracker report in 2023 shows that the implementation of the target is not yet entirely on track, as national emissions are still increasing. This gap between target and realisation points to the need for a thorough evaluation of existing mitigation strategies and improving the effectiveness of cross-sector policy implementation to ensure sustainable and equitable achievement of climate targets (Sofia, 2019). Although various national and international policies have been implemented, and the global community's awareness of the severe impacts of climate change is increasing, the reality is that environmentally destructive behaviours are still being carried out. Various human activities, such as deforestation, massive use of fossil fuels, land burning, inefficient energy consumption, and increased waste production and greenhouse gas emissions, continue to take place, even though they have been proven to contribute significantly to global warming. This phenomenon reflects the gap between daily life. Many parties, whether individuals, corporations, or government institutions, often only make environmental issues a symbolic or mere formality, without being accompanied by a strong commitment to implementing sustainable policies. This poses a significant challenge in global efforts to curb the rate of climate change, as mitigation does not simply rely on legal policies or international agreements such as the Paris Agreement, but also requires a collective change in culture, behaviour, and mindset of society. Thus, legal protection of the environment must be accompanied by a sociological approach that can touch people's moral awareness and social responsibility as part of a long-term solution.

However, on the other hand, conservation efforts are often not as strong as the drive to exploit natural resources. Interest differences between the central government, local governments, and communities trigger prolonged conflicts. The central government tends to maintain conservation areas by the original purpose of their establishment, while local governments prioritise development to improve people's welfare. In addition, disharmony in forest area regulation mechanisms due to strong sectoral egos between and within government agencies has led to forest conversion for other development sectors, as reflected in Law No. 41/1999 on Forestry and Law No. 27/2007 on Spatial Planning. The lack of clarity on strategies to utilise forest areas containing potential mining materials is also a problem, given the overlapping regulations in Law No. 41/1999, Law No. 4/2009 on Mineral and Coal Mining, and Government Regulation No. 24/2010. In addition, disharmony in regulating the location of REDD+ programme implementation is also evident in Government Regulation No. 3/2008 and Minister of Forestry Regulation P.30/Menhut-II/2009, which regulate procedures for reducing deforestation and forest degradation emissions. Other discrepancies appear in the regulation of the licensing period for the utilisation of environmental services in Government Regulation No. 6/2007 in conjunction with Government Regulation No. 3/2008 and Minister of Forestry Regulation No. 30/Menhut-

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II/2009. All of these illustrate the weak synchronisation of regulations and policies in managing conservation areas in Indonesia (Gunawati, 2015).

Therefore, it is important to understand the dynamics of greenhouse gas emissions and the need to reduce anthropogenic CO2 emissions to mitigate the impacts of climate change. Natural or artificial events can cause environmental damage, but in this case, humans have an important role in damaging the environment. Humans are increasingly aggressive in changing the function of the Earth to fulfill their needs. Humans are one of the most important actors in everyday life, where all their activities affect the surrounding environment, both positively and negatively. Humans change the function of the Earth through illegal logging and massive forest burning for building construction, without considering the negative impacts on the environment (Andarini & Sudarti, 2023). Another impact of global warming is land change, which has now occurred in existing forest areas through land clearing for settlements, agriculture, livestock, and tourism. Land clearing for settlements, tourism, plantations, or others will reduce the quality of the earth's environment, one of which is the reduction of watersheds, because buildings now replace existing water-absorbing trees. Public awareness plays an important role in protecting the environment. Thanks to this awareness, people know what to do and what to avoid to minimise the negative impact of their actions. The level of public awareness is an important factor in environmental sustainability. Increased public awareness makes people understand what can damage the environment, and people can overcome environmental damage.

Scientists are studying ways to limit global warming. The key is: Limit CO2 emissions. There are two effective techniques to limit carbon emissions: first, replace energy as efficiently as possible. Alternative energies that can be used include wind, sunlight, nuclear energy, and geothermal energy. Windmills can convert wind energy into electrical energy. Sunlight can also be converted into electrical energy or heat sources that can be utilised, such as water heaters, solar cookers, and others. Geothermal energy can be utilised for power generation. CO2 emissions can be reduced if cars can be more fuel-efficient. Scientists and engineers have been working to create fuel-efficient engines. Inventions have developed devices to replace combustion engines or use smaller engines. Carbon sequestration also helps prevent carbon dioxide from entering the atmosphere or capture CO2 that is already present (Emocracy & Quina, n.d.).

Hiding carbon can be done in two ways: underground or groundwater storage, and storage in living plants. A layer of the earth that can be used is the natural storage of oil and gas in oil mines. Pumping CO2 into the oil storage in the earth's bowels will help make it easier to retrieve the remaining oil or gas. Deep layers of salt and coal can also hide carbon dioxide. Combining carbon from CO2 with hydrogen is needed to form simple sugars stored in tissues. Ecosystems with abundant vegetation, such as forests or plantations, can store more carbon, but future generations of humans must keep ecosystems intact; otherwise, the carbon stored in plants will escape into the atmosphere. Drying clothes outdoors with wind and heat is better than using a dryer, which emits many carbon emissions (Sompotan & Sinaga, 2022). However, of course, solutions to global warming require concerted efforts from all levels of society. Communities and other sectors must switch to clean energy sources such as solar, wind, and hydro power to reduce greenhouse gas emissions. Protecting and rehabilitating forests and implementing sustainable agricultural practices are also crucial. In addition, it is also important to reduce energy consumption, manage waste properly, and support environmentally friendly government policies. Each individual can contribute with simple actions such as saving energy, reducing plastic use, and choosing environmentally friendly products (Hakim, 2024). For example, some modern retailers such as Alfamart and Indomaret have implemented the "Plastic Bag Diet" programme by no longer providing single-use plastic bags. Instead, they provide eco-friendly shopping bags (Eco Bag) that can be used repeatedly to reduce dependence on plastic bags. The commitment to this programme is evident with the achievement of an 18.8% reduction in plastic bag usage by 2020, equivalent to more than 143 million plastic bags (Utomo & Dwiyanto, 2022).

In addition, electric vehicle innovation is a concrete step in reducing carbon emissions in the transport sector. The government has launched an electric vehicle subsidy policy and encouraged the development of charging station infrastructure. However, the reality is that the realisation is still minimal,

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especially outside large urban areas. Many areas do not yet have adequate charging facilities, and people are not fully accustomed to using electric vehicles. In addition, the relatively high price of electric vehicles and the lack of guaranteed ease of maintenance are considerations. Without the support of equitable infrastructure and strong education, this transition will be challenging to achieve. A more tailored approach to the conditions and needs of each region is needed so that the transition to environmentally friendly transport can run more effectively. Thus, equitable distribution is needed, and concrete steps are needed from the government, such as developing charging infrastructure that reaches non-urban areas, providing more equitable incentives, and facilitating access to electric vehicles (Zola et al., 2023). When viewed from a sociological perspective, legal protection of the environment will not succeed without the community's collective awareness and active participation in nature conservation efforts. The sociological approach shows that people's attitudes and behaviour towards the environment are strongly influenced by various factors, such as culture, education, and values adopted in daily life. For example, in some communities, traditional practices that support environmental values have eroded these values. As a result, people are less aware of the importance of preserving nature, especially in the broader context of global warming.

Environmental education and public awareness campaigns are among the important recommendations proposed in this article to improve people's understanding of global warming and its impacts. Education must be conducted in schools, through mass media, and community programmes based on cultural and local approaches. Social norms that support environmentally friendly behaviour need to be established and strengthened. These norms can be realised through campaigns involving community leaders, religious leaders, or public figures who greatly influence people's views on the environment. In addition, the importance of private sector involvement in environmental conservation efforts is highlighted. Many companies significantly impact the environment through their operational activities, whether through greenhouse gas emissions, pollution, or excessive use of natural resources. The role of the private sector should not be ignored. The government needs to encourage companies to adopt sustainable and environmentally friendly business practices, such as applying clean technology, using renewable energy, and implementing corporate social responsibility programmes that focus on environmental conservation.

Close co-operation between the government, society, and the private sector is required to address the challenges of global warming and its negative impacts. The government must take an active role in formulating strict environmental policies and ensuring effective law enforcement, so that violations of environmental regulations can be minimised. Communities must also be empowered and involved in environmental conservation activities, such as reforestation programmes, waste management, and water conservation. With strong synergy and collective awareness from all parties, it is hoped that the protection of Indonesia's natural resources can be effectively realised, which will ultimately help reduce the risk from the impacts of global climate change.

V. Conclusion

This article concludes that legal protection of Indonesia's nature is crucial in the face of the negative impacts of global warming that threaten the balance of the ecosystem and the welfare of society. Although Indonesia already has several environmental protection regulations, their successful implementation depends on public awareness and consistent law enforcement. A sociological approach reveals that cultural factors, social values, and collective awareness of the community play a significant role in shaping behavior that supports environmental conservation. This article suggests that the government strengthen environmental policies with stricter and more measurable law enforcement as a follow-up step. The government also needs to expand the scope of environmental education that targets the wider community to increase their understanding and awareness of global warming and its impacts. These education programs must be tailored to local characteristics to make them more effective and relevant to local communities. In addition, efforts should encourage community participation in various environmental conservation activities through community-based campaigns and activities. For example, tree planting, watershed maintenance, or waste

management can be part of a collective effort that involves the community in protecting the environment. Through this community-based approach, local cultural and social values are expected to be integrated, creating a strong collective awareness.

The private sector must also be actively involved in environmental conservation efforts. The government must establish regulations encouraging companies to adopt sustainable practices, such as reducing greenhouse gas emissions, using renewable energy, and better waste management. Thus, collaboration between the government, the community, and the private sector can result in behavioral changes that support the sustainable protection of nature. Only with synergy and collective awareness from all parties can environmental protection in Indonesia be effectively realized in the face of increasingly complex global challenges.

References

Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A Review of The Global Climate Change Impacts, Adaptation, and Sustainable Mitigation Measures. Environmental Science and Pollution Research, 29, 42539–42559. https://doi.org/10.1007/s11356-022-19718-6

Adamo, N., Al-Ansari, N., & Sissakian, V. (2021). Review of Climate Change Impacts on Human Environment: Past, Present and Future Projections. Engineering, 13(11), 605–630. https://doi.org/10.4236/eng.2021.1311044

Adi, A. C. (2024). Indonesia Tekankan Urgensi Dekarbonisasi Sektor Transportasi. Retrieved May 4, 2025, from Kementrian Energi dan Sumber Daya Mineral website: https://www.esdm.go.id/id/media-center/arsip-berita/indonesia-tekankan-urgensi-dekarbonisasi-sektor-transportasi#:~:text

Aditya, D. (2019). Rechstvacuum Hukum Kekayaan Intelektual Dalam Hal Discovery. Poros Hukum Padjadjaran, 1(1), 100–109.

Ainurrohmah, S., & Sudarti, S. (2022). Analisis Perubahan Iklim dan Global Warming yang Terjadi sebagai Fase Kritis. Jurnal Phi Jurnal Pendidikan Fisika Dan Fisika Terapan, 3(3), 1. https://doi.org/10.22373/p-jpft.v3i3.13359

Andarini, S. Y., & Sudarti, S. (2023). Analisis Efek global warming terhadap perubahan iklim. Jurnal Phi Jurnal Pendidikan Fisika Dan Fisika Terapan, 9(2), 31. https://doi.org/10.22373/p-jpft.v9i2.15549

Coren, E. (2024). Storytelling to Accelerate Climate Solutions. In Storytelling to Accelerate Climate Solutions. Switzerland: Springer. https://doi.org/10.1007/978-3-031-54790-4

Defa Hakim, M., & Hayqal Rafi Khamid, M. (2024). Penerapan Hukum Lingkungan dalam Menghadapi Krisis Perubahan Iklim Global. Jurnal Multidisiplin Ilmu Akademik, 1(3), 236–240.

Dhea, C., Mardhatillah, U., & Jingga, F. P. (2022). Greenhouse Effect Triggers of Global Warming and Countermeasures Efek Rumah Kaca Pemicu Pemanasan Global dan Upaya Penanggulangannya. UIN Syarif Hidayatullah Jakarta, 2(2), 328–340. Retrieved from https://semnas.biologi.fmipa.unp.ac.id/index.php/prosiding/article/view/450

Fadhlurrahman, I. (2025). Kementerian LHK Temukan 329 Titik Panas di Indonesia, Terbanyak di Kalimantan Barat (Minggu, 4 Mei 2025). Retrieved May 6, 2025, from databoks website: https://databoks.katadata.co.id/demografi/statistik/b4f2bc2e6516fd1/kementerian- lhk-temukan-329-titik-panas-di-indonesia-terbanyak-di-kalimantan-barat-minggu-4- mei-2025

Gunawati, D. (2015). Urgensitas Harmonisasi Hukum Perlindungan dan Pengelolaan Hutan dalam Mitigasi Perubahan Iklim Global melalui Program. 4(1), 160. Retrieved from https://jurnal.uns.ac.id/yustisia/article/view/8630

Hamza, Y. G., Kumar Ameta, S., Tukur, A., & Usman, A. (2020). Overview of Evidence and Reality of Climate Change. IOSR Journal of Environmental Science, 14(7), 17–26. https://doi.org/10.9790/2402-1407021726

Iblam, T. (2023). Polusi Udara Jakarta, Penyebabnya dan Bahaya Kesehatan.

Kholida Qothrunnada. (2024). Pemanasan Global: Penyebab, Dampak, dan Upaya Penanggulangannya. Journal of Research Trends in Education, 1(1), 1–7. Retrieved from https://journal.innoscientia.org/index.php/jetrin/article/view/138

Lockwood, A. H. (2020). The Scientific Evidence for Climate Change. In Heat Advisory, 1–23.

Lubis, A. F. (2022). Sosiologi Hukum : Mitigasi Dampak Global Warming Sebagai Role Model Konservasi Sumber Daya Alam di Tambling Wildlife Nature Conservation (TWNC). Jurnal Pengabdian Masyarakat Waradin, 2(1), 1–19. https://doi.org/https://doi.org/10.56910/wrd.v2i1.371

Ma'Ruf, A. (2021). Legal Aspects of Environment in Indonesia: An Effort to Prevent Environmental Damage and

Pollution. Journal of Human Rights, Culture and Legal System, 1(1), 18–31. https://doi.org/10.53955/jhcls.v1i1.4

Maharani, T. P., Tahik, P. A., Budiman, A. M. Q., & Maulida, N. S. (2022). Etika Masyarakat dan Global Warming. Praxis: Jurnal Filsafat Terapan, 1(2), 1–18. Retrieved from https://journal.forikami.com/index.php/praxis/article/view/407

May, A. (2020). Politics and Climate Change: A History. America: American Freedom Publications.

Nofita, P. (2021). Environmental Law Dispute Resolution Based On Positive Law. The 1st Proceeding International Conference And Call Paper "Omnibus Law Opportunities And Challenges Towards Entrepreneurs And Labor : Comparative Review," 318–329. Semarang: Sultan Agung Islamic University.

Nugroho, T., Maulana, J. F., Cakraningrat, K., & Ratnasari, Y. (2023). Membangun Kesadaran Hukum Masyarakat Dalam Perjuangan Keadilan Lingkungan Pertambangan Di Kabupaten Trenggalek. Swarna: Jurnal Pengabdian Kepada Masyarakat, 2(7), 784–791. https://doi.org/https://doi.org/10.55681/swarna.v2i7.760

Nugroho, W. S., Ismail, I., & Hariz, A. R. (2018). Korelasi Pengetahuan Mahasiswa Tentang Pemanasan Global Terhadap Perilaku Peduli Lingkungan Sekitar. Al-Hayat: Journal of Biology and Applied Biology, 1(1), 13. https://doi.org/10.21580/ah.v1i1.2682

Penman, H. L. (1960). Dr. R.K. Pachauri: The Crusader Against Climate Change. In Y. Joshi, P. K. Jayanthan, V. Dhawan, A. Kumar, & R. Kacker (Eds.), Nature (Vol. 187). New Delhi: Teri Alumni Association. https://doi.org/10.1038/187196a0

Riyanto. (2007). Strategi mengatasi pemanasan global. Pemanasan Global, 7(3), 213–221.

Salim, A., & Palullungan, L. (2021). The Challenges of Environmental Law Enforcement to Implement SDGs in Indonesia. International Journal of Criminology and Sociology, 10, 517–524. https://doi.org/10.6000/1929-4409.2021.10.60

Saputra, R., Usada, A., & Islam, M. S. (2024). Ecological Justice in Environmental Criminal Sanctions for Corporations in Indonesia: Problems and Solutions. Journal of Law, Environmental and Justice, 2(1), 1–17. https://doi.org/10.62264/jlej.v2i1.19

Setiani, P. (2020). Sains Perubahan Iklim. Jakarta: Grafika Offset.

Sofia, E. (2019). Implikasi Hukum Paris Agreement Melalui Program REDD+ Berbasis Blue Carbon Di Indonesia. Jurnal Magister Hukum Udayana (Udayana Master Law Journal), 8(2), 174. https://doi.org/10.24843/jmhu.2019.v08.i02.p03

Sompotan, D. D., & Sinaga, J. (2022). Pencegahan Pencemaran Lingkungan. Saintekes: Jurnal Sains, Teknologi Dan Kesehatan, 1(1), 6–13. https://doi.org/10.55681/saintekes.v1i1.2

Subhani, A., Hadi, M. S., Agustina, S., & Murdi, L. (2024). Jurnal Humanitas Eksplorasi Nilai-Nilai Edukasi Konservasi Mata Air pada Tradisi. Jurnal Humanitas: Katalisator Perubahan Dan Inovator Pendidikan, 10(2), 297–312.

Surtani. (2015). Efek Rumah Kaca Dalam Perspektif Global (Pemanasan Global Akibat Efek Rumah Kaca). Jurusan Geografi UNP, 04(01), 49–55.

Thani, S. (2016). Peranan Hukum Dalam Perlindungan Dan Pengelolaan Lingkungan Hidup. Pengelolaan Lingkungan Hidup, 1–23.

Tia Putri Maharani, Prangky Arikyanto Tahik, Agung Muhamad Qa'bah Budiman, N. S. M. (2023). Etika masyarakat dan global warming. Etika Masyarakat, (2022), 1–12. https://doi.org/10.11111/praxis.xxxxxxx

Utomo, A. Z., & Dwiyanto, B. M. (2022). Pengaruh Green Marketing Dalam Sosialisasi "Diet Kantong Plastik" Terhadap Keputusan Pembelian Pada Produk Eco Bag (Tas Belanja Ramah Lingkungan) Alfamart Melalui Minat Beli Sebagai Variabel Intervening (Studi Pada Konsumen Alfamart Di Kabupaten Pati). Diponegoro Journal Of Management, 11(5), 1–15. Retrieved from http://ejournal-s1.undip.ac.id/index.php/dbr

Wahyuni, H., & Suranto, S. (2021). Dampak Deforestasi Hutan Skala Besar terhadap Pemanasan Global di Indonesia. JIIP: Jurnal Ilmiah Ilmu Pemerintahan, 6(1), 148–162. https://doi.org/10.14710/jiip.v6i1.10083

Wang, T. (2021). August Krogh, Carbonic Acid, Combustion of Coal, and Global Warming. Function, 2(6), 1–2. https://doi.org/10.1093/function/zqab052

Wulff, P. (2020). The climate legacy of Svante Arrhenius. Icon: Journal of The International Committee for the History of Technology, 25(2), 163–169.

Wunanto, E. O. (2021). Studi Perbandingan Estimasi Emisi Gas Rumah Kaca TPA Tamangapa (Vol. 75). Universitas Hasanuddin.

Yanuarsi, S. (2019). Pengaruh Global Terhadap Hukum Lingkungan Di Indonesia. Solusi, 17(3), 258–268.

ISSN [Online]: 2797-5827

https://doi.org/10.36546/solusi.v17i3.216

Zola, G., Siska, ;, Nugraheni, D., Andhien, ;, Rosiana, A., Dzamar, ;, … Agustanta, N. (2023). Inovasi kendaraan listrik sebagai upaya meningkatkan kelestarian lingkungan dan mendorong pertumbuhan ekonomi hijau di Indonesia. Ekonomi Sumberdaya Dan Lingkungan, 11(3), 2303–1220.