

Indonesia's Participation in Responding to Global Warming Issues

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ABSTRACT

Global warming is characterized by an increase in the temperature of the atmosphere, sea, and land on earth. The occurrence of global warming will cause a series of extreme phenomena in nature in the form of changes in weather and climate that can pose a threat to the survival of life. Indonesia is an archipelagic country that has a high level of climate vulnerability, so it is highly affected by climate change. In addition to having great potential to be negatively impacted by climate change, Indonesia also has great potential to take part in mitigating and adapting to the negative impacts of climate change. This study aims to see how much effort has been made by Indonesia to participate in responding to the issue of global warming. This study uses the DPSIR (Driving force, Pressure, State, Impact, and Response) analysis method. With this analysis, it will be studied what triggers the issue of global warming, the pressures faced, the current environmental conditions or status, the perceived impact, and how the efforts have been made by the Government of Indonesia to address these issues.

Keywords: Global warming, extreme natural phenomena, changes in weather and climate, participation.



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INTRODUCTION

Global warming has become a major environmental issue and has become an international concern since the industrial revolution. Global warming is characterized by an increase in the temperature of the atmosphere, sea, and land on earth. The occurrence of global warming will cause a series of extreme phenomena in nature in the form of changes in weather and climate that can pose a threat to the survival of life. All living things on earth will be able to feel the real impact of global warming. This of course raises great concern for every country in the world, including Indonesia.

Indonesia is an archipelagic country that has a high level of climate vulnerability, so it is highly affected by climate change. Many cities in Indonesia are developing in coastal areas. Global warming will pose a threat to Indonesia in the form of sinking small islands and cities in coastal areas. This is due to rising sea levels due to the melting of polar ice caps as a result of global warming. In addition, global warming can also cause damage to coral reefs in Indonesia because they are sensitive to rising seawater temperatures. Thus, the natural resources in Indonesia are slowly being damaged by the impact of global warming.

In addition to having great potential to be negatively impacted by climate change, Indonesia also has great potential to take part in mitigating and adapting to the negative impacts of climate change. Indonesia is a country rich in natural resources, especially

forests with a large enough area. Forests have a very important role to sequester carbon.

This study aims to see how much effort has been made by Indonesia to participate in responding to the issue of global warming.

METHODS

This study uses the DPSIR (Driving force, Pressure, State, Impact, and Response) analysis method. With this analysis, it will be studied what triggers the issue of global warming, the pressures faced, the current environmental conditions or status, the perceived impact, and how the efforts have been made by the Government of Indonesia to address these issues. Thus, it is hoped that the efforts that have been made by Indonesia in responding to these issues can be evaluated and improved in the future to achieve the expected goals.

FINDINGS

1. The Process of Global Warming

The process of global warming is related to the process of increasing the average temperature of the earth's surface. The increase in the temperature of the earth's surface is due to the presence of solar radiation in the earth's atmosphere, then some of these rays turn into heat energy in the form of infrared rays which are absorbed by the air and the earth's surface. The energy absorbed by the air and the earth's surface should be reflected back in the form of infrared radiation or solar heat waves, but most of the infrared are trapped in the atmosphere because it is trapped by greenhouse gases. Then, these gases will absorb and reflect back the wave radiation emitted by the earth's surface, as a result, the heat will be stored on the earth's surface. This condition occurs repeatedly, causing an increase in the earth's temperature. The process of trapping heat by a layer of greenhouse gases in the atmosphere is called the greenhouse effect.

Global warming occurs as a form of atmospheric reaction to the increase in the intensity of the greenhouse effect. Greenhouse gases that surround the atmosphere, among others: Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydroperfluorocarbons (HFCs), Perfluorocarbons (CFCs), Sulfur Hexafluoride (SF₆). The increase in the concentration of these greenhouse gases in the air is caused by many things. One of the causes of the increase in carbon dioxide (CO₂) gas is the increase in the residual combustion of fuel oil (BBM), coal, and other organic fuels which exceed the ability of plants and the sea to absorb them. The increase in nitrous oxide (N₂O) gas is produced mainly from the combustion of fossil fuels and by agricultural land. This gas has the property of capturing heat 300 times greater than carbon dioxide. The increase in Perfluorocarbons (CFCs), Hydroperfluorocarbons (HFCs), and Sulfur Hexafluoride (SF₆) gases are produced by refrigerants that use freon, such as refrigerators, air conditioners, etc. This gas in addition to being able to withstand heat, also causes depletion of the ozone layer which is useful for preventing ultraviolet rays from entering the earth. This gas attacks Ozone, as a result, the Ozone content in space is depleted and causes holes at the north and south poles, so that UV II-6 (ultraviolet) is able to penetrate into the atmosphere and cause radiation.

2. DPSIR Analysis of Global Warming Issues

The issue of global warming is a challenge that must be solved jointly by every country in the world. This issue is becoming increasingly crucial because the process is accelerating and the impact is getting wider in various aspects of life. To be able to solve a problem, it must be clear the root of the problem. Regarding environmental problems, DPSIR analysis can be a solution in analyzing the root causes of environmental problems that occur. So, we hope that we can provide the right response to solving these problems. The DPSIR analysis framework used to analyze Global Warming Issues can be described as follows:

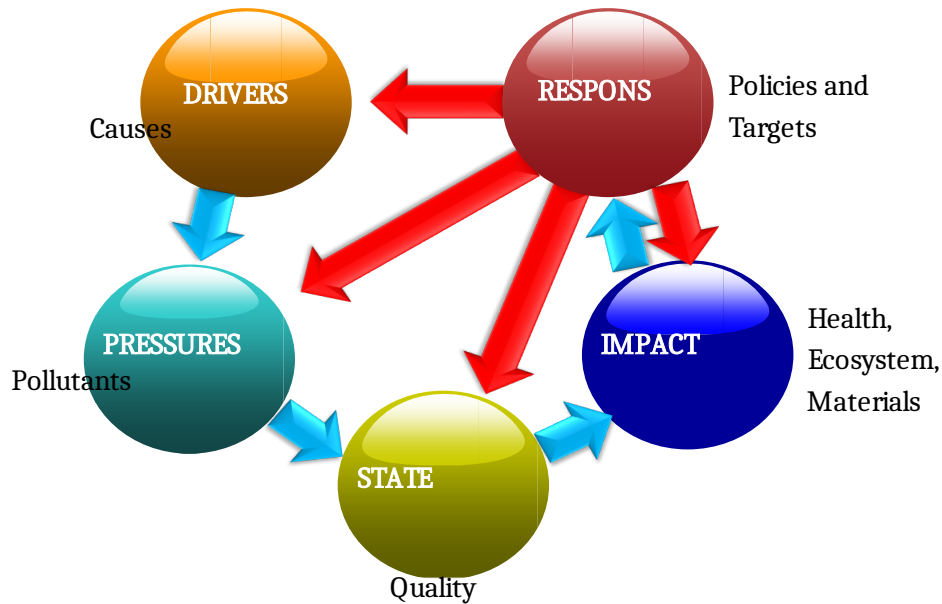


Fig 1. DPSIR Analysis Framework

The trigger (Driver) of the issue of global warming is the rapid development of industry and transportation as a contributor to greenhouse gases. Meanwhile, the pressure on this issue is the increase in greenhouse gas emissions in the air which causes the greenhouse effect. The greenhouse effect is a condition in which heat from sunlight that is emitted to the earth cannot be reflected through the earth's atmosphere because it is blocked by greenhouse gases. This causes the heat energy to be trapped in the atmosphere and increases the surrounding temperature, much like heat trapped in a greenhouse. Environmental conditions or status (State) with the issue of global warming can be seen from the current facts, namely based on BMKG observations which are in line with the statement of the World Meteorological Organization (WMO), showing that 2016 had an average temperature of 1.2 °C higher than Normal (ie 1981-2010 average).

The impact caused by global warming on the atmosphere itself will cause fluctuations in the flow of hot air which increases the temperature in the atmosphere, resulting in extreme weather and climate changes. An increase in temperature also occurs on the earth's surface and seawater, this will cause faster melting of ice at the north and south poles. So, by itself will raise sea level. For coastal and marine areas, climate change has an impact on erosion, flooding, land subsidence in various coastal cities, as well as changes in fishing patterns that can result in reduced harvests of marine products. Meanwhile, in urban areas, the impacts of climate change include damage to roads, bridges, ports, and other infrastructure caused by flooding, erosion, and land subsidence. Its impact on agriculture can have a significant impact on rice production levels and cultivation patterns. Meanwhile, in the

forestry sector, extreme climate change can affect the increase in forest fires as well as loss of biodiversity and changes in forest landscape or land use. Climate change also affects the risk of water shortages for domestic activities, such as the need for water for life. In the health sector, climate change can lead to an increase in cases of Dengue Hemorrhagic Fever (DHF) and water-borne and vector-borne diseases, especially during the rainy season.

3. Government Policy in Responding to Global Warming

The Indonesian government itself has ratified the Paris Agreement through Law No. 16 of 2016 on October 24, 2016. The tangible form of Indonesia's commitment under the Paris Agreement is to submit the First Nationally Determined Contribution (NDC) of Indonesia to the UNFCCC in 2016 ago. NDC stated that the commitment to contribute to reducing greenhouse gas emissions by 2030 is 29% with its efforts and up to 41% if there is international cooperation. In achieving the 29% target, Indonesia has good capital in fulfilling NDC's promises, namely through its policies and regulations, as well as the activities and roles of institutions in supporting funding, capacity building, technology transfer, partnerships, and research. The Indonesian government is working to develop various instruments for implementing NDCs so that they can be implemented after 2020. However, according to 2016 data, Indonesia has succeeded in reducing emissions by 8.7% from various sectors.

The Ministry of Environment and Forestry's efforts in controlling climate change also involve the community at the site level or the lowest level. This effort is through the Climate Village Program (Proklim) which combines adaptation and mitigation efforts. Currently, Proklim has reached around 1,500 climate villages in various provinces in Indonesia. Controlling climate change is also inseparable from efforts to prevent forest and land fires. The government has formed an Integrated Patrol team that involves various parties, including Manggala Agni, TNI, Polri, BPBD, Fire Care Community, and local government agencies. Through this integrated patrol, it is proven that it has succeeded in reducing the No. of hotspots in Indonesia. It is hoped that in the future the Government can encourage the creation of Indonesian public awareness of the dangers of the impact of climate damage and global warming. The main objective of the policy is expected not only to function as a countermeasure but also as a preventive measure.

4. Indonesia's Commitment in Responding to Global Warming Issues

The Indonesian government is committed to tackling the impact of global warming generated domestically by issuing laws and regulations to address the global warming issue, including:

❑ **Law No. 32 of 2009 concerning Environmental Protection and Management:** The government through Law No. 32 of 2009 regulates several matters related to climate change at the stages of planning, controlling, and maintaining the environment. At the planning stage, the government and local governments are required to prepare an Environmental Protection and Management Plan (RPPLH) which includes a climate change mitigation and adaptation plan. Article 10 paragraph (5) of Law No. 32 of 2009 states that "RPPLH is the basis for preparation and is included in the Medium Term Development Plan and Long Term Development Plan". Furthermore, climate change is also regulated in the environmental control stage through the preparation of a Strategic Environmental Study (KLHS) which in the preparation of the study includes studies on vulnerability and adaptation to climate change. KLHS plays an important role in formulating or evaluating policies, plans, and/or programs, and has been used as an

instrument to prevent pollution or environmental damage.

- ❓ **Law No. 5 of 1960 concerning Basic Regulations on Agrarian Principles:** Law No. 5 of 1960 concerning Basic Regulations on Agrarian Principles (UUPA) is the basic regulation that regulates the use and ownership of land. The discussion on the UUPA is important about knowing the types of land rights because Article 1 Paragraph (5) of Law No. 41 of 1999 concerning Forestry states that forests located on private land are included in private forests. Therefore, it is necessary to know the rights to land, which are regulated in the Logga. In the construction of the UUPA, all the earth, water, and space, including the natural resources contained therein within the territory of the Republic of Indonesia as a gift from God Almighty, are the earth, water, and space of the Indonesian people and our national assets controlled by the state. The state's right to control grants the authority to 1) regulate and administer the allocation, use, supply, and maintenance of the earth, water, and space; 2) determine and regulate legal relations between people and the earth, water, and space; determine and regulate legal relations between people and legal actions concerning the earth, water, and space.
- ❓ **Law No. 5 of 1990 concerning Conservation of Biological Natural Resources and Their Ecosystems:** Conservation of living natural resources is the management of living natural resources whose utilization is carried out wisely to ensure the continuity of their supply while maintaining and improving the quality of their diversity and value. Conservation of living natural resources and their ecosystems aims to achieve the preservation of living natural resources and the balance of their ecosystems so that they can better support efforts to improve community welfare and the quality of human life. Conservation of living natural resources and their ecosystems is the responsibility and obligation of the Government and the community. To carry out the conservation of natural resources, the following steps are taken: 1) protection of life support systems; 2) preservation of the diversity of plant and animal species and their ecosystems; and 3) sustainable use of living natural resources and their ecosystems. Conservation in the form of preserving and protecting living natural resources and their ecosystems has the potential to maintain the potential of stored carbon (carbon stock) and reduce carbon release/emissions from activities that change the function of forest areas and deforestation.
- ❓ **Law No. 41 of 1999 concerning Forestry:** In 1999, the Government of Indonesia enacted Law No. 41/1999 on Forestry. This law has several purposes, namely; 1) make arrangements for the forest to be used as much as possible for the prosperity of the people; 2) optimize the function of the forest environment, and 3) implement participatory and equitable sustainable development. This law distinguishes the meaning of forestry, forest area, and forest. In general, it can be understood that forestry involves a management system regarding forests and related matters, forest means forest as a natural phenomenon, while forest area means forest as a natural phenomenon which is then designated by the government as forest to emphasize its status, function, area, and forest areas. Forests are the only natural component capable of reducing carbon emissions. In line with keeping the forest area at 30% of the total land area, it is one of the most realistic forms of reducing greenhouse gas emissions from the forestry sector. Prevention of forest and land fires is one of the main keys to reducing emission rates in addition to forest conversion and deforestation activities.
- ❓ **Law No. 4 of 2009 concerning Mineral and Coal Mining:** The Mineral and Coal Mining Law (Minerba Law) is closely related to the borrow-to-use forest area permit. Mining is defined as a part or all of the stages of activities in the context of research, management, and exploitation of minerals or coal which include general investigation,

exploration, feasibility studies, construction, mining, processing and refining, transportation, and sales, as well as post-mining activities. In practice, mining is based on the principles of 1) benefits, fairness, and balance; 2) siding with the interests of the nation; 3) participatory, transparency, and accountability; and 4) sustainable and environmentally friendly.

- ❑ **Law No. 18 of 2008 concerning Waste Management:** One of the objectives of the enactment of Law No. 18 of 2008 concerning Waste Management is to change the paradigm of waste management. The paradigm of waste management that has been applied so far is to consider waste as useless waste, and not as a resource that needs to be utilized. The existing paradigm also sees waste management as relying on an end-of-pipe approach, where waste is collected, transported, and disposed of to the final waste processing site. This law considers these two paradigms to be changed for several reasons. First, waste management that relies on an end-of-pipe approach fails to notice that the landfill has the potential to release methane (CH₄) gas. Second, the end-of-pipe approach requires a large amount of time and money to be able to decompose waste. The concept of waste management starting from the reduction process and handling that prioritizes waste reprocessing (reduce, reuse, recycle) is a form of reducing greenhouse gas emissions, especially carbon emissions from the manufacturing process and methane gas emissions from the waste decomposition process.
- ❑ **Law No. 31 of 2009 concerning Meteorology, Climatology, and Geophysics:** The government through Law No. 31 the Year 2009 has paid attention to aspects of climate change in its regulation. This can be seen from the regulatory material in the Law which mandates the government to mitigate and adapt to climate change, by implementing: 1) formulation of national policies, strategies, programs, and climate change control activities; 2) coordination of climate change control activities; and 3) monitoring and evaluating the implementation of policies on climate change impacts. The formulation of national policies, strategies, programs, and activities for controlling climate change is carried out through stages of activities which include: 1) an inventory of greenhouse gas emissions; 2) monitoring the symptoms of climate change and greenhouse gases; data collection; and 3) data analysis. The regulation of climate change in this Law is closely related to the regulation of climate change in other laws and regulations.
- ❑ **Law No. 18 of 2013 concerning Prevention and Eradication of Forest Destruction:** Forest destruction is the process, method, or act of destroying forests through illegal logging activities, the use of forest areas without a permit or the use of permits that are contrary to the intent and purpose of granting permits in forest areas that have been determined, has been designated, or are being processed by the government. Government. The Law on Prevention and Eradication of Forest Destruction has the following objectives; 1) guarantee legal certainty and provide a deterrent effect for perpetrators of forest destruction; 2) ensure the existence of forests in a sustainable manner while maintaining sustainability and not damaging the environment and the surrounding ecosystem; 3) optimizing the management and utilization of forest products by taking into account the balance of forest functions to create a prosperous society; and 4) increasing the capacity and coordination of law enforcement officers and related parties in dealing with the prevention and eradication of forest destruction. The provisions in this Law contain the acts of forest destruction and law enforcement for these acts. Prevention and eradication of forest destruction are one of the efforts to maintain carbon stock in forests and prevent the decline in the ability of forests to absorb greenhouse gases.
- ❑ **Presidential Regulation No. 61 of 2011 concerning National Action Plan for**

Reducing Greenhouse Gas Emissions: Indonesia has established the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) through Presidential Regulation No. 61 of 2011 (Perpres RAN-GRK). The Presidential Regulation is targeted to reduce national greenhouse gas emissions by 26% below the level of greenhouse gas emissions in 2020 without any mitigation action intervention. This achievement figure is carried out with national funding. Furthermore, it is also stated in the Presidential Regulation on RAN-GRK that the target for reducing greenhouse gas emissions can be increased to a total of 41% if Indonesia gets foreign assistance for funding, capacity building, and technology transfer. The target for reducing greenhouse gas emissions that has been set by the Indonesian government is a form of the country's commitment to stabilizing global greenhouse gases as regulated in several international instruments. Each achievement of reducing greenhouse gas emissions is calculated using an internationally agreed calculation method to provide accountability and transparency of information.

- ❓ **Presidential Regulation No. 71 of 2011 concerning the Implementation of the National Greenhouse Gas Inventory:** The government through Presidential Decree No. 71 of 2011 has regulated the implementation of a national greenhouse gas inventory, in which it is stated that the greenhouse gas inventory is carried out to obtain information on 1) the level and status of national greenhouse gas emissions; 2) achievement of reducing greenhouse gas emissions/increasing greenhouse gas absorption from national climate change mitigation actions. Furthermore, it is also stated that the implementation of greenhouse gas inventories is carried out at the national, provincial, and district/city levels, and the person in charge of certain businesses/activities. With the obligation to conduct an inventory of greenhouse gases, greenhouse gas information will be formed from the site level (bottom-up approach), which can be compared with greenhouse gas information from the national level (top-down approach). With various laws and regulations that have been issued by the government, the issue of climate change is no longer new, but an issue that can be applied to the level of environmental protection and management, including the level of development planning. This provides an opportunity for the government and the business world to contribute to the implementation of climate change mitigation.

5. Indonesia's Commitment to Climate Change

The Indonesian government shows a serious commitment to dealing with climate change. On 31 October - 12 November 2021 in Glasgow, Scotland, the Indonesian Ministry of Finance together with other stakeholders attended an important meeting related to global efforts to mitigate and mitigate the impacts of climate change, namely the 26th Conference of the Parties (COP26) United Nations Framework Convention on Climate Change (UNFCCC). Indonesia has also demonstrated its important role at the world level as the host of COP-13 in 2007 in Bali which, among other things, produced the Bali Action Plan which places the important role of Indonesia's forests through the implementation of the REDD+ scheme as well as the production of the IFCA (Indonesia Forest Climate Alliance) study. The Bali Action Plan, among others, agreed on the existence of Policy Approaches and Positive Incentives for REDD+ in Developing Countries that would allow for solutions to deforestation in developing countries so that it can be reduced, but still, be able to continue its national development.

Presidential Regulation No. 16 of 2015 brought the consequence of merging the Ministry of Environment, Ministry of Forestry, National Council on Climate Change, and the REDD+ Management Agency into the Ministry of Environment and Forestry which

was further operationalized through Minister of Environment and Forestry Regulation No. 18 of 2015. Ministry of Environment and Forestry, through the Director-General of Climate Change Control, is tasked with formulating and implementing policies in the field of climate change control in realizing Indonesia's commitment to reducing emissions at both national and international levels. Controlling climate change in Indonesia requires an interactive and synergistic national and international process. The implementation of the agreement at the international level needs to be translated into the context of national development, including the ratification of the Paris Agreement and the NDC through mitigation and adaptation actions. This is intended to support sustainable development and mainstream the principles of low emissions and responsiveness to climate change. The effectiveness of climate change control is also highly dependent on policies and their implementation at all levels (international, regional, national, and sub-national). Indonesia's active role is also evidenced in the fact that Indonesia is one of the first developing countries to deliver its national target as a form of voluntary commitment at the international level, namely reducing emissions by 26% from business-as-usual conditions in 2030 with national resources and up to 41% if it gets international support and cooperation.

Indonesia plays an important role in controlling global climate change. Because the Peat and Mangrove Restoration Agency (BRGM) also continues to accelerate the rehabilitation of mangroves. This effort also gathers community support, one of which is by holding a Mangrove Community Field School in the Sebrang Bersatu Community Forest (HKM), Belitung, Bangka Belitung Islands. The program which was attended by 40 participants consisted of representatives of Community Groups, Field Coordinators, and Village Facilitators. Where later they will be given education-related to mangrove ecosystem management, participatory mapping, mangrove ecosystem rehabilitation techniques, seeding and planting, monitoring and embroidery, as well as follow-up plans based on local resources. By optimizing the participation of all parties, site by site mangrove locations will be green, until finally, one large landscape will be green because it is completely planted. The landscape is part of our nature, part of our life. We need to be aware that mangroves a fortress of land and mangroves the source of life for marine life.

CONCLUSION

DPSIR's analysis of the issue of global warming can be explained as follows: the driver of the issue of global warming is the rapid development of industry and transportation as contributors to greenhouse gases. While the pressure on this issue is the increase in greenhouse gas emissions in the air that cause the greenhouse effect, environmental conditions or status (State) with the issue of global warming can be seen by the increase in temperature every year in various parts of the world. The impact caused by global warming on the atmosphere causes fluctuations in the flow of hot air which increases the temperature in the atmosphere, resulting in extreme weather and climate changes. Indonesia's active involvement in negotiations under the UNFCCC is a response to the issue of global warming, one of the forms of this active role in negotiations and has helped determine the direction of decisions regarding Reducing Emissions from Deforestation and Degradation (REDD+) that were born under the UNFCCC which Law No. 6/1994 on Ratification of the United Nations Framework Convention on Climate Change was also enacted and supported by other laws and regulations that demonstrate Indonesia's commitment to climate change.

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