



## Climate and Environmental Policy in Indonesia: Challenges and Opportunities

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### Abstract

Climate and environmental policy issues are increasingly pressing in the global context. This requires policies that mitigate and adapt to climate change, which is influenced by factors such as rising global temperatures, extreme rainfall and severe natural disasters. The purpose of writing this article is to review various theoretical foundations relevant to climate policy, including the impact of climate change on various sectors, the role of greenhouse gases in global warming, the concept of climate justice, and the importance of adaptation and mitigation strategies. Apart from that, this article also aims to discuss the importance of international regulations such as the Kyoto Protocol and the Paris Agreement, the role of environmental economics in policy making, and political dynamics that influence climate policy. This research uses a literature review method to evaluate previous research on climate and environmental policy by utilizing sources such as Publish or Perish. From the results of a search on Scopus with the keywords "climate and environmental policy," 297 articles were found, and after filtering, ten articles exploring various aspects of climate and environmental policy were identified. Qualitative data processing is carried out in three stages: data reduction, data presentation, and conclusion. Data reduction involves selecting data that needs to be coded, sharpening the data, and eliminating unnecessary data. Data presentation is carried out through narrative text to facilitate understanding, while inference uses deductive techniques, drawing conclusions from general to specific data. The results of this literature review emphasize the need for a holistic approach that integrates mitigation and adaptation efforts, addresses economic and social impacts, monitors the implementation of international policies, actively involves stakeholders, and focuses on sustainable development. This report highlights the importance of public education and awareness in supporting sustainable policy implementation and behavior change.

**Keywords: Climate Change; Public Policy; Environmental Policy; Mitigation Strategies; Sustainable Development; Indonesia**

### Abstrak

*Isu kebijakan iklim dan lingkungan yang semakin mendesak dalam konteks global. Hal ini perlu adanya kebijakan yang memitigasi dan beradaptasi terhadap perubahan iklim, yang dipengaruhi oleh faktor-faktor seperti kenaikan suhu global, curah hujan ekstrem, dan bencana alam yang parah. Tujuan dari penulisan artikel ini adalah untuk mengulas berbagai landasan teoritis yang relevan dengan kebijakan iklim, termasuk dampak perubahan iklim pada berbagai sektor, peran gas rumah kaca dalam pemanasan global, konsep keadilan iklim, dan pentingnya strategi adaptasi dan mitigasi. Selain itu penulisan artikel ini juga bertujuan untuk membahas pentingnya peraturan internasional seperti Protokol Kyoto dan Perjanjian Paris, peran ekonomi lingkungan dalam pembuatan kebijakan, dan dinamika politik yang mempengaruhi kebijakan iklim. Penelitian ini menggunakan metode tinjauan pustaka untuk mengevaluasi penelitian sebelumnya tentang kebijakan iklim dan lingkungan dengan memanfaatkan sumber*

*seperti Publish atau Perish. Dari hasil pencarian di Scopus dengan kata kunci "kebijakan iklim dan lingkungan," ditemukan 297 artikel, dan setelah disaring, sepuluh artikel yang mengeksplorasi berbagai aspek kebijakan iklim dan lingkungan diidentifikasi. Pengolahan data kualitatif dilakukan melalui tiga tahap: reduksi data, penyajian data, dan penyimpulan. Reduksi data melibatkan pemilihan data yang perlu diberi kode, penajaman data, dan penghilangan data tidak diperlukan. Penyajian data dilakukan melalui teks naratif untuk memudahkan pemahaman, sementara penyimpulan menggunakan teknik deduktif, menarik kesimpulan dari data umum ke khusus. Hasil dari kajian literatur ini adalah menekankan perlunya pendekatan holistik yang mengintegrasikan upaya mitigasi dan adaptasi, mengatasi dampak ekonomi dan sosial, memantau implementasi kebijakan internasional, melibatkan pemangku kepentingan secara aktif, dan fokus pada pembangunan berkelanjutan. Laporan ini menyoroti pentingnya pendidikan dan kesadaran masyarakat dalam mendukung implementasi kebijakan berkelanjutan dan perubahan perilaku.*

***Kata Kunci: Perubahan Iklim; Kebijakan Publik; Kebijakan Lingkungan; Strategi Mitigasi; Pembangunan Berkelanjutan; Indonesia***

## **Introduction**

Climate and environmental policy is becoming an increasingly urgent issue and gaining global attention as climate change becomes increasingly apparent and its impacts are increasingly felt throughout the world. Climate change, such as rising global average temperatures, increasing levels of extreme precipitation, and the frequency of severe natural disasters, has triggered an urgent need to adopt and implement policies that focus on mitigating and adapting to climate change (Kania et al., 2023). According to Xu et al., (2023) in recent decades, various countries and international institutions have introduced policies and regulations to reduce greenhouse gas emissions, promote renewable energy, and limit activities that damage the environment. In this context, climate and environmental policy research has become crucial for identifying effective solutions, evaluating the impact of existing policies, and designing better policy strategies (Jakučionytė-Skodienė & Liobikienė, 2023).

According to Yousfi et al., (2023), climate change has also influenced other aspects of public policy, such as energy security, public health, and food security. In this regard, climate and environmental policy research has helped in understanding the complexity of the interconnections between various policy areas. However, several challenges need to be addressed in the context of climate and environmental policy research (Chou et al., 2023). One of them is expanding understanding of the impact of climate change on various sectors and populations, as well as how policies can respond to these changes effectively (Sarathchandra & Haltinner, 2023). In addition, the implementation of climate and environmental policies often faces complex political, economic, and social obstacles (Forsyth & McDermott, 2022). According to Raimi (2021), policy research on climate and the environment also has the potential to identify new economic opportunities, such as renewable energy industries and green technology, which can support sustainable economic growth. Therefore, research in the field of climate and environmental policy is not only about protecting the environment but also about creating economic opportunities and improving the quality of life (Freeman, 2020). Against this background, research in the field of climate and environmental policy has great relevance in the current global context. According to Basseches (2023), these studies help governments, non-governmental organizations, and society as a whole in formulating and implementing effective policies to protect the environment, respond to climate change, and ensure long-term prosperity for future generations.

## Methods

This research uses a literature review method to collect and evaluate previous research on climate and environmental policy, utilizing sources such as Publish or Perish. The search yielded 297 articles from Scopus. After filtering based on relevance and substance, ten articles were identified that explored various aspects of climate and environmental policy. The author facilitates the search using the keywords “climate and environmental policy”. The qualitative data processing procedure in this study was carried out through three stages, namely 1) Data reduction: it is a process of selecting data, focusing attention on simplifying data, abstracting data, and transforming raw data that emerges from written records in the field.

At the data reduction stage, the selection of data that needs to be coded, data that must be discarded, and patterns that must be summarized. In data reduction activities, data sharpening, data classification, data directing, removal of unnecessary data, and data organization are carried out to make it easier to understand; 2) Presentation of data: after the data has been reduced, the next step is to display the data. By displaying data, it will make it easier to understand what happened and plan further work based on what has been understood. The most frequent presentation of data in qualitative research is with narrative text. The presentation of data displays structured information that gives the possibility of drawing conclusions and acting. The data that has been compiled is then presented in the form of analysis so that the problems that are the object of study will be illustrated; 3) Concluding: the technique of concluding is an essential step in the research process, concluding is based on the organization of information obtained in data analysis and concluding this study using deductive techniques, namely drawing techniques from general data to specific conclusions.

## Result and Discussion

A review of the literature shows that climate change mitigation policies have covered various aspects, including the use of renewable energy, carbon taxes, reducing industrial emissions, and low-emission transportation. In many countries, increasing investment in renewable energy has become a key point in efforts to reduce greenhouse gas emissions (Respitawulan & Rahayu, 2019). Meanwhile, according to Saikanth et al. (2023) adaptation to the impacts of climate change, especially in areas that are vulnerable to natural disasters. Adaptation strategies form a critical component of addressing the multifaceted challenges posed by climate change. These strategies encompass a diverse set of measures, including the restoration of natural ecosystems, the development of climate-resilient infrastructure, and the enhancement of urban planning. By restoring natural ecosystems, we not only protect biodiversity but also fortify the natural environment against the impacts of climate change. Resilient infrastructure ensures that communities are better equipped to withstand and recover from the adverse effects of extreme weather events. Simultaneously, mitigation policies are crucial in tackling the root causes of climate change. Renewable energy and carbon taxes have emerged as key instruments in these policies across various nations. The transition to renewable energy sources not only reduces carbon emissions but also opens avenues for new economic opportunities. Investments in renewable energy infrastructure contribute to sustainable development while addressing the pressing issue of climate change. In parallel, carbon taxes act as powerful motivators for emission reduction, fostering a shift towards cleaner energy alternatives. Highlighting the importance of adaptation, especially in vulnerable regions, is imperative. Robust adaptation planning becomes a priority in areas susceptible to the impacts of climate change. Efforts such as ecosystem restoration play a pivotal role in building resilience, contributing to the overall well-being of communities.

Additionally, improving urban planning ensures that cities are better equipped to handle the challenges posed by natural disasters and extreme weather changes. By integrating adaptation strategies into planning processes, society's vulnerability can be significantly reduced. In conclusion, the intertwining of adaptation and mitigation strategies is essential for comprehensive climate action. While mitigation addresses the root causes, adaptation ensures resilience in the face of inevitable changes. Ecosystem restoration, resilient infrastructure, and thoughtful urban planning collectively contribute to building a sustainable and climate-resilient future for societies worldwide.

According to Hussain et al. (2020), The economic and social impacts of climate change show that climate change can have significant economic impacts in various sectors, including agriculture, food, and fisheries. Apart from that, social impacts are also a major concern, such as inequality in the impacts of climate change and the vulnerability of poor communities to disasters. Meanwhile, according to Tanaka et al. (2021), international policies and climate change agreements should refer to the Paris Agreement as a global policy framework for addressing climate change. However, there is still debate about the effectiveness of implementing this agreement and the responsibilities of developed and developing countries in achieving emissions targets. Thus it becomes important to understand the economic and social impacts of climate change. Addressing the intricate challenges associated with climate change demands a nuanced approach, with a particular focus on issues like the unequal distribution of its impacts and the heightened vulnerability of impoverished communities. Crafting effective policies necessitates special attention to these aspects, emphasizing the need for ongoing research to inform more inclusive and equitable policy formulations. A comprehensive understanding of the disparities in climate change impacts is vital for creating strategies that uplift marginalized communities and promote social justice in the face of environmental challenges. The Paris Agreement represents a significant milestone in the global commitment to combat climate change. While it sets ambitious goals and outlines a collective framework for action, continuous scrutiny and evaluation of its implementation are crucial. Regular monitoring ensures that nations adhere to their commitments and prompts adjustments when necessary. This ongoing assessment is essential to maintain the momentum generated by the agreement and to address emerging challenges effectively. Furthermore, the achievement of global emission targets relies heavily on fostering closer international cooperation, particularly between developed and developing countries. Collaborative efforts are instrumental in sharing resources, technology, and expertise to support less affluent nations in their endeavors to adopt sustainable practices. By bridging the gap between developed and developing economies, a more inclusive and effective approach to mitigating climate change can be realized. International cooperation not only accelerates progress but also fosters a sense of shared responsibility in the global pursuit of a sustainable and climate-resilient future.

According to Reed (2008), stakeholder engagement shows that it is an important factor in formulating and implementing successful climate and environmental policies. Active involvement from civil society, the private sector, NGOs, and local communities has been proven to increase policy effectiveness and support better implementation. Meanwhile, according to Leal Filho et al. (2021) emphasize the importance of the concepts of sustainable development and sustainable development in the context of climate and environmental policy. Policies that consider economic, social, and environmental aspects can contribute to achieving long-term sustainability goals. Thus, in formulating climate and environmental policies, the active involvement of various stakeholders, including civil society, business, and local communities, is key to achieving broader agreement and gaining the support necessary for policy success. Enhancing

effective and inclusive participation mechanisms is imperative for comprehensive climate action. Such efforts should prioritize creating platforms that engage diverse stakeholders, ensuring that voices from various sectors and communities contribute to the decision-making process. This inclusivity is crucial for fostering a sense of shared responsibility and garnering support for sustainable practices. Moreover, embracing the concept of sustainable development is pivotal in shaping holistic climate and environmental policies. Recognizing that these policies are interconnected with economic, social, and environmental dimensions, a sustainable development approach seeks to strike a balance that benefits all aspects of society. Policies crafted under this framework aim to optimize long-term advantages while ensuring the resilience and sustainability of ecosystems. By integrating economic, social, and environmental considerations, policies can better withstand the test of time and contribute to lasting positive impacts. However, the effectiveness of sustainable policies necessitates ongoing assessment and scrutiny. Further research is essential to measure the actual impact of these policies on ecosystems, societies, and economies. This evaluation should encompass not only immediate outcomes but also the long-term consequences, providing valuable insights into the efficacy of sustainable development strategies. Continuous research and evaluation create a feedback loop that informs future policy adjustments, ensuring that approaches remain adaptive and responsive to the evolving challenges of climate change and environmental sustainability. Here are 10 things the Indonesian government should do regarding Climate and Environmental Policy:

## **1. Climate Change and its Impact**

The first theoretical basis is a deep understanding of climate change and its impact on the environment and society. Climate change, such as rising global temperatures, changing weather patterns, and increasing intensity of natural disasters, has serious impacts on ecosystems, natural resources, and food security. (IPCC, 2001). According to Mahato (2014) over time, climatic shifts could impact farming in various aspects, including the quantity and quality of crops regarding productivity, growth rates, photosynthesis, transpiration rates, and the availability of moisture, among others.

The rapid increase of CO<sub>2</sub> and other greenhouse gases in the atmosphere is leading to climate change. This phenomenon impacts various sectors including agriculture, forestry, public health, biodiversity, as well as ecosystems ranging from aquatic to mountainous regions (Malla, 2008). Climate change is relevant to human rights, public health, and socio-economic fairness due to its wide-ranging effects and its notably heavier burden on vulnerable and socially disadvantaged groups. A community's resilience to climate change hinges on its capacity to predict, manage, withstand, and rebound from severe weather occurrences. The phenomenon is poised to impact various areas including industry, agriculture, as well as transportation, health, and energy systems (Shonkoff et al., 2011).

## **2. Greenhouse Gases and Their Effects**

Understanding the greenhouse effect and the role of greenhouse gases is essential in the context of climate policy. Gases such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrogen oxides (N<sub>2</sub>O) play a major role in global warming. This theoretical foundation helps identify emission sources and mitigation solutions (EPA, 2023). According to Kweku et al., (2018) the Greenhouse effect, essential for Earth's warmth, is caused by gases like water vapor, CO<sub>2</sub>, methane, and nitrous oxide, which trap heat in the atmosphere. This effect prevents Earth from being much colder, thus supporting current life. Greenhouse gases contribute to global warming by allowing sunlight in but

blocking Earth's emitted energy, a key principle in atmospheric science. This is crucial for making Earth habitable, highlighting the importance of these gases in Earth's temperature regulation. Since the start of the industrial era, the swift rise in greenhouse gas levels has led to worries about possible ensuing changes in the climate (Ledley et al., 1999).

### **3. Climate Justice and Policy**

The theoretical foundations of environmental justice in-depth discussing the concept of distributing environmental damage and the impacts of climate change fairly. The principle of justice includes consideration of the countries and groups most affected, and their involvement in climate policy (Adger, 2006). According to Klinsky & Dowlatabadi (2009), the concept of distributive justice in climate change policy is a topic that attracts both ethical and climate policy circles, yet these two communities have largely remained separate. The Paris Climate Agreement is a key development in climate policy, but there's ongoing debate over compensating for climate change's negative effects and assigning clear responsibilities. The disparity in impact understanding between developed and developing countries creates procedural injustice, which needs prioritizing and addressing in policy decisions (Huggel et al., 2016).

### **4. Adaptation and Mitigation**

In the context of climate policy, it is important to understand the difference between adaptation (attempts to adapt to the impacts of climate change) and mitigation (efforts to reduce greenhouse gas emissions). This theoretical foundation helps design balanced policy strategies (Wilbanks, 2003). According to Bosello et al., (2010), it is widely recognized that an effective climate strategy should integrate both mitigation and adaptation. However, determining the optimal balance between adaptation and mitigation to most effectively combat climate change remains an unresolved issue.

Due to the global inability to establish a sufficient system for capping greenhouse gas emissions at a safe threshold, the focus on adaptation to climate change has significantly increased in the negotiations of the UN Framework Convention on Climate Change (UNFCCC) since 2007 (Khan & Roberts, 2013). Since the late 1980s, global climate change has been a major focus for scientists and policymakers, leading to efforts primarily aimed at reducing carbon dioxide emissions to prevent future climate effects. Alongside these mitigation strategies, adaptation measures are also being implemented, involving changes in behavior at various levels to reduce society's vulnerability to climate change (Pielke Jr, 1998).

### **5. International Regulations**

Knowledge of international regulatory frameworks, such as the Kyoto Protocol and the Paris Agreement, is important in understanding global cooperation in addressing climate change. The basis of this theory includes the principles of international law related to climate change (UNFCCC, 2015). According to Bailey (2007), the pursuit of effective and efficient climate policy has resulted in a significant increase in the adoption of market-based tools and voluntary agreements (referred to as New Environmental Policy Instruments [NEPIs]) both nationally and internationally. Current WTO regulations offer member countries a certain degree of leeway to act on climate change issues. Nonetheless, these rules do limit internal regulatory policies, and the discussion around prospective institutional modifications will play a crucial role in determining the effectiveness of addressing global environmental challenges like climate change (Green, 2005).

## **6. Environmental Economics**

Environmental economics concepts help in measuring the costs and benefits of various climate policy actions. This includes an understanding of economic instruments such as carbon taxes, emissions trading systems, and incentives for renewable energy (Nicholas Stern, 2006). According to Pollitt et al. (2013), behavioral economics may not drastically cut energy use as per the IEA's "450" climate policy scenario, but it helps identify areas for sustainable energy consumption changes. Its key role in climate policy involves shaping public perception about policy costs and aiding the development of a flexible energy demand responsive to changes in renewable energy supply due to weather. This is in line with the opinion of Kolstad & Toman (2005) that in climate policy discussions in the United States and beyond, economics has taken on a more noticeable and significant role compared to its involvement in other environmental issues. Environmental economists are challenged by the ambiguous economic grounds for stringent greenhouse gas reduction, with diverse views among experts creating uncertainty about climate change outcomes and the evaluation of mitigation strategies (Pindyck, 2012).

## **7. Environmental Politics**

Theoretical grounding in environmental politics helps understand the political dynamics that influence climate policymaking. It covers the role of interest groups, elections, and policy cycles. According to Kraft (2021) for over two decades, "Environmental Policy and Politics" has provided educators and students with current insights into the challenges posed by environmental, energy, and natural resource issues in the United States. Apart from that, according to Compston (2009), advancements in comprehending the political aspects of climate change have been somewhat slower, yet they are equally crucial for the implementation of necessary policies. In this regard, according to Mayrhofer & Gupta (2016), although the concept offers significant promise in addressing the issue of misaligned costs and benefits in climate policy over time and space, its practical impact is restricted. This limitation arises because its engagement is primarily among economists, with minimal cross-disciplinary efforts that also consider the political and institutional dimensions of co-benefits.

## **8. Social and Humanitarian**

Understanding the social and humanitarian aspects of climate change, such as community vulnerability, disaster response, and local adaptation, is important in designing policies that focus on human well-being (O'Brien et al., 2004). According to Eriksen et al. (2017), humanitarian interventions can spearhead transformative adaptation, necessitating changes in political and financial systems to include diverse vulnerability insights and challenge current development models. However, this responsibility shouldn't fall entirely on the humanitarian sector.

Apart from that, according to Florin Marin & Naess (2017) despite its promise, challenges like entrenched organizational cultures and existing financial models hinder progress. Addressing local social, historical, and political inequities is essential for effectively tackling humanitarian crises and climate change vulnerability. In the last forty years, climate services have transitioned from simple forecasting tools to key players in global climate change adaptation and risk assessment. Despite this, they've received limited attention from human geographers and critical risk theorists, who are more focused on the political dynamics of climate change and its global scientific impact (Nobert & Wen, 2022).

## **9. Technology and Innovation**

Theoretical foundations on technology and innovation help in understanding how technological developments can be used in climate change mitigation and adaptation, including renewable energy, low-emission vehicles, and green technology (Gaur et al., 2022). Substantial greenhouse gas (GHG) emission reductions with minimal social cost demand significant technological changes, especially in the energy sector, a point broadly agreed upon in international climate change discourse. However, experts differ on the best methods to drive this technological shift and its policy impacts. Implementing these strategies also poses practical challenges at both national and international levels (Grubb, 2004).

According to Popp (2006), economists have only recently started to incorporate the impact of induced innovation in climate policy models, partly because empirical evidence demonstrating the extent of these effects was not available until a short while ago. Significant changes in energy production and usage are essential to reduce greenhouse gas emissions and tackle climate change. The cost of technologies like alternative energy and improved efficiency will greatly influence the total expense. Government policies, particularly in environmental and R&D sectors, play a crucial role in promoting clean technology development, and understanding these policy incentives is key to assessing the effectiveness of climate policy (Popp, 2010).

## **10. Concept of Sustainable Development**

Finally, understanding the concept of sustainable development is the basis for climate policy aimed at achieving a balance between economic growth, social welfare, and environmental protection for present and future generations (Latacz-Lohmann et al., 2019). Merging the approaches, concepts, and methods of climate change and sustainable development could offer significant advantages. To illustrate this, we will first review recent progress in both the climate change and sustainable development sectors before addressing how to effectively combine these two areas (John B. Robinson and Deborah Herbert, 2001). According to Swart et al. (2003) integrating climate change and sustainable development is crucial for effectively tackling both, as stabilizing greenhouse gases is tied to socio-economic development. Climate policies should be central to broader socio-economic strategies, a concept supported by examples from the IPCC's Third Assessment Report in various economic sectors.

## **Conclusion**

From the results of a literature review in the field of climate and environmental policy, several key findings can be drawn: 1) mitigation and Adaptation Policies: climate change mitigation policies, including the use of renewable energy and carbon taxes, have become the main steps in efforts to reduce greenhouse gas emissions. Meanwhile, adaptation to the impacts of climate change, such as ecosystem restoration and urban planning that is resilient to climate change, is becoming increasingly important, especially in areas that are vulnerable to disasters. Policies must include a holistic approach that integrates mitigation and adaptation efforts. These policies must be designed to minimize environmental impacts while preparing society for inevitable climate change; 2) economic and Social Impacts: climate change can have significant economic impacts in sectors such as agriculture, food, and fisheries. Apart from that, social impacts such as inequality and the vulnerability of poor communities to climate disasters are also a major concern. Increasing the involvement of stakeholders from various levels of society can ensure that policies reflect their needs and expectations. Effective and inclusive participation mechanisms must be developed; 3) international Policy: The Paris



Agreement has been an important milestone in global efforts to address climate change. Although this agreement has great potential, there are still challenges in implementing and fulfilling commitments by developed and developing countries. It is important to regularly monitor and evaluate the implementation of climate and environmental policies to ensure that goals and targets achieve desired results. This evaluation should be the basis for policy improvements and adjustments; 4) stakeholder Engagement: active engagement of stakeholders from various sectors, including civil society, the private sector, NGOs, and local communities, has been proven to increase the effectiveness of climate and environmental policies. Countries must continue to cooperate within the framework of international agreements such as the Paris Agreement. This requires strong commitment and joint monitoring to ensure compliance with commitments and achievement of global emissions targets; 5) sustainability and Sustainable Development: the concept of sustainable development must be the focus in policy formulation. Policies that consider economic, social, and environmental aspects can contribute to achieving long-term sustainability goals. Efforts must be made to increase public understanding of climate change and its impacts. Public education and awareness can be important tools in supporting more sustainable policy implementation and behavior change.

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