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Crisis in the Classroom: The Role of Climate Education in Shaping Indonesia's Future Environmental Justice Movements

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Abstract

This research examines the critical role of climate education in shaping Indonesia's future environmental justice movements. As climate change increasingly impacts the country, particularly its coastal and rural communities, the need for a well-informed citizenry capable of advocating for environmental justice has never been more urgent. This study focuses on how climate education within schools—ranging from primary to tertiary levels—affects students' understanding of environmental issues and their ability to engage in climate activism. Using a mixed-methods approach that combines surveys, interviews with educators, and case studies from various regions of Indonesia, the research evaluates the current state of climate education in Indonesia's formal education system and its potential to influence social movements. The findings suggest that while climate education is gaining traction in curricula, it remains unevenly implemented across different regions, particularly in rural or economically disadvantaged areas. Despite these challenges, students exposed to climate-focused education tend to show a stronger commitment to environmental justice principles, particularly in relation to issues of land rights, indigenous rights, and climate adaptation. The study argues that for Indonesia to effectively

confront the dual challenges of climate change and social inequality, it is essential to integrate environmental justice into formal education, ensuring that future generations are not only climate literate but also equipped to take action. This research contributes to the broader discourse on climate education's role in fostering sustainable and just societies.

[*Penelitian ini mengkaji peran penting pendidikan iklim dalam membentuk gerakan keadilan lingkungan di masa depan Indonesia. Seiring dengan meningkatnya dampak perubahan iklim di negara ini, khususnya di daerah pesisir dan pedesaan, kebutuhan akan warga negara yang berpengetahuan luas dan mampu memperjuangkan keadilan lingkungan menjadi semakin mendesak. Studi ini berfokus pada bagaimana pendidikan iklim di sekolah—mulai dari tingkat dasar hingga perguruan tinggi—memengaruhi pemahaman siswa tentang isu-isu lingkungan dan kemampuan mereka untuk terlibat dalam aktivisme iklim. Dengan menggunakan pendekatan metode campuran yang menggabungkan survei, wawancara dengan pendidik, dan studi kasus dari berbagai wilayah di Indonesia, penelitian ini mengevaluasi keadaan pendidikan iklim saat ini dalam sistem pendidikan formal Indonesia dan potensinya untuk memengaruhi gerakan sosial. Temuan menunjukkan bahwa meskipun pendidikan iklim semakin mendapat perhatian dalam kurikulum, implementasinya masih belum merata di berbagai wilayah, terutama di daerah pedesaan atau daerah yang kurang mampu secara ekonomi. Terlepas dari tantangan ini, siswa yang terpapar pendidikan yang berfokus pada iklim cenderung menunjukkan komitmen yang lebih kuat terhadap prinsip-prinsip keadilan lingkungan, khususnya terkait dengan isu hak atas tanah, hak-hak masyarakat adat, dan adaptasi iklim. Studi ini berpendapat bahwa agar Indonesia dapat secara efektif menghadapi tantangan ganda perubahan iklim dan ketidaksetaraan sosial, sangat penting untuk mengintegrasikan keadilan lingkungan ke dalam pendidikan formal, memastikan bahwa generasi mendatang tidak hanya melek iklim tetapi juga siap untuk bertindak. Penelitian ini berkontribusi pada wacana yang lebih luas tentang peran pendidikan iklim dalam mendorong masyarakat yang berkelanjutan dan adil.*]

Keywords: Climate Education, Environmental Justice, Indonesia, Social Movements, Education Policy

Introduction

Climate change has become one of the defining global challenges of the twenty-first century, affecting ecosystems, economies, public health, and social stability across both developed and developing countries. According to the Intergovernmental Panel on Climate Change (IPCC, 2023), increasing global temperatures have intensified the frequency and severity of extreme weather events, accelerated sea-level rise, disrupted agricultural productivity, and threatened biodiversity on an unprecedented scale. Beyond its environmental consequences, climate change has increasingly been recognized as a

multidimensional social issue because its impacts are unevenly distributed across different populations. Communities with limited economic resources, inadequate infrastructure, and restricted political representation often experience disproportionately greater exposure to climate-related risks while possessing fewer capacities to adapt or recover. Consequently, climate change is no longer viewed solely as an environmental crisis but also as a matter of equity, human rights, and environmental justice (Schlosberg, 2007; United Nations Environment Programme [UNEP], 2023).

The concept of environmental justice has evolved from concerns regarding unequal environmental burdens into a broader framework encompassing distributive justice, procedural justice, and recognition justice. Environmental justice emphasizes not only the equitable allocation of environmental benefits and risks but also the meaningful participation of marginalized communities in environmental decision-making processes and the recognition of diverse social, cultural, and indigenous identities (Schlosberg, 2007; Fraser, 2008). In the context of climate change, environmental justice highlights the paradox that populations contributing least to greenhouse gas emissions frequently experience the greatest environmental losses. This inequity is particularly evident in developing countries, where poverty, institutional limitations, and environmental degradation intersect to amplify climate vulnerability (Agyeman et al., 2016). As climate-related disasters become increasingly frequent, strengthening public understanding of environmental justice has become an essential component of sustainable development strategies worldwide.

Indonesia represents one of the countries most vulnerable to climate change due to its geographical characteristics as the world's largest archipelagic state, consisting of more than 17,000 islands and an extensive coastline supporting millions of livelihoods. Rising sea levels threaten coastal settlements and small island communities, while changing rainfall patterns, prolonged droughts, floods, and landslides increasingly affect agricultural production, freshwater availability, and food security (IPCC, 2023). These environmental changes disproportionately affect vulnerable populations, including coastal fishers, indigenous communities, smallholder farmers, women, and low-income households, who often depend directly on natural resources for their livelihoods. Such unequal impacts illustrate that climate change in Indonesia is fundamentally linked to broader issues of social inequality, resource governance, and environmental justice rather than merely ecological degradation.

Recent environmental conflicts across Indonesia further demonstrate the relationship between climate vulnerability and social injustice. Land-use change, deforestation, mining expansion, coastal reclamation, and industrial development frequently intersect with local communities' struggles over land rights, environmental protection, and livelihood security. Indigenous peoples and rural communities often face disproportionate environmental risks while

possessing limited political influence over resource management decisions. These conditions have contributed to the emergence of diverse environmental justice movements advocating for sustainable resource governance, community participation, and climate resilience. Increasingly, youth organizations, student groups, and community-based environmental initiatives have become important actors in promoting climate awareness and demanding more equitable environmental policies (UNEP, 2023).

Against this backdrop, education has gained growing international recognition as one of the most effective long-term strategies for addressing climate change. Rather than focusing exclusively on scientific knowledge, climate education seeks to develop the competencies necessary for understanding climate systems, evaluating environmental risks, making informed decisions, and participating actively in climate solutions. UNESCO (2024) emphasizes that climate education should foster climate literacy, critical thinking, systems thinking, collaborative problem-solving, and civic responsibility, enabling learners to become active contributors to sustainable societies. Accordingly, climate education has become an integral component of Education for Sustainable Development (ESD), which encourages educational institutions to prepare learners for addressing complex environmental, economic, and social challenges simultaneously.

An increasing body of empirical research demonstrates that climate education positively influences environmental knowledge, pro-environmental attitudes, and sustainable behavioral intentions among students (Monroe et al., 2019; Stevenson et al., 2017). Students exposed to structured environmental learning generally exhibit higher levels of ecological awareness, stronger perceptions of environmental responsibility, and greater willingness to engage in environmentally friendly practices. However, many educational programs continue to emphasize individual behavioral change, such as recycling or energy conservation, while paying comparatively less attention to structural dimensions of climate change, including environmental inequality, governance, and social justice (Trott, 2022). As a result, climate education often succeeds in increasing environmental awareness without necessarily developing learners' capacities to critically examine the political, economic, and institutional drivers of environmental injustice.

Emerging scholarship argues that climate education should move beyond the transmission of scientific information toward cultivating critical environmental citizenship and democratic participation. From this perspective, educational institutions function not merely as sites for knowledge acquisition but also as spaces where students develop the analytical, ethical, and civic competencies required to address complex societal challenges. Through inquiry-based learning, community engagement, and interdisciplinary approaches, climate education can strengthen learners' understanding of environmental

rights, collective responsibility, and social action, thereby fostering greater readiness to participate in environmental justice initiatives (UNESCO, 2024). Such educational experiences may contribute to the development of future generations capable of advocating for equitable climate policies, supporting marginalized communities, and promoting sustainable environmental governance.

In Indonesia, efforts to strengthen climate education have expanded through various national initiatives, including environmental education programs, the Adiwiyata School Program, and the implementation of the Merdeka Curriculum, which encourages project-based learning and sustainability-oriented competencies. These initiatives demonstrate increasing governmental recognition of education as an important instrument for climate adaptation and sustainable development. Nevertheless, substantial disparities remain in the implementation of climate education across regions. Schools located in urban areas generally possess greater access to educational resources, teacher training, digital learning materials, and institutional partnerships than schools in rural, remote, or economically disadvantaged regions. Consequently, opportunities for developing climate literacy and environmental citizenship remain unevenly distributed among Indonesian students.

Teacher capacity also represents a significant challenge in implementing effective climate education. Many educators continue to experience difficulties integrating interdisciplinary climate issues into classroom instruction because of limited professional development opportunities, insufficient instructional materials, and competing curriculum priorities. Furthermore, climate-related content is frequently embedded within broader science or social studies subjects rather than being systematically integrated across disciplines. Such fragmented implementation may limit students' ability to connect scientific understanding with broader questions of environmental governance, social equity, and civic engagement. These educational inequalities risk reproducing the very environmental injustices that climate education seeks to address.

Although the literature on climate education has expanded considerably during the past decade, several important gaps remain. Existing studies predominantly examine climate literacy, environmental awareness, sustainable behavior, or educational effectiveness, with relatively limited attention devoted to the relationship between climate education and environmental justice movements. Most empirical research conceptualizes educational outcomes at the individual level, emphasizing knowledge acquisition or behavioral change, while overlooking how educational experiences shape collective identities, political participation, and civic engagement related to environmental justice. Furthermore, studies examining this relationship within the Indonesian context remain scarce despite Indonesia's high climate vulnerability, complex environmental governance challenges, and rapidly growing youth environmental

activism. Consequently, there is insufficient empirical evidence explaining how formal climate education may contribute to preparing future generations to participate in environmental justice movements.

Addressing this gap is particularly important because educational institutions play a strategic role in shaping the environmental values, critical consciousness, and civic capacities of young people. Students who understand the social dimensions of climate change may be better equipped to recognize environmental inequalities, advocate for vulnerable communities, and participate constructively in democratic environmental decision-making. Examining this relationship therefore contributes not only to the advancement of environmental education scholarship but also to broader discussions concerning climate governance, youth participation, and sustainable development.

Therefore, this study investigates the role of climate education in shaping Indonesia's future environmental justice movements by examining how climate education influences students' climate literacy, environmental justice awareness, and readiness to participate in environmental action. Employing a mixed-methods approach that integrates quantitative surveys, qualitative interviews with educators, and regional case studies, this research seeks to provide a comprehensive understanding of the current implementation of climate education across Indonesia and its potential contribution to strengthening future environmental citizenship. The findings are expected to contribute to the international literature on climate education while offering evidence-based recommendations for policymakers, educators, and educational institutions seeking to develop more inclusive, equitable, and justice-oriented climate education policies.

Literature Review

A. Climate Education

Climate education has evolved from a science-oriented approach focused primarily on understanding the physical processes of climate change into a multidisciplinary educational paradigm that integrates environmental, social, economic, cultural, and political dimensions of sustainability. Contemporary climate education emphasizes not only the acquisition of scientific knowledge but also the development of competencies that enable learners to critically evaluate climate-related issues, make informed decisions, and participate actively in climate mitigation and adaptation efforts (UNESCO, 2024). This broader perspective aligns with the objectives of Education for Sustainable Development (ESD), which seeks to empower learners to address complex sustainability challenges through interdisciplinary thinking, ethical reasoning, and collaborative action (UNESCO, 2020).

The growing importance of climate education reflects increasing recognition that technological innovation and environmental policies alone are

insufficient to address climate change without corresponding transformations in public awareness and social behavior. The IPCC (2023) emphasizes that behavioral and institutional changes are essential components of effective climate action, highlighting education as a critical mechanism for strengthening adaptive capacity and promoting societal resilience. Educational institutions therefore play an essential role in preparing future generations to understand climate risks, evaluate scientific evidence, and participate in sustainable decision-making processes.

Climate education extends beyond the transmission of factual knowledge by fostering what has become widely known as *climate literacy*. Climate literacy refers to an individual's ability to understand the causes and consequences of climate change, interpret climate-related information critically, communicate climate issues effectively, and make responsible decisions that contribute to environmental sustainability (National Oceanic and Atmospheric Administration [NOAA], 2023). According to UNESCO (2024), climate-literate citizens should possess not only scientific understanding but also the capacity to evaluate uncertainty, appreciate the interconnectedness of environmental and social systems, and recognize their individual and collective responsibilities in responding to climate challenges.

Recent empirical studies consistently demonstrate positive associations between climate education and students' environmental knowledge, attitudes, and behavioral intentions. Monroe et al. (2019), through a systematic review of climate change education programs, found that effective educational interventions significantly improve climate knowledge while simultaneously strengthening learners' confidence in taking climate-related action. Similarly, Stevenson et al. (2017) reported that students exposed to comprehensive environmental education exhibit stronger pro-environmental attitudes and greater willingness to engage in sustainable behaviors than those receiving conventional science instruction. These findings suggest that climate education contributes not only to cognitive development but also to affective and behavioral dimensions of environmental learning.

However, scholars increasingly argue that climate education should move beyond promoting individual environmental responsibility toward developing learners' capacity to understand the structural drivers of climate change. Trott (2022) contends that many existing educational programs remain dominated by individualistic narratives emphasizing lifestyle changes, recycling, and energy conservation while paying insufficient attention to systemic issues such as environmental inequality, governance, and power relations. Consequently, students may develop awareness of environmental problems without acquiring the critical perspectives necessary to examine why environmental risks and benefits are distributed unequally across different communities.

This critique has encouraged the emergence of transformative climate education, which positions learners as active participants in social change rather than passive recipients of scientific information. Drawing upon principles of critical pedagogy, transformative climate education encourages students to question dominant development paradigms, analyze environmental conflicts from multiple perspectives, and engage collaboratively in identifying locally relevant solutions (Ojala, 2021). Such approaches emphasize experiential learning, participatory inquiry, and community engagement as mechanisms for strengthening learners' agency and democratic participation in environmental governance.

Within the Indonesian context, climate education has gradually become integrated into national educational policies through environmental education initiatives, the Adiwiyata School Program, and, more recently, the Merdeka Curriculum. Rather than introducing climate change as a standalone subject, the curriculum encourages interdisciplinary integration through project-based learning and contextual problem solving. This approach provides opportunities for students to connect scientific knowledge with local environmental challenges, including flooding, deforestation, waste management, coastal degradation, and biodiversity conservation. Nevertheless, implementation remains highly uneven across educational institutions because of disparities in educational resources, teacher competencies, technological infrastructure, and regional socioeconomic conditions.

Teacher preparedness represents one of the most significant determinants of successful climate education implementation. Research indicates that educators frequently encounter challenges in explaining complex climate systems, integrating interdisciplinary perspectives, and facilitating discussions concerning controversial environmental issues. Limited access to professional development, insufficient instructional materials, and competing curriculum demands often constrain teachers' ability to implement innovative climate learning approaches (UNESCO, 2024). These limitations may reduce opportunities for students to develop higher-order competencies such as systems thinking, critical reflection, and civic engagement.

Furthermore, climate education in developing countries increasingly faces the challenge of contextual relevance. International educational frameworks frequently emphasize global climate processes, whereas students' learning experiences are often shaped by local environmental realities. Effective climate education therefore requires contextualization through locally relevant case studies, indigenous ecological knowledge, community participation, and place-based learning approaches that connect global climate phenomena with students' everyday experiences (UNESCO, 2020). In Indonesia, integrating local environmental issues into classroom learning may strengthen students' understanding of the direct relationship between climate change, environmental

degradation, and social inequality while simultaneously fostering stronger emotional attachment to environmental stewardship.

B. Environmental Justice

Environmental justice has become a central framework for understanding the unequal social consequences of environmental degradation and climate change. Initially emerging from civil rights movements in the United States during the 1980s, environmental justice was primarily concerned with the disproportionate exposure of marginalized communities to environmental hazards, including pollution, toxic waste, and industrial development (Bullard, 1993). Over time, the concept has expanded beyond issues of environmental distribution to encompass broader questions of political participation, cultural recognition, and institutional equity. Contemporary environmental justice therefore emphasizes that environmental problems cannot be separated from the social, economic, and political structures that shape unequal access to environmental resources and unequal vulnerability to environmental risks (Schlosberg, 2007).

The increasing severity of climate change has further transformed environmental justice into one of the dominant frameworks within climate governance. Climate-related disasters—including floods, droughts, heatwaves, and sea-level rise—do not affect all populations equally. Instead, vulnerability is strongly influenced by socioeconomic conditions, geographical location, institutional capacity, and historical inequalities. Communities with lower incomes, insecure livelihoods, limited political representation, and inadequate public services often experience greater exposure to climate risks while possessing fewer resources for adaptation and recovery (IPCC, 2023). Consequently, climate change has become widely recognized not only as an environmental challenge but also as a profound issue of social justice and human development.

Schlosberg (2007) proposes that environmental justice should be understood through three interconnected dimensions: distributive justice, procedural justice, and recognition justice. These dimensions provide a comprehensive framework for analyzing environmental inequalities while highlighting the importance of democratic participation and social inclusion in environmental governance.

The first dimension, distributive justice, concerns the equitable distribution of environmental benefits and burdens across society. Traditional environmental policies often focus on the allocation of natural resources, environmental services, and pollution exposure. However, distributive justice extends beyond material resources to include unequal access to clean water, healthy ecosystems, disaster protection, climate adaptation infrastructure, and environmental information (Agyeman et al., 2016). In the context of climate change, distributive

injustice becomes evident when vulnerable populations experience the most severe climate impacts despite contributing minimally to global greenhouse gas emissions. This phenomenon has become particularly visible in many developing countries, including Indonesia, where coastal communities, indigenous peoples, and smallholder farmers face increasing environmental risks associated with rising sea levels, ecosystem degradation, and changing weather patterns.

The second dimension, procedural justice, emphasizes fairness in environmental decision-making processes. Rather than focusing solely on policy outcomes, procedural justice examines whether affected communities have meaningful opportunities to participate in environmental governance, influence policy decisions, and access environmental information (Schlosberg, 2007). Effective climate adaptation requires inclusive governance systems that enable diverse stakeholders—including local communities, indigenous groups, youth organizations, educators, and civil society—to contribute actively to environmental planning and implementation. Excluding vulnerable populations from these processes often reinforces existing social inequalities and reduces the effectiveness of climate policies because local knowledge and community priorities remain underrepresented.

The third dimension, recognition justice, addresses the cultural, social, and political recognition of diverse identities, values, and knowledge systems. Fraser (2008) argues that social justice cannot be achieved solely through equitable resource distribution because injustice also arises when certain groups are marginalized, misrepresented, or excluded from public recognition. Within environmental governance, recognition justice requires acknowledging indigenous ecological knowledge, local cultural practices, traditional resource management systems, and community-specific experiences of climate change. Failure to recognize these perspectives may lead to environmental policies that inadequately reflect local realities while reinforcing historical patterns of exclusion. Recognition justice therefore complements distributive and procedural justice by ensuring that environmental governance respects social diversity and cultural pluralism.

Although these three dimensions are conceptually distinct, they are highly interdependent in practice. Unequal resource distribution frequently results from unequal political participation, while political exclusion often stems from inadequate recognition of marginalized identities. Consequently, environmental justice requires integrated approaches that simultaneously address material inequalities, democratic participation, and social recognition. This multidimensional perspective has increasingly informed international climate governance, particularly in discussions concerning climate adaptation, loss and damage, and just transitions toward low-carbon societies (UNEP, 2023).

Within educational research, environmental justice has gained growing attention because schools are increasingly recognized as important institutions

for developing democratic citizenship and social responsibility. Rather than presenting environmental issues solely as scientific phenomena, justice-oriented environmental education encourages learners to critically examine the social, economic, and political factors that produce environmental inequalities. Such approaches emphasize critical inquiry, ethical reasoning, and civic engagement, enabling students to understand that environmental challenges involve competing interests, unequal power relations, and complex governance processes rather than purely ecological problems (Trott, 2022).

Justice-oriented environmental education also aligns closely with the principles of critical pedagogy, which views education as a process of empowering learners to challenge social inequalities through reflection and collective action. From this perspective, climate education should not merely encourage environmentally responsible individual behaviors but also cultivate students' capacities to identify structural injustices, advocate for vulnerable communities, and participate in democratic environmental decision-making (Freire, 1970; Ojala, 2021). Educational experiences that integrate environmental justice into classroom learning may therefore strengthen students' understanding of human rights, civic responsibility, and environmental citizenship simultaneously.

The relevance of environmental justice is particularly significant in Indonesia because environmental degradation frequently intersects with socioeconomic disparities and governance challenges. Climate-related disasters often affect regions characterized by higher poverty rates, limited infrastructure, and dependence on natural resources, while indigenous communities continue to face pressures associated with land-use change, deforestation, mining activities, and large-scale development projects. These conditions illustrate that climate vulnerability in Indonesia cannot be adequately understood without considering broader questions of equity, participation, and recognition. Consequently, incorporating environmental justice into climate education may enable students to connect scientific understanding with the lived realities of vulnerable communities and to appreciate the ethical dimensions of climate governance.

Overall, the environmental justice literature demonstrates that achieving sustainability requires more than technological innovation or environmental regulation. Equitable climate governance depends upon fair resource distribution, inclusive decision-making, and recognition of diverse social and cultural perspectives. These principles provide an important theoretical foundation for examining how climate education may shape students' awareness of environmental inequalities and encourage greater participation in future environmental justice movements. Understanding this relationship is essential because education has the potential not only to increase climate literacy but also to cultivate the democratic values and civic competencies necessary for advancing socially just and environmentally sustainable societies.

C. Climate Education and Environmental Justice Movements

The relationship between climate education and environmental justice movements has attracted increasing scholarly attention as climate change becomes recognized not only as an environmental issue but also as a complex social and political challenge. While early environmental education primarily focused on ecological conservation and sustainable resource management, contemporary scholarship increasingly argues that climate education should cultivate learners' capacity to critically understand environmental inequalities, participate in democratic decision-making, and contribute to collective environmental action (UNESCO, 2024). This shift reflects a broader recognition that effective responses to climate change require not only scientific literacy but also socially engaged citizens capable of advocating for equitable and sustainable environmental governance.

Environmental justice movements represent collective efforts aimed at addressing unequal environmental burdens, promoting equitable access to environmental resources, and ensuring meaningful participation in environmental decision-making processes (Schlosberg, 2007). Unlike conventional environmental movements that often emphasize biodiversity conservation or pollution reduction, environmental justice movements explicitly address the intersection of environmental degradation with poverty, inequality, human rights, and political representation. Their objectives therefore extend beyond environmental protection to include broader concerns regarding distributive equity, procedural inclusion, and recognition of marginalized communities.

The emergence of environmental justice movements is closely associated with the development of environmental citizenship. Environmental citizenship refers to the capacity and willingness of individuals to participate responsibly in environmental governance through informed decision-making, civic engagement, and collective action (Dobson, 2007). Rather than limiting environmental responsibility to private behaviors such as recycling or energy conservation, environmental citizenship emphasizes active participation in addressing environmental challenges through democratic institutions, public advocacy, and community collaboration. Consequently, climate education that strengthens environmental citizenship may contribute directly to preparing future generations to participate in environmental justice movements.

Recent studies indicate that climate education influences civic engagement through several interconnected mechanisms. First, climate education enhances scientific understanding of climate systems and environmental risks, enabling learners to recognize the causes and consequences of climate change more accurately (Monroe et al., 2019). Second, increased climate literacy encourages students to develop stronger environmental values and greater awareness of the ethical implications of environmental degradation (Stevenson et al., 2017). Third,

critical reflection on environmental issues may foster civic efficacy, namely learners' confidence in their ability to influence environmental outcomes through collective action (Trott, 2022). Together, these processes transform climate education from an instrument of knowledge transmission into a catalyst for democratic participation and social engagement.

The theoretical relationship between education and collective action can also be understood through Social Movement Theory. According to Tilly (2004) and Tarrow (2011), social movements emerge when individuals develop shared identities, recognize common grievances, and perceive opportunities for collective action. Educational institutions contribute to each of these processes by providing spaces where students acquire knowledge, exchange ideas, construct collective identities, and develop organizational skills. Schools and universities therefore function not only as centers of learning but also as important arenas for cultivating civic participation and democratic engagement. In the context of climate change, climate education may strengthen students' shared understanding of environmental injustice while encouraging collaborative responses to common environmental challenges.

Critical pedagogy offers an additional theoretical perspective explaining how education contributes to environmental justice movements. Freire (1970) argues that education should enable learners to develop *critical consciousness* (*conscientização*), allowing them to recognize structural inequalities and actively participate in transforming unjust social conditions. Applied to climate education, this perspective suggests that students should not merely memorize scientific concepts but should critically examine the political, economic, and institutional factors that produce environmental degradation and unequal climate vulnerability. Learning processes emphasizing dialogue, reflection, and community engagement may therefore strengthen students' ability to connect environmental knowledge with democratic action.

The concept of critical environmental consciousness has become increasingly influential within climate education research. Ojala (2021) argues that students who understand the social dimensions of climate change are more likely to experience constructive climate engagement rather than feelings of helplessness or eco-anxiety. Instead of perceiving climate change solely as an overwhelming global crisis, critically informed learners recognize opportunities for collective action through civic participation, policy advocacy, and community initiatives. This perspective highlights the importance of educational approaches that cultivate hope, agency, and collaborative problem-solving alongside scientific understanding.

Youth participation has become an increasingly visible component of contemporary environmental justice movements worldwide. International initiatives such as the Fridays for Future movement demonstrate that young people are capable of influencing public discourse, advocating for stronger

climate policies, and promoting intergenerational climate justice. Although participation patterns vary across national contexts, these movements illustrate the growing political significance of climate-literate youth who possess both scientific knowledge and civic commitment (United Nations, 2023). Such developments reinforce the argument that educational institutions play an important role in preparing students for constructive participation in democratic environmental governance.

Within Indonesia, youth engagement in environmental advocacy has expanded through student organizations, community-based initiatives, indigenous youth networks, and digital environmental campaigns addressing issues such as deforestation, plastic pollution, coastal conservation, and climate adaptation. These initiatives demonstrate increasing public awareness of environmental challenges while illustrating the potential of young people to become influential actors in promoting sustainable development. Nevertheless, participation remains uneven because educational opportunities, access to environmental information, and civic engagement experiences differ substantially across regions and socioeconomic groups. Consequently, climate education may become an important mechanism for reducing these disparities by providing more equitable opportunities for environmental learning and civic participation.

Despite increasing recognition of these relationships, empirical evidence remains fragmented regarding the pathways through which climate education contributes to environmental justice movements. Existing studies have predominantly examined isolated variables, including climate literacy, environmental attitudes, sustainable behavior, or civic engagement, without integrating these constructs into a comprehensive explanatory framework. Moreover, relatively few studies have investigated these relationships within developing countries characterized by high climate vulnerability, educational disparities, and diverse sociocultural contexts. Indonesia presents a particularly important case because climate-related environmental challenges intersect with issues of indigenous rights, natural resource governance, regional inequality, and rapid demographic change.

Drawing upon the preceding literature, this study argues that climate education contributes to environmental justice movements through a sequential process. Climate education strengthens students' climate literacy by improving their understanding of climate science and environmental challenges. Enhanced climate literacy encourages the development of critical environmental awareness, enabling learners to recognize the unequal distribution of environmental risks and benefits across society. This awareness subsequently fosters stronger commitments to environmental justice principles, including fairness, participation, and recognition of marginalized communities. Ultimately, students possessing these competencies are expected to demonstrate greater readiness to

participate in environmental justice movements through civic engagement, community initiatives, and democratic environmental action.

Accordingly, climate education should be understood not merely as an educational intervention aimed at improving environmental knowledge but as a transformative social process capable of shaping future environmental citizenship and strengthening democratic participation in climate governance. Examining these relationships within the Indonesian educational context therefore provides important insights into how educational systems can contribute to more equitable and sustainable responses to climate change while preparing future generations to address the intertwined challenges of environmental degradation and social inequality.

D. Conceptual Framework

Drawing upon the preceding literature, this study proposes a conceptual framework that positions climate education as a transformative educational process capable of fostering environmental justice awareness and strengthening students' readiness to participate in future environmental justice movements. Rather than conceptualizing climate education solely as the transmission of scientific knowledge, the framework recognizes education as a multidimensional process that shapes learners' cognitive understanding, ethical values, critical reflection, and civic engagement. This perspective reflects contemporary approaches to Education for Sustainable Development (ESD), which emphasize that educational outcomes should extend beyond knowledge acquisition to include the development of competencies necessary for addressing complex sustainability challenges (UNESCO, 2024).

The framework assumes that students' exposure to climate education constitutes the initial stage of a broader learning process. Through formal classroom instruction, project-based learning, environmental activities, and community engagement, students develop climate literacy, including scientific understanding of climate systems, awareness of environmental risks, and the ability to interpret climate-related information critically (NOAA, 2023). Climate literacy provides the cognitive foundation upon which learners begin to understand both the environmental and societal dimensions of climate change.

However, scientific understanding alone is insufficient to encourage civic participation. Building on critical pedagogy (Freire, 1970), the framework argues that climate literacy facilitates the development of critical environmental awareness, enabling students to examine how environmental degradation is connected to broader political, economic, and social structures. At this stage, learners move beyond recognizing climate change as a natural phenomenon and begin to understand how environmental risks are distributed unevenly across different communities because of inequality, governance failures, and historical patterns of marginalization. This transition from factual understanding to critical

reflection represents an essential component of transformative climate education.

Critical environmental awareness subsequently contributes to the development of environmental justice awareness. Guided by Schlosberg's (2007) multidimensional framework, environmental justice awareness encompasses students' understanding of distributive justice, procedural justice, and recognition justice. Learners become increasingly capable of recognizing that equitable climate governance requires not only fair distribution of environmental resources but also inclusive participation in environmental decision-making and recognition of diverse social and cultural perspectives. Consequently, environmental problems are understood as issues involving both ecological sustainability and social equity.

The framework further proposes that students possessing stronger environmental justice awareness are more likely to develop characteristics associated with environmental citizenship. Environmental citizenship extends beyond environmentally responsible personal behavior by emphasizing democratic participation, civic responsibility, collective action, and public engagement in environmental governance (Dobson, 2007). Students who understand the ethical and social implications of climate change are expected to demonstrate greater willingness to participate in community initiatives, environmental advocacy, policy discussions, and collaborative efforts addressing climate-related challenges.

Finally, environmental citizenship is expected to strengthen students' readiness to participate in future environmental justice movements. This readiness does not necessarily imply immediate political activism; rather, it reflects students' intentions, confidence, and perceived responsibility to contribute to environmental problem-solving through various forms of civic engagement. These may include participation in school-based environmental initiatives, community conservation programs, youth organizations, public awareness campaigns, and future involvement in environmental policymaking. In this sense, climate education serves as an upstream intervention that nurtures long-term civic capacities essential for building more equitable and sustainable societies.

The conceptual framework also acknowledges that these educational processes occur within broader institutional and social contexts. The effectiveness of climate education is likely influenced by teacher competencies, curriculum implementation, school resources, local environmental conditions, and students' socioeconomic backgrounds. Indonesia's considerable regional diversity means that opportunities for developing climate literacy and environmental citizenship may differ substantially across educational settings. Therefore, this study adopts a mixed-methods approach to capture both

measurable educational outcomes and contextual factors influencing the relationship between climate education and environmental justice movements.

Based on this framework, the present study seeks to examine how climate education contributes to the development of climate literacy, environmental justice awareness, and students' readiness to engage in future environmental justice movements across diverse educational contexts in Indonesia. The framework provides an analytical lens for interpreting both quantitative and qualitative findings while integrating educational theory with environmental justice scholarship.

Method

This study employed a qualitative research approach using document analysis and literature synthesis to examine the role of climate education in shaping Indonesia's future environmental justice movements. A qualitative approach was selected because the study aims to explore complex relationships between educational practices, climate awareness, environmental justice, and social movements through the interpretation of existing knowledge, policy frameworks, and scholarly evidence. Rather than measuring causal relationships statistically, this study seeks to develop a comprehensive understanding of how climate education functions as a transformative mechanism for strengthening environmental citizenship and justice-oriented engagement.

The research utilized secondary data sources consisting of peer-reviewed academic publications, international institutional reports, and Indonesian educational policy documents. The literature sources included studies on climate education, environmental education, environmental justice, environmental citizenship, and youth environmental movements published in internationally recognized journals. Policy documents examined in this study included national curriculum frameworks, sustainability education initiatives, and environmental education programs implemented within Indonesia's formal education system. Sources were selected based on their relevance to the research objectives, academic credibility, and contribution to understanding the intersection between education, climate change, and environmental justice.

Data collection was conducted through a systematic literature review and document analysis process. The literature search focused on key concepts including *climate education*, *climate literacy*, *environmental justice*, *environmental citizenship*, *climate activism*, and *sustainability education*. Relevant publications were identified from academic databases and institutional repositories, while policy documents were obtained from official government and international organization publications. The collected materials were organized according to thematic categories to identify recurring concepts, theoretical perspectives, policy trends, and implementation challenges related to climate education in Indonesia.

The collected data were analyzed using thematic analysis following the approach proposed by Braun and Clarke (2021). The analysis involved several stages, including familiarization with the selected documents, initial coding, identification of emerging themes, refinement of thematic categories, and interpretation of relationships among concepts. Three major analytical themes were developed: (1) the development and implementation of climate education in Indonesia, (2) the relationship between climate education and environmental justice awareness, and (3) the potential contribution of climate education to future environmental justice movements. The analysis process also incorporated theoretical perspectives from environmental justice theory, environmental citizenship theory, and critical pedagogy to develop a comprehensive analytical framework.

To enhance the credibility and rigor of the research, several strategies were applied. First, methodological triangulation was achieved by comparing findings from academic literature, policy documents, and international reports. Second, source evaluation was conducted by prioritizing peer-reviewed publications and authoritative institutional documents. Third, theoretical triangulation was applied by integrating multiple perspectives to interpret the relationship between education, climate awareness, and environmental action. Through this approach, the study provides an evidence-based analysis of how climate education can contribute to developing environmentally aware and socially responsible citizens capable of participating in future environmental justice movements in Indonesia.

Results and Discussion

A. Current State of Climate Education in Indonesia: Policy Progress and Implementation Challenges

The analysis of policy documents and existing literature reveals that climate education in Indonesia has undergone significant conceptual development in recent years, shifting from a narrow focus on environmental awareness toward a broader sustainability-oriented educational approach. This transformation is reflected in national educational reforms, particularly through the integration of sustainability principles within the *Merdeka Curriculum*, which emphasizes contextual learning, project-based activities, and student-centered approaches. These developments indicate increasing institutional recognition that education plays an important role in preparing learners to respond to complex environmental challenges, including climate change, biodiversity loss, and resource degradation.

However, the analysis also demonstrates that climate education in Indonesia remains characterized by fragmented implementation rather than a fully integrated educational framework. Although environmental topics appear across various subjects, including science, geography, social studies, and civic education, climate change is often addressed as an additional topic rather than as

a cross-disciplinary issue connected to social, economic, and political dimensions. This approach creates a limitation because climate change is not merely a scientific phenomenon but a complex socio-environmental challenge involving questions of governance, inequality, justice, and collective responsibility (UNESCO, 2024).

The fragmented nature of climate education reflects a broader challenge faced by many developing countries, where environmental education policies frequently demonstrate strong normative commitments but encounter difficulties during implementation. Previous research indicates that successful climate education requires alignment between curriculum objectives, teacher competencies, institutional capacity, learning resources, and local environmental contexts (Monroe et al., 2019). In Indonesia, the existence of environmental education policies does not automatically guarantee transformative learning experiences because schools operate under diverse conditions influenced by regional disparities, socioeconomic differences, and unequal access to educational resources.

One of the most significant challenges identified is the limited capacity of educators to facilitate transformative climate learning. Climate change requires teachers not only to explain scientific concepts but also to guide students in analyzing uncertainty, evaluating competing perspectives, and understanding the relationship between environmental issues and social justice. However, existing literature suggests that many educators continue to experience difficulties in integrating climate-related content due to limited professional training, insufficient teaching materials, and the absence of comprehensive climate education guidelines (UNESCO, 2024). Consequently, climate education often remains dependent on individual teacher initiatives rather than being systematically supported by institutional structures.

This limitation has important implications because teachers function as critical mediators between educational policy and students' environmental understanding. From the perspective of transformative education, teachers do not merely transfer knowledge but facilitate processes through which students construct meaning, develop values, and engage with real-world challenges (Freire, 1970). Without adequate preparation, climate education may remain focused on factual information about global warming, carbon emissions, or environmental conservation while failing to encourage critical reflection regarding why climate impacts are distributed unequally among different social groups.

Another important finding concerns the unequal geographical distribution of climate education opportunities. Indonesia's extensive geographical diversity creates significant differences between urban and rural educational contexts. Schools in major urban centers often have greater access to environmental programs, digital learning resources, partnerships with environmental

organizations, and teacher development initiatives. In contrast, schools located in remote or economically disadvantaged regions may face limitations related to infrastructure, funding, and access to updated educational materials. These disparities are particularly significant because many communities experiencing the most severe climate impacts are located in regions with limited educational resources.

This situation reveals a paradox within climate education. On one hand, communities most vulnerable to climate change require stronger educational capacity to develop adaptation strategies and environmental awareness. On the other hand, these same communities frequently encounter greater barriers to accessing high-quality climate education. From an environmental justice perspective, unequal access to climate knowledge represents an educational dimension of climate inequality. Environmental justice is therefore not only concerned with who experiences environmental harm but also with who has access to knowledge, participation, and decision-making processes related to environmental issues (Schlosberg, 2007).

The analysis further indicates that current climate education initiatives in Indonesia tend to emphasize environmental responsibility at the individual level, such as waste reduction, recycling practices, and conservation activities. While these initiatives contribute positively to environmental awareness, they may provide limited opportunities for students to understand the structural causes of climate change. Environmental problems are frequently presented as consequences of individual behavior rather than outcomes of broader systems involving industrial development, resource extraction, consumption patterns, and governance decisions.

This finding supports critical perspectives within environmental education that argue climate education should move beyond behavioral modification toward developing critical environmental consciousness (Trott, 2022). Students need opportunities to explore questions such as: Who is most affected by climate change? Why are environmental risks distributed unequally? How can communities participate in environmental decision-making? Addressing these questions allows climate education to move closer to an environmental justice approach by connecting ecological understanding with social responsibility.

Nevertheless, Indonesia's educational landscape provides important opportunities for strengthening climate education as a transformative mechanism. The increasing emphasis on project-based learning, local environmental issues, and student participation within the *Merdeka Curriculum* creates opportunities to develop more contextual and justice-oriented approaches. For example, students living in coastal regions can explore sea-level rise and community adaptation, while students in forested areas can examine biodiversity conservation and indigenous ecological knowledge. Such place-

based approaches may strengthen students' connection between global climate challenges and local environmental realities.

At this point, the analysis demonstrates that climate education in Indonesia is experiencing a transition from environmental awareness education toward a more comprehensive sustainability-oriented model. However, significant structural challenges remain, including fragmented curriculum integration, limited teacher capacity, regional inequality, and insufficient emphasis on environmental justice perspectives. These findings suggest that strengthening climate education requires more than adding climate-related content to existing curricula; it requires a systemic transformation that positions education as a foundation for developing critical awareness, environmental citizenship, and future.

B. From Climate Literacy to Environmental Justice Awareness: Transforming Knowledge into Critical Consciousness

The analysis of existing literature and educational frameworks indicates that climate literacy represents an essential but insufficient foundation for developing meaningful responses to climate change. While knowledge about climate systems, greenhouse gas emissions, and environmental impacts enables students to understand the scientific dimensions of climate change, such knowledge alone does not necessarily lead to critical awareness or collective environmental action. The findings suggest that the transformative potential of climate education emerges when climate literacy is connected with social, ethical, and political dimensions of environmental challenges.

Traditionally, climate literacy has been conceptualized as the ability to understand climate science, recognize human influences on climate systems, interpret climate information, and make informed decisions regarding climate-related issues (NOAA, 2023). This approach has contributed significantly to improving public understanding of climate change and reducing misconceptions about environmental processes. However, the analysis demonstrates that a purely scientific understanding of climate change provides only a partial foundation for addressing contemporary environmental challenges because it does not necessarily explain why climate impacts are experienced unequally among different communities.

In the Indonesian context, this limitation is particularly significant because climate vulnerability is closely connected with social and economic inequalities. Rising sea levels, extreme weather events, ecosystem degradation, and resource scarcity do not affect all communities equally. Coastal populations, indigenous groups, small-scale farmers, and economically disadvantaged communities often experience greater exposure to climate risks because their livelihoods depend directly on vulnerable ecosystems and because they frequently possess limited adaptive capacity. Therefore, climate education that focuses exclusively on

environmental processes without addressing inequality may fail to develop students' understanding of the justice dimensions of climate change.

The analysis indicates that integrating environmental justice perspectives into climate education represents an important pathway for transforming climate literacy into critical environmental consciousness. Environmental justice education encourages students to examine not only what causes climate change but also how climate impacts are distributed, whose voices are included in environmental decision-making, and which communities require greater recognition and protection. Through this approach, students move from understanding climate change as a universal environmental problem toward recognizing it as a complex issue involving power relations, social inequality, and competing interests (Schlosberg, 2007).

This transformation can be explained through the concept of critical consciousness developed within critical pedagogy. Freire (1970) argues that education should enable learners to move beyond passive knowledge acquisition toward critical reflection on social realities and the capacity to participate in transformative action. Applied to climate education, critical consciousness involves recognizing that environmental problems are shaped by human decisions, institutional structures, and patterns of resource distribution. Students are therefore encouraged to question why certain communities experience greater environmental risks and how alternative forms of environmental governance can be developed.

The findings suggest that justice-oriented climate education contributes to three interconnected forms of awareness. First, students develop distributive justice awareness, which involves understanding that environmental benefits and burdens are unequally distributed among populations. Within climate education, this perspective allows learners to recognize that communities contributing minimally to greenhouse gas emissions may nevertheless experience severe climate impacts. This understanding challenges simplified narratives of climate change and introduces students to questions of fairness, responsibility, and climate equity.

Second, students develop procedural justice awareness, referring to recognition of the importance of participation and representation in environmental decision-making processes. Climate change responses often involve decisions regarding land use, energy development, conservation, and adaptation planning. Without meaningful participation from affected communities, climate policies may reproduce existing inequalities. Through climate education, students can learn that addressing environmental challenges requires inclusive governance processes where diverse social groups have opportunities to contribute their knowledge and perspectives.

Third, students develop recognition justice awareness, which emphasizes respect for diverse identities, cultural values, and local ecological knowledge. This

dimension is particularly relevant in Indonesia, where indigenous communities possess extensive knowledge regarding forest management, biodiversity conservation, and sustainable resource use. However, such knowledge systems are frequently marginalized within formal environmental governance. Incorporating recognition justice into climate education allows students to appreciate the importance of indigenous knowledge and community-based approaches in addressing climate challenges.

The transition from climate literacy toward environmental justice awareness also changes the role of students within environmental discourse. Under conventional environmental education models, students are often positioned as future individuals responsible for adopting sustainable behaviors. However, justice-oriented climate education positions students as potential environmental citizens capable of participating in collective processes of social and ecological transformation. This shift reflects Dobson's (2007) concept of environmental citizenship, which emphasizes civic responsibility, political engagement, and participation in environmental decision-making rather than merely individual environmental actions.

The analysis further demonstrates that this transformation requires pedagogical approaches that connect classroom learning with real-world environmental issues. Place-based learning, community engagement, project-based activities, and interdisciplinary approaches provide opportunities for students to examine environmental challenges within their own social contexts. For example, students living in coastal areas may explore the relationship between sea-level rise, community adaptation, and livelihood security, while students in agricultural regions may investigate changing rainfall patterns, food systems, and rural vulnerability. Such approaches enable learners to understand that climate change is experienced differently across communities and requires locally relevant solutions.

Nevertheless, the implementation of justice-oriented climate education faces several challenges. One significant challenge is the tendency of educational systems to prioritize measurable scientific knowledge over complex social analysis. Curriculum structures and assessment systems often emphasize factual understanding, making it more difficult to evaluate competencies such as critical thinking, ethical reasoning, and civic engagement. As a result, teachers may prioritize climate facts while avoiding discussions of environmental conflicts, political controversies, or social inequalities associated with climate change.

Another challenge concerns the potential politicization of environmental education. Discussions of environmental justice inevitably involve questions regarding economic development, resource governance, and social inequality. In some educational contexts, educators may hesitate to address these issues because they are perceived as controversial or beyond the traditional boundaries of science education. However, avoiding such discussions may limit students'

ability to understand the full complexity of climate change and its societal implications.

The findings therefore suggest that strengthening climate education requires a conceptual shift from climate awareness education toward transformative climate justice education. Such an approach does not reject scientific literacy but expands it by integrating ethical reflection, social analysis, and civic participation. By connecting climate knowledge with questions of justice, climate education can contribute to the development of learners who are not only informed about environmental problems but also capable of understanding and addressing the inequalities associated with those problems.

Therefore, this analysis demonstrates that climate literacy serves as the cognitive foundation, while environmental justice awareness represents the critical and ethical dimension necessary for meaningful climate engagement. The relationship between the two suggests that climate education has the potential to become a transformative force by converting knowledge into critical consciousness and preparing students to participate in future environmental justice initiatives.

C. Climate Education and the Formation of Environmental Citizenship: Preparing Future Environmental Justice Movements

The analysis indicates that the transformative contribution of climate education extends beyond improving environmental knowledge and awareness by supporting the development of environmental citizenship. Environmental citizenship represents a critical link between individual learning processes and collective environmental action because it emphasizes the responsibility of citizens to participate in addressing environmental challenges through democratic engagement, social responsibility, and collective problem-solving (Dobson, 2007). Within this perspective, climate education functions not merely as a mechanism for increasing awareness but as an institutional pathway through which future generations acquire the knowledge, values, and competencies necessary to participate in environmental justice movements.

Unlike conventional approaches that conceptualize environmental responsibility primarily through individual behavioral changes, environmental citizenship emphasizes the political and social dimensions of sustainability. Recycling, reducing energy consumption, and adopting environmentally friendly lifestyles remain important practices; however, they represent only one dimension of environmental responsibility. Climate change is fundamentally shaped by broader systems involving economic structures, political decisions, patterns of resource consumption, and unequal access to environmental resources. Therefore, addressing climate change requires citizens who are capable of engaging with collective processes, questioning environmental inequalities, and advocating for more equitable forms of governance.

The findings demonstrate that climate education contributes to environmental citizenship through three interconnected mechanisms: knowledge development, identity formation, and civic empowerment. First, climate education provides students with the knowledge required to understand environmental challenges and evaluate possible solutions. Without adequate understanding of climate systems and environmental processes, individuals may struggle to distinguish scientific evidence from misinformation or to critically assess climate policies. Thus, climate literacy serves as the cognitive foundation of environmental citizenship.

Second, climate education contributes to the formation of environmental identities. Environmental identity refers to the extent to which individuals perceive environmental protection as an important component of their personal and social values. Educational experiences that connect students with local environmental issues can strengthen emotional connections with nature and increase perceptions of responsibility toward affected communities. This identity formation is particularly important in environmental justice contexts because it encourages students to understand environmental problems as shared social concerns rather than distant ecological issues.

Third, climate education promotes civic empowerment by developing students' confidence and capacity to participate in environmental decision-making. Civic empowerment involves recognizing that individuals and communities possess the ability to influence environmental outcomes through collective action. This dimension is closely related to Freire's (1970) concept of critical consciousness, in which education enables learners to identify social problems and become active participants in transforming their communities.

The relationship between environmental citizenship and environmental justice movements can be further explained through Social Movement Theory. According to Tarrow (2011), social movements develop when individuals share collective identities, recognize common grievances, and perceive opportunities for organized action. Climate education can contribute to each of these processes. By learning about climate change and environmental inequalities, students develop shared understandings of environmental problems. By examining cases of environmental injustice, they recognize common grievances affecting vulnerable communities. By participating in school-based projects, community initiatives, and environmental campaigns, they gain experiences that may increase their capacity for future collective action.

This theoretical relationship is particularly relevant in understanding the increasing role of youth in global climate movements. Recent decades have witnessed a significant expansion of youth-led environmental activism, demonstrating that young people are not merely passive recipients of climate policies but increasingly active participants in climate governance. Youth movements have challenged governments, corporations, and international

institutions by demanding stronger climate commitments, greater accountability, and recognition of intergenerational justice. These developments demonstrate that environmental education can contribute to broader social movements when it is connected with opportunities for participation and civic engagement.

Within Indonesia, the potential relationship between climate education and environmental justice movements is particularly significant because environmental challenges frequently involve conflicts over natural resources, community rights, and development priorities. Environmental issues such as deforestation, mining expansion, marine degradation, waste management, and climate adaptation have generated increasing public discussion regarding sustainability and social justice. In this context, young people represent an important social group capable of influencing environmental discourse through educational institutions, digital platforms, and community-based initiatives.

However, the analysis also reveals that awareness alone does not automatically translate into environmental activism. The transition from environmental knowledge to collective action depends on several enabling conditions, including institutional support, opportunities for participation, social networks, and recognition of youth voices in environmental governance. Students may understand climate challenges but remain unable to participate meaningfully if educational institutions do not provide spaces for discussion, collaboration, and community engagement. Therefore, climate education should be accompanied by participatory learning environments that allow students to practice environmental citizenship rather than merely study its concepts.

One important implication is that schools and universities should be reconsidered as potential spaces for environmental movement formation. Educational institutions traditionally function as places for knowledge transmission, but they can also become arenas for developing civic identities and collective action capacities. Environmental clubs, sustainability projects, community partnerships, and student-led initiatives can provide practical experiences through which learners transform knowledge into participation. Such activities are particularly valuable because they demonstrate that environmental justice is not only a theoretical concept but also a lived practice involving communities, institutions, and collective responsibility.

Nevertheless, the development of environmental citizenship through climate education requires careful consideration of inclusivity. Environmental movements have historically faced criticism when they prioritize the perspectives of privileged groups while overlooking marginalized communities. Therefore, climate education must ensure that students understand diverse experiences of climate vulnerability and recognize the importance of indigenous knowledge, local communities, and historically marginalized voices. Incorporating environmental justice principles prevents climate education from becoming

limited to elite environmentalism and instead promotes more inclusive forms of environmental participation.

The Indonesian educational context provides both challenges and opportunities for advancing this approach. On one hand, differences in educational resources, regional conditions, and institutional capacities may create unequal opportunities for students to develop environmental citizenship. On the other hand, Indonesia's rich ecological diversity and strong traditions of community-based environmental management provide valuable opportunities for developing locally grounded climate education models. Integrating local environmental knowledge with scientific climate education may strengthen students' understanding of sustainability while promoting respect for diverse environmental perspectives.

In further, the analysis demonstrates that climate education can serve as a foundation for future environmental justice movements by transforming students from passive recipients of environmental information into active environmental citizens. Through the development of climate literacy, critical consciousness, and civic empowerment, education creates the social and intellectual conditions necessary for collective environmental action. However, realizing this transformative potential requires moving beyond awareness-based education toward participatory, justice-oriented, and contextually relevant learning approaches.

D. Structural Barriers and Opportunities for Climate Justice-Oriented Education in Indonesia

The analysis reveals that although climate education has significant potential to contribute to environmental justice movements, its transformative capacity is strongly influenced by structural conditions within the educational system. Climate education does not operate in isolation; rather, it is embedded within broader institutional, political, economic, and social contexts that determine how environmental knowledge is produced, transmitted, and translated into action. Therefore, strengthening climate education requires addressing not only curriculum content but also the systemic factors that shape educational opportunities and outcomes.

One of the major barriers identified is the limited integration of environmental justice perspectives within formal education structures. Although environmental sustainability has become increasingly visible in Indonesian educational policies, climate-related learning often remains oriented toward environmental conservation and individual responsibility rather than broader questions of justice, inequality, and governance. Students may learn about climate change causes, environmental protection, and sustainable lifestyles; however, they may receive limited opportunities to critically examine how climate

impacts intersect with poverty, land rights, indigenous knowledge, and unequal access to environmental resources.

This limitation reflects a broader challenge within environmental education globally. Traditional environmental education approaches have historically emphasized awareness creation and behavioral modification, assuming that increased knowledge will naturally lead to sustainable actions. However, environmental justice scholarship challenges this assumption by arguing that environmental problems are deeply connected to social structures and power relations (Schlosberg, 2007). Consequently, education that ignores these dimensions may unintentionally reproduce simplified narratives that place responsibility primarily on individuals while overlooking institutional and systemic drivers of environmental degradation.

A second structural challenge concerns teacher preparedness and professional capacity. Teachers represent the primary actors responsible for translating climate education policies into classroom practices; however, many educators receive limited formal training related to climate science, sustainability education, and environmental justice perspectives. The complexity of climate change requires interdisciplinary teaching competencies that combine scientific knowledge with social analysis, ethical reasoning, and participatory learning approaches. Without sufficient preparation, teachers may avoid controversial environmental topics or rely primarily on textbook-based approaches that provide limited opportunities for critical engagement.

Teacher capacity is particularly important because climate education requires pedagogical transformation rather than simply additional curriculum content. Effective climate education involves facilitating dialogue, encouraging inquiry, connecting global challenges with local experiences, and enabling students to develop solutions collaboratively. These approaches require educators to act as facilitators of critical learning rather than merely transmitters of information (Freire, 1970). Therefore, investment in teacher professional development represents a fundamental requirement for developing justice-oriented climate education.

A third barrier concerns educational inequality across geographical and socioeconomic contexts. Indonesia's diverse geography creates substantial differences in educational resources, technological infrastructure, and institutional capacity. Schools located in metropolitan areas often have greater access to environmental programs, partnerships with non-governmental organizations, and digital learning resources. In contrast, schools in remote regions may face difficulties accessing updated climate materials, teacher training opportunities, and sustainability initiatives.

From an environmental justice perspective, this inequality creates a significant concern because communities experiencing the greatest climate vulnerability are frequently those with fewer educational resources. Coastal

communities, agricultural regions, and indigenous territories often face direct impacts from climate change, yet students in these areas may have fewer opportunities to access high-quality climate education. Therefore, educational inequality may reinforce climate inequality by limiting the ability of vulnerable communities to participate effectively in environmental decision-making processes.

Despite these challenges, the analysis identifies several opportunities for advancing climate justice-oriented education in Indonesia. First, recent curriculum reforms provide opportunities to integrate climate change more systematically across disciplines. The emphasis on contextual learning and student projects within the *Merdeka Curriculum* creates possibilities for connecting classroom learning with real environmental issues experienced by local communities. Such approaches can strengthen students' understanding that climate change is not an abstract global problem but a reality affecting their own communities.

Second, place-based and community-based learning approaches represent important strategies for strengthening environmental justice education. Climate challenges differ significantly across Indonesian regions; therefore, educational approaches should reflect local environmental realities. Learning activities focused on coastal adaptation, forest conservation, agricultural resilience, waste management, or indigenous ecological knowledge can help students understand the relationship between environmental systems and social well-being.

Third, collaboration among schools, universities, government institutions, environmental organizations, and local communities can strengthen the practical dimension of climate education. Partnerships provide opportunities for students to engage directly with environmental challenges while developing civic competencies and collective problem-solving skills. Such collaboration also reflects the principle of procedural justice by expanding opportunities for diverse stakeholders to participate in environmental learning and decision-making.

The relationship between structural barriers and transformative opportunities is summarized in Table 1.

Table 1.
Structural Barriers and Opportunities for Climate Justice-Oriented Education in Indonesia

Structural Dimension	Current Challenges	Implications for Environmental Justice Education	Transformative Opportunities
Curriculum Integration	Climate change is often addressed as a separate environmental topic rather than an interdisciplinary issue	Limits students' understanding of climate change as a social justice issue	Integrate climate justice perspectives across science, social studies, civic education, and sustainability projects

Structural Dimension	Current Challenges	Implications for Environmental Justice Education	Transformative Opportunities
Teacher Capacity	Limited training in climate science, sustainability pedagogy, and environmental justice	Reduces teachers' ability to facilitate critical and participatory learning	Develop continuous professional development programs focused on transformative climate education
Educational Inequality	Unequal access to resources, technology, and environmental learning opportunities across regions	Vulnerable communities may have limited capacity for climate adaptation and advocacy	Promote equitable access through government support, digital resources, and regional partnerships
Learning Approaches	Dominance of knowledge-based and behavior-oriented environmental education	Students may understand environmental problems without recognizing structural causes	Adopt inquiry-based, place-based, and community-based learning approaches
Student Participation	Limited institutional spaces for youth environmental engagement	Reduces opportunities to develop environmental citizenship	Establish student environmental initiatives, community projects, and participatory governance models
Local Knowledge Recognition	Indigenous and community ecological knowledge remains underrepresented	Weakens recognition justice and marginalizes alternative environmental perspectives	Integrate local ecological knowledge into formal climate education

Source: Various sources, edited by Authors

The findings presented in Table 1 demonstrate that climate education reform requires a systemic approach rather than isolated curriculum adjustments. While improving climate-related content is important, transformative education depends on broader changes involving teacher development, institutional support, educational equity, and participatory learning environments.

Furthermore, these findings reinforce the argument that environmental justice-oriented climate education must address both knowledge inequality and participation inequality. Knowledge inequality refers to unequal access to climate information and educational opportunities, whereas participation inequality concerns unequal opportunities to influence environmental decisions. Addressing both dimensions is essential because environmental justice requires not only awareness of environmental problems but also the capacity to participate in creating solutions.

The analysis therefore suggests that Indonesia's future environmental justice movements will depend partly on the extent to which educational systems

can cultivate environmentally informed and socially engaged citizens. Schools and universities should not be viewed merely as institutions that prepare students for economic participation but also as spaces where democratic environmental values are developed. Through justice-oriented climate education, educational institutions can contribute to building generations capable of understanding environmental inequalities, advocating for vulnerable communities, and participating constructively in climate governance.

E. Toward a Climate Justice Education Model for Indonesia: Integrating Policy, Pedagogy, and Social Transformation

The findings from the previous sections demonstrate that climate education has the potential to become a transformative mechanism for advancing environmental justice in Indonesia. However, realizing this potential requires moving beyond conventional approaches that primarily emphasize environmental awareness and individual behavioral change. The analysis suggests that climate education should be reconceptualized as a broader social process that integrates scientific understanding, critical reflection, civic participation, and institutional transformation. In this perspective, climate education becomes not only an educational intervention but also a foundation for developing environmentally responsible citizens capable of contributing to future environmental justice movements.

The proposed model emerging from this study is based on three interconnected dimensions: policy transformation, pedagogical transformation, and social transformation. These three dimensions represent complementary pathways through which climate education can contribute to environmental justice. Policy transformation provides the institutional foundation by ensuring that climate education receives adequate recognition, resources, and strategic direction. Pedagogical transformation concerns how climate issues are taught and experienced within learning environments. Social transformation represents the long-term outcome through the development of environmental citizenship and collective environmental action.

The first dimension, policy transformation, emphasizes the importance of integrating climate justice perspectives into national educational strategies. Current educational policies in Indonesia have increasingly acknowledged sustainability; however, the analysis indicates that climate education requires stronger institutional positioning. Rather than treating climate change as a supplementary environmental topic, educational policies should recognize climate justice as an interdisciplinary learning objective connected to citizenship education, social responsibility, and sustainable development.

This policy transformation requires several strategic actions. First, climate change and environmental justice concepts should be systematically incorporated into curriculum frameworks across educational levels. Second,

teacher development policies should prioritize climate competencies, including scientific understanding, sustainability pedagogy, and the ability to facilitate discussions about environmental inequalities. Third, educational planning should address regional disparities by ensuring that students in climate-vulnerable areas have equitable access to climate learning resources and opportunities.

The second dimension, pedagogical transformation, focuses on changing how climate education is delivered. The findings indicate that effective climate education cannot rely solely on information transmission because knowledge alone does not guarantee environmental engagement. Instead, climate education should adopt transformative pedagogies that encourage inquiry, dialogue, reflection, and participation. These approaches enable students to connect climate knowledge with lived experiences and develop the critical consciousness necessary to understand environmental injustice.

A climate justice-oriented pedagogy should incorporate several principles. First, learning should be place-based, connecting global climate challenges with local environmental realities. Second, learning should be participatory, allowing students to engage in problem identification and solution development. Third, learning should be inclusive, recognizing diverse perspectives, including indigenous knowledge and community experiences. These principles reflect the broader goals of Education for Sustainable Development, which emphasizes empowering learners to become active contributors to sustainability transitions (UNESCO, 2020).

The third dimension, social transformation, represents the long-term objective of climate justice education: the development of environmentally responsible and socially engaged citizens. The analysis demonstrates that climate education can contribute to environmental justice movements by strengthening environmental citizenship. Students who develop climate literacy, critical awareness, and civic competencies are more likely to recognize environmental inequalities and participate in collective efforts to address climate challenges.

However, social transformation should not be understood as simply increasing the number of environmentally concerned individuals. Environmental justice movements require collective identities, institutional support, and opportunities for participation. Therefore, educational institutions should create spaces where students can practice environmental citizenship through sustainability projects, community partnerships, environmental organizations, and participatory decision-making processes. Such experiences allow students to transform theoretical knowledge into practical engagement.

The relationship among these three dimensions is illustrated in the proposed Climate Justice Education Model as shown on Figure 1. The proposed model contributes to existing scholarship by positioning climate education as an upstream mechanism for environmental justice transformation. Previous studies

have frequently examined climate education outcomes through individual-level indicators such as knowledge, attitudes, and behavioral intentions (Monroe et al., 2019; Stevenson et al., 2017). While these outcomes remain important, this study expands the discussion by emphasizing that climate education also has collective and political dimensions. Through the development of environmental citizenship, education can influence how future generations understand environmental inequalities and participate in processes of social change.

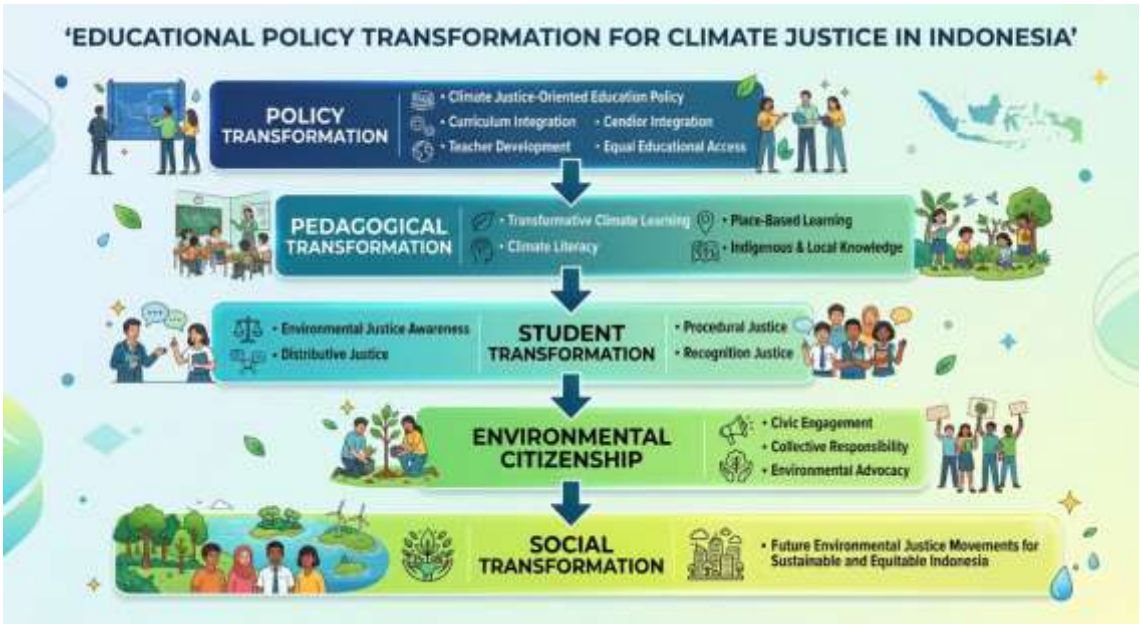

Figure 1.
Climate Justice Education Model for Indonesia

This model also contributes to environmental justice scholarship by highlighting education as an often-overlooked dimension of justice. Environmental justice discussions commonly focus on resource distribution, environmental risks, and political participation. However, access to climate knowledge and opportunities for environmental learning also represent important justice concerns. Communities with limited access to climate education may face greater difficulties participating in adaptation planning, environmental advocacy, and climate governance. Therefore, educational justice should be considered an integral component of broader environmental justice efforts.

For Indonesia, the model provides several practical implications. First, policymakers should strengthen climate education as part of national climate adaptation and sustainability strategies. Second, educational institutions should develop learning environments that encourage critical engagement with environmental issues rather than merely promoting individual sustainability behaviors. Third, partnerships among schools, universities, communities, and

environmental organizations should be expanded to provide students with opportunities to participate in real-world environmental initiatives.

Nevertheless, the transformation toward climate justice education requires attention to potential challenges. Educational institutions must avoid presenting environmental justice as a purely theoretical concept disconnected from students' experiences. Similarly, climate education should balance global scientific perspectives with local environmental knowledge and community realities. Without such contextualization, climate education may fail to engage learners or address the specific environmental challenges experienced across Indonesia's diverse regions.

Furthermore, the analysis demonstrates that climate education represents a strategic pathway for shaping Indonesia's future environmental justice movements. By integrating policy reform, transformative pedagogy, and social participation, climate education can contribute to developing generations of citizens who possess not only environmental knowledge but also the critical awareness and civic capacity required to pursue equitable climate solutions. In this sense, classrooms become important spaces where future environmental justice movements are intellectually prepared, socially organized, and ethically grounded.

Conclusion

This study demonstrates that climate education has a significant potential to function as a transformative pathway for advancing environmental justice in Indonesia. The analysis reveals that climate education should not be limited to improving students' understanding of climate science but should also cultivate critical environmental awareness, environmental citizenship, and the capacity to engage with broader questions of social equity and environmental governance. By integrating climate literacy with environmental justice perspectives, education can help students recognize the unequal distribution of climate risks, understand the importance of inclusive decision-making, and develop the civic competencies necessary for future environmental justice movements. The study contributes theoretically by connecting climate education, environmental justice, and social movement perspectives into an integrated framework that positions education as an important foundation for long-term environmental transformation.

From a policy perspective, the findings highlight the need for Indonesia to strengthen climate justice-oriented education through curriculum integration, teacher capacity development, equitable access to learning resources, and participatory learning approaches. Climate education should be embedded within broader sustainability and citizenship education strategies to ensure that students are not only informed about environmental challenges but also empowered to participate in addressing them. While this study is limited by its reliance on secondary sources and document-based analysis, it provides a

conceptual foundation for future empirical research examining how climate education influences students' environmental attitudes, civic engagement, and participation in environmental initiatives across diverse Indonesian contexts. Future studies may further investigate the effectiveness of specific pedagogical models and explore how educational institutions can become more active spaces for cultivating environmental justice leadership among younger generations.

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