
THE ROLE OF INTERNATIONAL ENVIRONMENTAL LAW IN ACHIEVING NET-ZERO EMISSIONS: A CRITICAL ANALYSIS OF THE PARIS AGREEMENT AND ITS LEGAL EFFECTIVENESS

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ABSTRACT

The world's ecosystems, economies, and cultures are facing an existential threat due to climate change, which is accelerating at an alarming rate. The reason being is greenhouse gas. International environmental law play a vital role toward a net-zero emission globally. The Paris Agreement as the main accord of UN Framework Convention on Climate Change (UNFCCC) and this study seeks to analyze its implementation and its structural design along with legal effectiveness in achieving the net-zero goals. The analysis is collective climate governance starting in 1972 with the Stockholm Conference, then moving to the 1992 Rio Earth Summit, and including the Kyoto Protocol as well as the Paris Agreement. This raises concerns about ambition, collectiveness, enforced standards, and adequacy in meeting the 1.5°C goal of Paris agreement.

This research examines fundamental legal concepts such as Common but Differentiated Responsibilities (CBDR), 'the polluter pays' principle, the precautionary principle, and sustainable development in relation to the obligations under the Paris regime through comparative case studies of China, India, the US, the EU, and Kazakhstan. The study illustrates how certain official policies, development goals, and the prevailing political determination in a country impacts its climate commitments and outcomes. This study also analyzes the recent events such as the Glasgow Climate Pact of 2021 and the UAE consensus during COP28 in 2023, which for the first time called for a "just, orderly, and equitable" transition away from fossil fuels.

Research suggests that the Paris Agreement, while propelling an unprecedented level of international engagement, falls short of guaranteeing net-zero results because of the lack of legally binding emission. This is

because international climate law is in need of strict compliance measures, equitable burden-sharing, robust climate financing, and perhaps, additional provisions such as an international fossil fuel treaty. The conclusion underscores the necessity of sustained political determination, technological innovation, and international collaboration to make international environmental law more robust and effective.

Introduction

Changing of the climate dynamically is a pressing issue throughout the globe, which is basically caused by common human act like the excessive burning of petroleum and other fuel, which has a greater impact on the environment, including sea level rise, extreme irregularities in weather. These present events are intensifying and posing a massive threat to human civilization and the Earth, too. It's necessary to address the present issue with efficiency as, it reverse the development progress, intensify resource conflicts and displacements of populations throughout the globe. To mitigate the consequences of the catastrophe, achieving net-zero emissions becomes a global goal to set with priority.¹

Currently, the planet is going through global warming, where it is approximately 1.2 degrees Celsius warmer than it used to be in the late 1880s, with emissions which rose in these decades.² It is very important to limit global warming to not more than 1.5 degrees Celsius as decided via the Paris Agreement to reduce the greenhouse gas emissions by 50% by 2023 in comparison with 2019.³ It must be noted that the previous year, 2024, was the hottest year on record, which underscores the need for immediate and transformative action.⁴

Combating climate change at a global level requires robust international cooperation. no single nation could resolve this multifaceted issue single-handedly. International environmental law is there to provide a necessary framework for collective action, enabling countries to give efforts to coordinate and share resources to establish common goals to fight climate change.

¹'What Is Climate Change? - NASA Science' <<https://science.nasa.gov/climate-change/what-is-climate-change/>> accessed 8 August 2025.

²'World of Change: Global Temperatures' (29 January 2020) <<https://earthobservatory.nasa.gov/world-of-change/global-temperatures>> accessed 8 August 2025.

³'1.5°C: What It Means and Why It Matters | United Nations' <<https://www.un.org/en/climatechange/science/climate-issues/degrees-matter>> accessed 8 August 2025.

⁴'Confirmed: 2024 Was the Hottest Year on Record, Says UN Weather Agency | UN News' <<https://news.un.org/en/story/2025/01/1158891>> accessed 8 August 2025.

This collaborative approach is needed to develop and implement global strategies which transcend national borders and improve a unified response to an inherently global change.

This research paper will critically analyse how the Paris Agreement is effective when it comes to achieve zero emission. It would examine how the Paris Agreement facilitate or hinders the achievement of net zero emissions, which will include the enforcement mechanisms within the treaty globally.

How International Environmental Law is evolving

Brief History of Climate Law

The subject of international environmental law has always been important and has been particularly marked by several pivotal conferences and agreements with regards to discussion concerning global warming and climate change. The United Nations Conference on the Human Environment which was held in Stockholm in the year 1972 was a significant and a very important global platform to address major environmental issues, which are matters of international concern. This conference also helped in the establishment of the United Nations Environment Programme (UNEP) and this program also laid down the foundation for the reference of the future environmental cooperation.⁵

In the Earth Summit which was held in Rio in the year 1992 (United Nations Conference on Environment and Development), after twenty years, through this conference the principle of common but differentiated responsibilities and sustainable development was able to get the importance and get advanced here. Key agreements which produced in this summit, also include the United Nations Framework Convention on Climate Change.⁶

Further development on the UNFCCC, the Kyoto Protocol, is one of the major steps forward, which set legally threshold for developed countries. Although it is marked as a crucial moment in international climate policy, non-participation of some major emitter countries make it ineffective to some extent who are the top cost contributors of greenhouse gases to the environment, which causes global warming.⁷

⁶'United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992 | United Nations' <<https://www.un.org/en/conferences/environment/rio1992>> accessed 8 August 2025.

⁷'What Is the Kyoto Protocol? | UNFCCC' <https://unfccc.int/kyoto_protocol> accessed 8 August 2025.

Foundational Legal Principles

There are several legal principles in international environmental law which have been developed through these previously mentioned summits on environmental concerns. International environmental law is governed by four foundational international legal principles, which are sustainable development popularised in the Rio Earth Summit, the Polluter Pays Principle, the Precautionary Principle and the Common but Differentiated Responsibilities (CBDR).⁸

The Polluter Pays Principle and the Common but Differentiated Responsibilities (CBDR) principles govern international environmental law, keeping hand in hand where sustainable development ensures meeting the needs of now without making compromises on the ability of future generations to meet their needs.⁹

On the other hand, the precautionary principle assesses whether there is any threat of serious and irreversible damage to the international environment. It also ensures that there should be cost-effective measures even if there is no scientific proof, as a lack of scientific proof should not postpone the prevention of environmental degradation.

The Polluter Pays Principle holds that a person who is the cause of the pollution must bear the consequences. The same has been incorporated in national and international environmental protection agreements.

Common But Differentiated Responsibilities (CBDR): This was first used in Rio 1992, where they affirmed every state has a responsibility to protect the environment to some degree, yet, differing capabilities, and historical debt to environmental problems exist. This principle acknowledges the differing economic and social situations between countries, and thus, it is further implied that the developed countries are expected to take responsibility. This principle acknowledges the differing economic and social situations between countries, and thus, it is then further implied that the developed countries are supposed to take responsibility.¹⁰

⁸'The Principles of International Environmental Law Through the Lens of International Courts and Tribunals | SpringerLink' <https://link.springer.com/chapter/10.1007/978-94-6265-507-2_18> accessed 8 August 2025.

⁹ibid.

¹⁰'Common but Differentiated Responsibilities (CBDR) | Britannica' <<https://www.britannica.com/topic/common-but-differentiated-responsibilities>> accessed 8 August 2025.

Evolution from Top-Down to Bottom-Up Frameworks

The mindset of addressing global challenges in the domain of international environmental law has notably evolved. Agreements like the Kyoto Protocol largely embraced a top-down approach. This was a model in which international institutions would enforce legally binding emission reduction targets on states that signed the agreement. Although that sounded straightforward, the guaranteed legal obligations that came with it were harder to enforce politically and deal with for ratification or compliance from the major emitting nations that needed to be included but did not want to be forced to meet outside targets.

The newest agreements, like the Paris agreements, are notably more bottom-up in approach. In contrast, the model urges countries to decide and submit what they deem is the suitable climate contributions, known as NDCs, Nationally Determined Contributions. This attempt aims to enable wider engagement and deeper domestic ownership of climate action, letting each country design plans based on their unique context and abilities. This attempt may be beneficial regarding inclusiveness and flexibility, but it still raises concerns about the collective ambition and enforceability of climate targets, which we will analyse relative to the Paris Agreement.¹¹

III. The Paris Agreement as a Legal Instrument

Overview

The Paris Agreement is known to be an important treaty which is internationally adopted in the 21st Conference of the Parties (COP21)¹² to the United Nations Framework Convention on Climate Change (UNFCCC), the conference was held in Paris in the year 2015. The implementation of the Paris Agreement was started in the year 2016. The main aim of the Paris Agreement is to strengthen the international response in regard to the climate change.

Legal Nature

Paris Agreement is commonly perceived as a mixture of elements that are both legally binding and not legally binding, which results in a hybrid treaty. The Paris Agreement is an international

¹¹Nicholas Chan, 'Climate Contributions and the Paris Agreement: Fairness and Equity in a Bottom-Up Architecture' (2016) 30 Ethics & International Affairs 291
<https://www.cambridge.org/core/product/identifier/S0892679416000228/type/journal_article> accessed 11 August 2025.

¹²'COP 21 | UNFCCC' <<https://unfccc.int/event/cop-21>> accessed 11 August 2025.

treaty of a legally binding nature, but some of its core elements, such as the Nationally Determined Contributions (NDCs), are not legally binding concerning their specific goals. The importance of this distinction is uppermost:

Binding in Procedure: In this, the parties are legally bound to prepare, communicate, and maintain successive NDCs, and to follow domestic measures to achieve it. They are also obligated by the procedural conditions, such as reporting on their emissions and advancements, as well as taking part in the worldwide inventory process.

Non-binding in substance: There is no legal force behind the emission reduction goals outlined in each nation's NDC. Because nations can determine their ambition levels based on their unique national circumstances, this promotes greater adaptability and wider participation. It also prompts questions about whether the Agreement's long-term temperature targets can be met with the current level of ambition.

To achieve widespread participation, a problem that has beset earlier climate agreements, such as the Kyoto Protocol¹³, this hybrid approach was a deliberate design decision. The Paris Agreement aimed to remove political obstacles and promote a more inclusive global climate regime by letting nations self-differentiate their pledges.

Key Provisions:

The Paris Agreement is organised around several crucial clauses that work together to promote global climate action:

1. Long-Term Temperature Goal: To limit the rise in average global temperature to well below 2°C above pre-industrial levels, the agreement sets a more ambitious target of 1.5°C. This long-term goal aims to mitigate the devastating impacts of climate change.¹⁴

2. Nationally Determined Contributions (NDCs): Through NDCs, each nation is expected to describe how it is planning to reduce emissions and making them prepare for the effects of climate change. Every five years, these submissions are made, and it is anticipated that each

¹³What Is the Kyoto Protocol? | UNFCCC' <https://unfccc.int/kyoto_protocol> accessed 8 August 2025.

¹⁴Understanding the Paris Agreement's Long Term Temperature Goal' (*Climate Analytics*) <<https://climateanalytics.org/comment/understanding-the-paris-agreements-long-term-temperature-goal>> accessed 11 August 2025.

one will be more ambitious than the one before. NDCs are a crucial tool for carrying out the objectives of the Paris Agreement at the national level.¹⁵

3. Transparency and Reporting: A framework for openly tracking, documenting, and confirming nations' climate initiatives and advancements toward their NDCs is part of the agreement. This makes it possible to make adjustments based on group progress and helps to ensure accountability.

4. Global Stocktake (GST): The GST is a procedure used to evaluate the group's progress over time in reaching the Paris Agreement's long-term objectives. After the initial GST in 2023, it will be carried out every five years. The GST encourages nations to strengthen their climate actions and assists in identifying progress gaps.¹⁶

5. Finance, Technology, and Capacity Building: To help developing nations with their climate initiatives, the Paris Agreement acknowledges the necessity of financial aid, technology transfer, and capacity building. It is anticipated that wealthy nations will provide financial assistance to developing nations to help them carry out their NDCs and prepare for the effects of climate change. Additionally, the agreement encourages the exchange of knowledge and technologies related to climate change.

6. Loss and Damage: The agreement's Article 8 discusses "loss and damage," or the effects of climate change to which nations cannot adapt. It promotes collaboration and assistance in dealing with loss and damage, including comprehensive risk management, emergency preparedness, and early warning systems.

7. Article 6: International Cooperation: This article outlines procedures for global collaboration on carbon markets and other emission-reduction initiatives. This covers clauses about internationally transferred mitigation outcomes (ITMOs) and a system for exchanging premium carbon credits. In order to improve climate action, it also permits non-market-based

¹⁵'Nationally Determined Contributions (NDCs) | UNFCCC' <<https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>> accessed 11 August 2025.

¹⁶'#Stocktake4ClimateEmergency – Home to the Local Governments and Municipal Authorities Constituency (LGMA) in the UNFCCC' <https://www.cities-and-regions.org/stocktake4climateemergency/?msclkid=fa7fed95090b19a16850850cb03b333f&utm_source=bing&utm_medium=cpc&utm_campaign=Cities-And-Regions&utm_term=global%20stocktake&utm_content=UNFCCC%20Global%20Stocktake> accessed 11 August 2025.

collaboration.¹⁷

Critical Examination: Paris Agreement vs. Kyoto Protocol and Legal Obligations

The Paris Agreement is fundamentally different from its predecessor, the Kyoto Protocol, in terms of its legal form and approach to emissions reduction.

Top-Down vs. Bottom-Up: Earlier mentioned, the Broad Kyoto Protocol was TOP-DOWN in the sense that it simply imposed (in concept) top-down, legally binding emission reduction targets on developed countries in Part II of its main framework. It also reduced the number of participants and a lack of implementation. Also, unlike the Paris Agreement, which does not contain a top-down mechanism for work at the national or country level. This encourages more participation, but changes the focus from legally enforcing targets to using a more adaptive and facilitative model.¹⁸

Universal Participation: Only when they have major emitters as participants, such as the United States, has an agreement been globally ratified sufficiently so in the case of the Kyoto Protocol, which left out developing nations from commitments to limit emissions. The Paris Agreement accomplished this by embracing self-determined contributions, which were made possible through its near-universal participation that brought both developed and developing countries to the table, acknowledging that the imperative to combat climate change stems from a shared sense of responsibility for solving a global problem together.

Legally Binding Nature of Net-Zero: The Paris Agreement does not commit parties to achieving net-zero emissions by a certain date, nor does it set fixed, legally binding emission reduction levels for each country. Rather, it invites parties to achieve net-zero in the second half of this century (Article 4) and to submit more ambitious NDCs every five years. The legal duty is in the procedure of putting forward, holding on to, and reporting on NDCs, not in the content of the targets themselves. Such a distinction is pragmatic in nature to secure wider commitment, putting participation and serial ambition ahead of rigid, possibly unattainable, legal requirements.

¹⁷Article 6 of the Paris Agreement | UNFCCC' <<https://unfccc.int/process-and-meetings/the-paris-agreement/article6>> accessed 11 August 2025.

¹⁸Joanna Depledge, 'The "Top-down" Kyoto Protocol? Exploring Caricature and Misrepresentation in Literature on Global Climate Change Governance' (2022) 22 International Environmental Agreements: Politics, Law and Economics 673 <<https://link.springer.com/article/10.1007/s10784-022-09580-9>> accessed 8 August 2025.

This reform in the legal framework represents a worldwide agreement that, even if it entails a less strict legal duty on individual targets, a more flexible and inclusive framework is required to handle the complexity of climate change.

Policy Recommendations

Although even after having a stringent framework, these eight years were most warmest years since 2015 to 2022. The present agreement has failed to equitably phase out fossil fuels, which are predominantly responsible for climate change. To make it a complete framework, there must be an additional treaty, like a suggestion for a Fossil Fuel Treaty. Most industrialised countries must follow the same. It will help accelerate climate action with deeper, faster emission cuts.

C. Case Study:

India and China:

India and China, being large developing economies and major emitters, pose singular challenges and complexities in the Paris Agreement architecture. Both nations have made Nationally Determined Contributions (NDCs) that are frequently internationally supported and state domestically led development priorities. Their strategies underscore the CBDR principle and the intricate interdependence of climate action and economic development. China has pledged to peak its CO₂ emissions by 2030 and become carbon neutral before 2060. Its NDC also sets targets on growing the proportion of non-fossil fuels in primary energy consumption and growing forest stock.¹⁹

While China's climate efforts are intimately linked with its economic growth ambitions, its sustained use of coal in generating energy remains a great challenge. The nation stresses its right to development and the obligation of developed countries to extend economic and technological aid. India: India's NDC encompasses goals for lowering the emissions intensity of its GDP, raising the proportion of non-fossil fuel-based power, and generating more carbon sinks.

¹⁹ China, India, and the Paris Agreement: A Comparative Analysis of China's and India's UNFCCC Narratives' <https://www.researchgate.net/publication/372572744_China_India_and_the_Paris_Agreement_A_Comparative_Analysis_of_China%27s_and_India%27s_UNFCCC_Narratives> accessed 8 August 2025.

India has always reiterated that its climate efforts would depend on receiving sufficient climate finance and technology transfer from developed nations. Since its emphasis lies in poverty alleviation and economic growth, its emission trajectory is predominantly determined by its energy needs and industrialisation. Both China and India's NDCs illustrate how national development requirements can influence the ambition and terms of climate commitments, highlighting the value of fair burden-sharing and global cooperation in meeting international climate objectives.

United States of America:

In the recent past, United States of America has withdrawn from Paris Agreement during the reign of President Donald Trump which is considered as a massive setback in attaining sustainable development and combating climate change. Being second largest emitter, United States of America is historical biggest contributor in climate change thus it plays a crucial role. Trump has withdrawn USA's participation from the Paris Agreement showing the reasons of unfairness and economic burden to USA and also USA has allowed India and China to continue with fuel which emit green house gases. The claim of unemployment is another major claim made by Trump which he has cited as an effect of compliance with the Paris Agreement. Trump doesn't only stop there additionally another claim of security to national sovereignty is another excuse given by Mr President as a reason for withdrawal from the treaty. The said decision of the USA undermine the goal of the Paris Agreement.²⁰

Europe:

The European Union is a leading example of a major economic bloc with stringent domestic climate legislation, which is committed to addressing the issues of climate change. The said responsibilities and notions have been enshrined in their ambitious policies like the European Green Deal and the European Climate Law. The European Green Deal is another set of legal instruments for a policy initiative to make the EU climate-friendly by 2050. On the other hand, European Climate Law is a legally binding instrument setting an intermediate target of reducing

²⁰ 'The Economic Case for the United States to Remain in the Paris Agreement on Climate Change' <<https://primarysources.brillonline.com/browse/climate-change-and-law-collection/the-economic-case-for-the-united-states-to-remain-in-the-paris-agreement-on-climate-change;cccc0148202001480738>> accessed 8 August 2025.

greenhouse gas emissions in line with the Paris Agreement Goal.²¹

Future of International Climate Law

The Glasgow Climate Pact (2021)

Passed at COP26 in Glasgow, the Glasgow Climate Pact was a major step towards operationalising the Paris Agreement. For the first time ever in a UNFCCC decision, the Pact specifically invited Parties to step up their efforts towards the phase-down of unabated coal power and inefficient fossil fuel subsidies. Though the language was eventually watered down from "phase-out" to "phase-down" because of eleventh-hour interventions, it was an important recognition of the imperative to shift from fossil fuels. The Pact also called on nations to revisit and enhance their 2030 emission-cutting goals (NDCs) by 2022, acknowledging that existing commitments were too weak to achieve the 1.5°C target. It also put the spotlight on ramping up adaptation finance and loss and damage.²²

COP28 (2023) Outcomes

COP28 in 2023 in Dubai reached a milestone by having language on phasing down fossil fuels explicitly included in its outcome, referred to as the UAE Consensus. For the first time in a COP outcome, countries agreed to a transition plan to "transition away from fossil fuels in energy systems, in a just, orderly and equitable style, driving action in this decisive decade, to reach net zero by 2050 in line with science."²³

Contribution of Kazakhstan

Kazakhstan is an holding an essential portion of the Asian Continent. The political leadership of Kazakhstan has shown will and vision to lead the way in combating global warming and climate issues. Kazakhstan's fossil fuel and mining industry has a greater impact on contributing to emissions. Taking the same into consideration, Kazakhstan has set a goal to

²¹'The European Green Deal - European Commission' <https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en> accessed 8 August 2025.

²²'The Glasgow Climate Pact – Key Outcomes from COP26 | UNFCCC' <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact-key-outcomes-from-cop26>> accessed 8 August 2025.

²³'COP28: Key Outcomes Agreed at the UN Climate Talks in Dubai - Carbon Brief' <<https://www.carbonbrief.org/cop28-key-outcomes-agreed-at-the-un-climate-talks-in-dubai/>> accessed 8 August 2025.

achieve carbon neutrality by 2060 by its political leadership.²⁴

Conclusion

This paper critically examined the contribution of international environmental law to net-zero emissions, specifically focusing on the Paris Agreement. We have mapped the development of international climate law from its early milestones, including the Stockholm Conference and Rio Earth Summit, up to the more contemporary Kyoto Protocol and Paris Agreement. We analysed core legal concepts such as sustainable development, the precautionary principle, the polluter pays principle, and common but differentiated responsibilities that form the basis of international environmental governance.

Looking forward, future trends like the expansion of climate litigation, the forthcoming ICJ advisory opinion on state responsibilities, and the creation of the Loss and Damage Fund herald an increasing need for greater accountability and justice in global climate policy. The Glasgow Climate Pact and the COP28 results, with the specific call to phase down fossil fuels, show a step-by-step but strong evolution of global climate ambition.²⁵

²⁴‘Ways to Achieve the Goals of the Paris Agreement and Kazakhstan’s Carbon Neutrality’ (UNDP) <<https://www.undp.org/kazakhstan/speeches/ways-achieve-goals-paris-agreement-and-kazakhstans-carbon-neutrality>> accessed 8 August 2025.

²⁵‘Global Trends in Climate Litigation: The Changing Shape of Corporate Litigation Risk - Lexology’ <<https://www.lexology.com/library/detail.aspx?g=e15662ad-52e9-43a8-8a00-dddb344e22ab>> accessed 8 August 2025.