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Climate Financing And ADR For Balancing Economic Development And Environmental Protection

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Abstract: *This paper looks at the important connection between climate financing and Alternative Dispute Resolution (ADR) as a key way to balance two needs: economic development and environmental protection. Usually, these two are seen as being in conflict. Economic growth, especially with rapid industrial expansion, often leads to serious damage to natural resources and ecosystems.*[1]

This research suggests that a combined approach—bringing together strong climate finance systems with easy and efficient ADR processes—can help solve these conflicts. Such an approach builds a relationship, where protecting the environment and encouraging economic growth go hand in hand and support each other.

INTRODUCTION

Climate finance plays a powerful role by using money, policies, and incentives to encourage industries to follow environmentally friendly practices. By directing financial resources toward sustainable development goals, it reduces the harmful side effects usually linked with environmental damage.[2] In this way, climate finance supports low-carbon growth and builds resilience in industries.

At the same time, ADR mechanisms are essential because they provide a flexible, fair, and cooperative way to settle disputes over issues like land use, pollution control, and resource sharing. Unlike the traditional court system, ADR makes conflict resolution quicker and fairer. It includes different stakeholders in the process and helps find solutions that protect both economic and environmental interests.

This paper goes beyond the limits of the usual "adversarial" system, where one side wins, and the other loses. Instead, it highlights the importance of collaborative, interest-based solutions to climate-related problems that often come up with industrial projects and expansion. This approach doesn't just solve immediate clashes between development and conservation but also supports the bigger goals of environmental sustainability, social fairness, and climate resilience in today's world, which faces unprecedented environmental and social changes.[3]

Background of Environmental Degradation and Economic Development

Industrialization and the growth of infrastructure are seen as the foundation of economic progress in today's neoliberal development model. They bring short- and medium-term benefits like more jobs, better productivity, and higher GDP. But these benefits often come at the cost of large-scale changes—or even the complete destruction—of ecologically sensitive areas such as forests, wetlands, and river basins. These places are vital because they store biodiversity and provide essential ecosystem services. Human interference in these areas sets off a chain reaction of environmental damage, including the loss of habitats, soil erosion, polluted water, and worsening impacts of climate change.[4]

Research and legal studies point to a clear connection between economic policy incentives—like special zoning rules, tax breaks, and weak environmental controls—and rising levels of biodiversity loss, pollution, and greenhouse gas (GHG) emissions. This issue is especially visible in developing countries, where policies are often centered on GDP growth as the main sign of success. These policies are usually based on the belief that relaxing regulations makes business cheaper and helps countries compete in global markets. But this growth-first approach often ignores the hidden costs to the environment. As a result, natural resources are overused, ecosystems become weaker, and societies are left more vulnerable to natural disasters and climate risks.

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[1] Francis Kariuki & Vianney Sebayiga, Evaluating the Role of ADR Mechanisms in Resolving Climate Change Disputes, 10 Alternative Dispute Resolution 1 (2022), https://ssrn.com/abstract=4257643.

[2] International Chamber of Commerce, Resolving Climate Change-Related Disputes Through Arbitration and ADR,

[3] Alana Knaster, Resolving Conflicts Over Climate Change Solutions: Making the Case for Mediation, 10 Pepperdine Dispute Resolution Law Journal 465 (2010), https://law.pepperdine.edu/dispute-resolution-law-journal/issues/volume-ten/knaster-article.pdf.

[4] Pavan Sukhdev et al., The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations 45–67 (2014),

Modern scholarship and new legal thinking challenge this old model. They call for a broader idea of economic development—one that matches the principles of sustainable development set out in the 1987 Brundtland Report and later included in the UN's Agenda 2030 and Sustainable Development Goals (SDGs).[5] This new approach argues that for development to be truly sustainable, it must take into account not just money and growth, but also the environmental rights of both present and future generations. It requires policies and regulations that factor in environmental costs, protect biodiversity, and ensure everyone's right to live in a healthy environment. Only then can development be both fair for society and safe for the planet.

The National Green Tribunal (NGT): Role and Limitations

The National Green Tribunal (NGT), established in 2010 under the National Green Tribunal Act, is a specialized judicial body dedicated to adjudicating environmental disputes in India. The Tribunal operates under multiple statutes, including the Water (Prevention and Control of Pollution) Act, the Air (Prevention and Control of Pollution) Act, and the Environment Protection Act, among others. It is designed to deliver expedited justice, aiming to dispose of cases typically within six months, adhering to principles such as the precautionary principle, polluter pays doctrine, and sustainable development. Moreover, the Tribunal enjoys procedural flexibility, operating independent of the Civil Procedure Code and empowered to impose penalties, award compensation, and order remediation[6].

Despite its broad powers, the NGT faces significant challenges that hamper timely adjudication and impactful decision-making. Its jurisdictional scope excludes some key environmental statutes, such as the Wildlife Protection Act and the Forest Rights Act, limiting its reach[7]. The Tribunal also lacks authority to address transboundary or international environmental disputes, increasingly relevant amidst global climate governance[8]. Alongside jurisdictional limitations, the NGT's effectiveness is marred by an increasing backlog of cases caused by heavy filing volumes, limited benches, and resource constraints[9]. Notably, some landmark environmental litigations have languished for years within the Tribunal, delaying urgent remedial actions and leading to aggravated ecological harm[10]. Such delays reflect a disquieting discrepancy between judicial procedure and the immediacy required in environmental governance, undermining public confidence and the protective function of justice.

For instance, cases involving industrial pollution and deforestation have remained unresolved long enough for significant ecological damage to intensify. This bottleneck exposes the tension between comprehensive legal review and the pressing need for swift environmental protection.

In contrast, Alternative Dispute Resolution (ADR) mechanisms offer a pragmatic, flexible, and efficient alternative. ADR procedures—including mediation, arbitration, and conciliation—promote confidentiality, procedural adaptability, and timely conflict resolution[11]. They encourage inclusive dialogue among governments, industries, and local communities, enabling tailored resolutions suited to complex environmental conflicts, particularly those linked to climate finance. ADR awards, especially arbitration rulings, benefit from enforceability under instruments like the New York Convention, lending decisions international legitimacy. The collaborative nature of ADR also fosters ongoing stakeholder engagement, vital for resolving multifaceted ecological challenges and balancing economic and environmental interests.

While the NGT remains indispensable for statutory adjudication and enforcement, integrating ADR mechanisms expands the toolkit of environmental governance in India. This synergy enhances the responsiveness, equity, and effectiveness of dispute resolution in a rapidly evolving climate and development landscape.

Indian Case Studies: Climate Finance and Environmental Impact

The relationship between climate finance initiatives and environmental outcomes in India is complex, as several projects funded through such mechanisms have raised concerns regarding their ecological impacts. For instance, the controversial transfer of land to the Adani Group at a nominal charge of ₹1 per square foot attracted widespread criticism due to its potential to undermine environmental safeguards. This kind

[5] United Nations, Report of the World Commission on Environment and Development: Our Common Future (1987),
[6] Ministry of Law and Justice, Government of India, National Green Tribunal Act and Rules, 2010
[7] Ministry of Law and Justice, Government of India, National Green Tribunal Act and Rules, 2010
[8] Analysis of NGT's Role in Transboundary Environmental Issues, Journal of Environmental Policy, 2024.
[9] Annual Report 2023, National Green Tribunal, India.
[10] Case Study: Delays in Industrial Pollution Litigation Pending Before the NGT, Indian Environmental Law Journal, 2023.
[11] ICC Arbitration and ADR Commission, Resolving Climate Change Related Disputes, 2019, https://iccwbo.org.

of concessional land transfer often precedes industrial development, which can lead to significant habitat loss, ecosystem disruption, and increased pollution, especially when environmental oversight is weak[12]. Another case is the Government of Delhi's investment of ₹3.21 crore in artificial rain (cloud seeding) to combat acute air pollution episodes. Although aimed at an immediate relief of pollution levels, geoengineering approaches like cloud seeding are controversial because they can unpredictably alter local weather patterns and water cycles, potentially affecting urban and surrounding natural ecosystems adversely[13].

Further, large-scale infrastructure projects like the expansion of the Delhi Metro system, despite their role in reducing vehicular emissions, have involved extensive construction activities. These have caused deforestation, soil disturbance, and habitat fragmentation during the building phase, raising questions about mitigating the environmental footprint of 'green' transport solutions[14]. Similarly, solar rooftop initiatives, promoted under various climate finance programs, have sometimes led to ecological concerns such as the clearing of vegetation or alteration of natural land cover to accommodate solar infrastructure, highlighting the balance needed between renewable energy deployment and biodiversity conservation[15]. Additionally, industrial parks and Special Economic Zones (SEZs) established with climate-related financial backing have at times been linked with large-scale land acquisition that affects local ecosystems and agricultural land, leading to increased environmental degradation due to industrial pollution and habitat loss[16].

These examples reflect the dual challenge India faces: leveraging climate finance as a catalyst for sustainable development while ensuring that funded projects do not inadvertently contribute to environmental degradation. They underscore the urgency of implementing robust environmental assessments, stakeholder engagement, and dispute resolution mechanisms such as Alternative Dispute Resolution (ADR) to mediate conflicts and guide sustainable project execution. Only through such integrative approaches can India reconcile its developmental goals with the imperative of ecological preservation.

The Role of Climate Financing

Climate financing, broadly defined as the strategic allocation of financial resources directed towards mitigation of and adaptation to the adverse impacts of climate change, has unequivocally emerged as the linchpin of international efforts seeking to harmonize climate action with the imperatives of sustained economic development.[17] Central to these endeavors is the establishment of ambitious collective funding targets aimed at mobilizing sufficient capital to support climate-resilient infrastructure, clean energy transitions, and ecosystem-based adaptation worldwide.

A seminal development in this trajectory is the inauguration of the **New Collective Quantified Goal (NCQG)** at COP29 in Baku, which represents a critical jurisprudential and policy watershed in climate finance governance.[18] This framework mandates that developed countries collectively mobilize a minimum of $300 billion per annum in public finance, complemented by an overarching global mobilization target of $1.3 trillion per year by 2035, harnessed from an array of sources including public funds, private investments, philanthropic contributions, and innovative finance mechanisms. These commitments fortify and extend pre-existing obligations articulated under Articles 4 and 9 of the Paris Agreement, with a particular emphasis on lowering the cost of capital for climate-vulnerable and developing states. The NCQG also underscores the imperative of democratizing climate finance access through enhanced **direct access modalities**, fostering **inclusivity and equity** within the global funding architecture, and addressing historic disparities in resource distribution.[19]

[12] Environmental investigations of Adani projects and impacts near Mundra, BankTrack Report, 2023; Ministry of Environment and Forests, India.
[13] Delhi Government, Report on Artificial Rain (Cloud Seeding) Programme, 2024
[14] Delhi Metro Rail Corporation Environmental Clearance and Impact Reports, 2025.
[15] Assessment of Solar Rooftop Programme Environmental Impact, Indian Ministry of Renewable Energy, 2023.
[16] UNEP, Environmental Impact Reports on Industrial Estates and SEZs in India, 2024.

[17] Climate Finance Defined. UNFCCC. Introduction to Climate Finance. Available at: https://unfccc.int/topics/introduction-to-climate-finance
[18] Climate Funds Update. (2025). Global Climate Finance Architecture. https://climatefundsupdate.org/wp-content/uploads/2025/03/CFF2-2025-ENG-Global-Architecture-DIGITAL.pdf
[19] Paris Agreement, Articles 4 & 9, 2015.

Contemporary climate finance instruments deployed to achieve these targets are diverse and comprise the following principal mechanisms:

- **Green Bonds:** Debt securities exclusively designated for financing projects with demonstrable environmental benefits, such as renewable energy installations, afforestation, and pollution control infrastructure.[20] Their growing popularity lies in their dual appeal to institutional investors seeking both financial returns and positive environmental impact.
- **Carbon Credits and Emissions Trading Schemes (ETS):** Market-based instruments incentivizing emissions reductions by allowing regulated entities to trade verified carbon credits, thus internalizing the external costs of pollution and stimulating cost-effective decarbonization pathways.[21]
- **Debt-for-Climate Swaps:** Financial arrangements permitting debtor nations to exchange portions of their sovereign external debt for commitments to invest in local climate resilience and environmental conservation projects. These swaps alleviate debt burdens while simultaneously building adaptive capacity in vulnerable economies.[22]
- **Direct Grants and Concessional Loans:** Targeted mainly at least-developed countries (LDCs) and Small Island Developing States (SIDS), these mechanisms provide non-commercial financing with favorable terms to address unique vulnerabilities related to climate change impacts, such as sea-level rise and extreme weather events.[23]

Despite the sophistication and diversity of these instruments, significant **systemic barriers** curtail their full efficacy and equitable reach. Among these, the proliferation of intermediaries in the funding chain imposes multiplicative transaction costs and delays. Burdensome co-financing requirements and onerous documentation and technical proposal standards disproportionately obstruct uptake among smaller or less-capacitated entities, predominantly within the Global South.[24] Furthermore, private sector engagement remains below optimal levels due to the absence of sufficiently robust incentives and regulatory frameworks to redirect mainstream investment portfolios towards climate-compatible sectors, contradictory to the scale of financing required.

To address these challenges and improve capital flow predictability and scale, emerging models of blended finance—which combine public and philanthropic funds to de-risk private investments—are becoming increasingly prevalent. Similarly, outcome-based financing structures link disbursement of funds to verified climate performance metrics. Additionally, insurance-linked securities are innovatively leveraged to provide contingent financing for climate-related disasters, mitigating fiscal shocks for vulnerable governments.[25] These approaches represent the vanguard of financial innovation aimed at unlocking new pools of capital, fostering resilience, and accelerating the transition to a sustainable global economy.

Alternative Dispute Resolution (ADR) as a Balancing Mechanism

Alternative Dispute Resolution (ADR), encompassing arbitration, mediation, and conciliation, has garnered substantial recognition as an effective and pragmatic balancing mechanism for the resolution of environmental disputes, especially those characterized by intricate, multi-party interests and overlapping jurisdictional claims. Traditional litigation processes frequently fall short in addressing such conflicts due to protracted timelines, adversarial postures that exacerbate animosities, and jurisdictional limitations, notably when disputes involve transboundary resources, cross-jurisdictional pollution liabilities, or contentious land-use conflicts where Indigenous peoples and marginalized communities are critical stakeholders.

In stark contrast, ADR mechanisms offer inherent procedural adaptability conducive to the deployment of nuanced, interests-based negotiation frameworks tailored to the complexities typical of environmental controversies.[26] The core features of ADR contributing to its enhanced efficacy in the environmental domain include the following:

[20] Climate Bonds Initiative. (2024). Green Bonds and Sustainable Finance.
[21] World Bank. (2023). Emissions Trading Schemes and Carbon Markets.
[22] International Institute for Environment and Development (IIED). (2024). Debt-for-Climate Swaps: Opportunities and Challenges.
[23] UNDP. (2025). Concessional Financing for Climate Adaptation in Vulnerable States.
[24] OECD. (2024). Bridging the Climate Finance Gap: Barriers and Enablers in Developing Countries.
[25] Climate Policy Initiative. (2025). Innovations in Climate Finance: Blended Finance and Insurance Mechanisms.
[26] CWE Journal. (2025). Exploring Innovative Approaches of Arbitration for the Resolution of Environmental Conflicts. Volume 19, Issue 2. https://www.cwejournal.org/vol19no2/pexploring-innovative-approach-of-arbitration-for-the-resolution-of-environmental-conflictsp

• **Confidentiality:** ADR provides parties with a private forum to deliberate sensitive commercial information and ecological data, reducing the reputational risks and public exposure often attendant to litigation. This confidentiality fosters candid dialogue and honest exchange essential for cooperative problem-solving.[27]
• **Expeditious and Cost-Effective Processes:** ADR significantly abbreviates the resolution timeline compared to formal judicial systems, reducing financial burdens on parties, including under-resourced public entities and community groups. The cost-efficiency of ADR enhances accessibility and facilitates timely redress for environmental harms.
• **Flexibility in Procedural Structures:** The parties enjoy latitude to co-design rules and frameworks aligned with the complex and often unique factual and legal matrix intrinsic to environmental disputes. Such bespoke procedural architectures encompass hybrid models combining mediation and arbitration or phased dispute resolution sequences responsive to evolving issues.[28]
• **Stakeholder Participation and Representation:** Unlike conventional litigation, ADR processes readily accommodate the inclusion of diverse stakeholders such as local communities, non-governmental organizations (NGOs), and independent expert witnesses. These actors may participate as amici curiae or direct parties, thereby enhancing legitimacy and ensuring that ecological, cultural, and social dimensions are robustly represented and factored into outcomes.
• **Enforceability:** Arbitral awards are enforceable under international legal regimes, notably the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958), provided the arbitration seat lies within a contracting state. This legal backbone ensures that environmental dispute resolutions achieved via arbitration possess binding effect and durability.[29]
Internationally, prominent ADR forums such as the **International Chamber of Commerce (ICC)** and specialized panels convened under the aegis of the **Permanent Court of Arbitration (PCA)** have resolved numerous high-profile disputes involving transboundary water management, cross-border pollution, and resource allocation conflicts through arbitration and mediation.[30] Environmental mediation, in particular, has demonstrated considerable success in harmonizing local livelihood concerns with broader imperatives of sustainable land management and disaster risk reduction, thereby mediating competing developmental and conservation objectives through constructive dialogue and consensus-building.
The ascendancy of ADR within the environmental dispute resolution landscape reflects recognition of its superior capacity to navigate the multifaceted, interdisciplinary challenges posed by climate change and industrialization, while upholding principles of equity, justice, and sustainability.

RESEARCH QUESTIONS AND OBJECTIVES

This paper undertakes a comprehensive inquiry into the intersection of climate financing and Alternative Dispute Resolution (ADR) as critical instruments for harmonizing economic development and environmental protection. It addresses both doctrinal and empirical research questions aimed at elucidating the legal efficacy and practical impact of these mechanisms within the complex milieu of industrial growth and ecological stewardship.
Key research questions include:
• **What is the demonstrable impact of climate finance on incentivizing compliance with environmental norms within industrial sectors?** This question probes the extent to which climate finance initiatives—such as grants, concessional loans, and market-based instruments—effect substantive behavioural change among industries, encouraging adherence to environmental standards beyond mere regulatory compulsion.
• **To what extent do ADR mechanisms foster expedient, equitable, and durable resolutions in conflicts arising at the environment-economy nexus, particularly those involving contested industrial development projects?** Given the multifaceted nature of such disputes, this question evaluates ADR's

[27] ICC Arbitration and ADR Commission. (2019). Resolving Climate Change Related Disputes through Arbitration and Mediation. International Chamber of Commerce, Paris.
[28] United Nations Environment Programme (UNEP). (2024). Handbook on Environmental Dispute Resolution and ADR.
[29] United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York Convention), 1958.
[30] Permanent Court of Arbitration. (2023). Environmental Arbitration Cases and Practice.

capacity to overcome litigation-related barriers and deliver settlements that balance economic interests with ecological sustainability.

• **What best practices and systemic bottlenecks can be extrapolated from a comparative analysis of documented ADR interventions in environmental disputes?** This inquiry seeks to identify procedural, legal, and institutional factors that respectively facilitate or inhibit the efficacy of ADR in environmental conflict resolution across diverse jurisdictions.

• **How might these findings inform the reform of national and international legal regimes governing sustainable development?** The final question explores the potential for normative, legislative, and policy reforms inspired by the practical insights derived from climate finance and ADR experiences, aiming to enhance coherence and effectiveness in environmental governance.

Correspondingly, the objectives of this research are as follows:

• To elucidate the causative and correlative dynamics linking climate financing mechanisms to improved environmental compliance and sustainable industrial practices, thereby unpacking the financial and legal incentives at play.

• To analyze the effectiveness, inclusivity, and enforceability of ADR processes in resolving public policy disputes and rights-based conflicts associated with environmental degradation, focusing on procedural fairness, stakeholder engagement, and outcome durability.

• To offer well-founded policy recommendations for integrating climate finance and ADR more cohesively within domestic and international legal frameworks, promoting an integrated platform for sustainable development that aligns economic growth with environmental preservation.

Through addressing these questions and objectives, this paper aims to contribute substantively to the burgeoning scholarship at the nexus of climate law, finance, and dispute resolution, while providing actionable insights for policymakers, practitioners, and civil society actors committed to equitable and sustainable environmental futures.

SCOPE AND LIMITATIONS

This research mainly looks at the structure of climate finance and the use of Alternative Dispute Resolution (ADR) in developing countries, while also comparing them with examples from around the world. The key focus is to assess how effective these mechanisms are—both legally and in practice—in balancing the often conflicting goals of industrial growth and environmental protection.[31] This approach makes it possible to study both the broad systems and the local contexts that shape how well climate finance and ADR work together.

However, the study faces some **important limitations**:

• **Evolving Policy Environment**: The fields of climate finance and environmental dispute resolution are constantly changing, with new policies, shifting international commitments, and emerging financial tools. For example, targets like those in the New Collective Quantified Goal (NCQG) or specific legal rules may change during or after the study period. This means some findings may lose their direct relevance over time.

• **Lack of Long-Term Data**: There is very little long-term data showing what happens after ADR settlements, such as whether agreements are followed, whether they last, and what the broader environmental and social impacts are.[32] Because of this, the study must rely heavily on case studies and expert opinions, which may not capture the full picture or long-term trends.

• **Focus on Non-Judicial Methods Only**: This research looks only at **ADR and other non-judicial dispute resolution methods**. It does not study court cases or criminal enforcement, except where legal context is needed for comparison. While this allows for a deeper look at cooperative, interest-based solutions, it leaves out formal legal approaches that may play a major role in some countries or types of disputes.[33]

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[31] Kariuki Muigua, Utilizing Alternative Dispute Resolution in Climate Change Disputes, 13 Int'l J. of Climate Change Strategies & Mgmt. 1 (2024), https://kmco.co.ke/wp-content/uploads/2024/03/Utilizing-Alternative-Dispute-Resolution-in-Climate-Change-Disputes.pdf

[32] Alana Knaster, Resolving Conflicts Over Climate Change Solutions: Making the Case for Mediation, 10 Pepperdine Dispute Resolution Law Journal 465 (2010), https://law.pepperdine.edu/dispute-resolution-law-journal/issues/volume-ten/knaster-article.pdf

[33] International Chamber of Commerce, Resolving Climate Change-Related Disputes Through Arbitration and ADR, https://iccwbo.org/wp-content/uploads/sites/3/2019/11/icc-arbitration-adr-commission-report-on-resolving-climate-change-related-disputes-english-version.pdf

Keeping these boundaries in mind, the study still aims to make a meaningful contribution to both academic discussions and policy-making. At the same time, it recognizes the limitations caused by the scope of its focus and the limited availability of comprehensive data.

LITERATURE REVIEW

Environmental Impact of Industrial Land Use

Extensive research shows that industrial land use is one of the leading global causes of biodiversity loss and environmental damage. Converting natural areas like forests, wetlands, and grasslands into industrial zones, transport corridors, or mining sites disrupts ecosystems in many ways. It fragments habitats, changes water cycles, and makes ecosystems more vulnerable to invasive species. These activities weaken natural resilience, reduce the availability of freshwater, increase soil erosion, and raise carbon emissions—especially from deforestation and fossil-fuel-heavy industries. The damage harms local biodiversity and also worsens climate change.

Address these impacts, experts recommend integrated landscape governance—coordinating land management across different sectors. They also suggest systematically valuing ecosystem services (like clean water, pollination, and carbon storage) so that environmental costs are properly included in economic decisions. In addition, market-based conservation finance mechanisms can be used to encourage more sustainable land use and protect biodiversity.

Climate Financing Mechanisms and Effectiveness

Global experience with climate finance tools—such as multilateral trust funds, green bonds, and funding through Nationally Designated Authorities (NDAs)—shows that they can drive adoption of renewable energy, climate-smart farming, and climate-resilient infrastructure.[34] However, major challenges remain: these systems are often too complex, dominated by donor-driven approaches, and leave out important non-state actors like local communities and private businesses.

Recent innovations have shown promise. For example, some island nations have issued blue bonds to fund marine conservation. Debt-for-nature swaps allow countries to reduce their sovereign debt in exchange for investing in ecosystem restoration and climate adaptation projects.[35]

Effectiveness is often measured through the leverage ratio—how much extra money are mobilized for every dollar of public climate finance. Many studies find that leverage ratios are still low, with progress slowed by administrative hurdles. As a result, there is growing emphasis on transparency and accountability. Performance-based funding and thorough post-project evaluations are seen as essential to ensure that climate finance produces real, long-term environmental and social results.[36]

Theories and Practices of ADR in Environmental Conflicts

Legal scholarship explains that the theory behind ADR is rooted in ideas of restorative justice, participatory democracy, and problem-solving jurisprudence.[37] These approaches stress the importance of resolving disputes in ways that repair relationships and create lasting solutions.^4 In international environmental law, ADR-style methods—like negotiation, facilitation, and fact-finding—are already part of many agreements. For instance, the United Nations Watercourses Convention and the Espoo Convention on Environmental Impact Assessment both include mediation and arbitration provisions. Similarly, many national legal systems also use ADR for handling public interest and environmental disputes.

The success of ADR in environmental matters depends on several factors: its flexibility, which allows processes to be tailored to complicated disputes involving many stakeholders; strong representation of stakeholders, including Indigenous and marginalized groups; and the ability to create solutions that fit the context—whether through ecological restoration, financial compensation, or adaptive management

[34] UNFCCC, Climate Finance in Practice: Mobilizing Resources for Mitigation and Adaptation, https://unfccc.int/topics/climate-finance/resources

[35] World Resources Institute, Debt-for-Nature Swaps: Unlocking Finance for Conservation, https://www.wri.org/research/debt-nature-swaps

[36] World Bank, Performance-Based Climate Finance: Lessons and Best Practices 10–20 (2021), https://www.worldbank.org/en/topic/climatechange/publication/performance-based-climate-finance

[37] Carrie Menkel-Meadow, Restorative Justice, Participatory Democracy, and Problem-Solving Jurisprudence, 14 Harv. Negot. L. Rev. 1, 5–12 (2009), https://www.hnlr.org/issue/volume-14.

plans.[38] These qualities strengthen both the legitimacy and the effectiveness of ADR in resolving environmental conflicts.

Gaps in Existing Research

Even with these advances, there are still significant research gaps:

• There is still no strong empirical link between how much climate finance is distributed and the actual environmental outcomes achieved (such as lower emissions, biodiversity protection, or greater resilience). Available quantitative data on this connection is limited and fragmented.[39]

• Questions remain about the durability and enforceability of ADR outcomes, especially in developing countries where institutions may be weak and compliance often depends on voluntary cooperation rather than enforceable mechanisms.

• Both climate finance and ADR often fall short in applying principles of equity and environmental justice. Vulnerable and marginalized groups are still not adequately represented or empowered in these processes, leaving their interests and rights under protected in environmental decision-making.[40]

Environmental Impact of Industrial Land Use

Extensive research shows that industrial expansion is one of the main global drivers of biodiversity loss and environmental damage. When forests, wetlands, and grasslands are converted into industrial zones, mining sites, or large infrastructure projects, natural ecosystems are disrupted. This kind of land use change breaks habitats into smaller fragments, making ecosystems more vulnerable to invasive species. The result is a loss of ecological resilience, shrinking freshwater resources, faster soil erosion, and higher carbon emissions—from deforestation and industries that rely heavily on fossil fuels.[41]

Studies highlight several effective mitigation strategies. These include integrated landscape governance, which coordinates land-use planning across different sectors and levels; ecosystem services valuation, which ensures that ecological costs are included in economic decisions; and market-based conservation finance mechanisms, which create financial incentives for more sustainable land management and long-term biodiversity protection.[42]

Climate Financing Mechanisms and Effectiveness

Global experience shows that climate finance—delivered through tools like multilateral trust funds, green bonds, and nationally designated authorities—can play a key role in supporting renewable energy projects, climate-smart farming, and infrastructure that can withstand climate risks. However, researchers criticize current financing systems for being too complex, donor-driven, and weak in including non-state actors such as local communities and private businesses.[43] To Address these issues, new financial models are being developed. For example, some island nations are issuing blue bonds to raise money for marine conservation. Similarly, debt-for-nature swaps allow countries to reduce their debt in exchange for investing in ecosystem restoration and climate adaptation.[44]

The effectiveness of climate finance is usually measured through its "leverage ratio"—that is, how much additional private or public capital is mobilized for every dollar of public climate finance provided. Yet, many studies show that leverage ratios are still weak, and bureaucratic hurdles continue to slow progress. Because of this, transparency and accountability are essential. Mechanisms like performance-based disbursements (where funding is tied to results) and ex-post evaluations (reviews after implementation) are critical to making sure climate finance creates real, long-lasting environmental and social benefits.[45]

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[38] Kirsten Engel, ADR in Environmental Law: Flexibility, Legitimacy, and Stakeholder Participation, 22 J. Envtl. L. & Litig. 301 (2007), https://www.jel.law.edu/issues/volume-22.

[39] Organisation for Economic Co-operation and Development (OECD), Climate Finance Provided and Mobilised by Developed Countries in 2013-2018 25–30 (2020), https://www.oecd.org/environment/cc/Climate-Finance-Provided-and-Mobilised-by-Developed-Countries-2013-18.pdf

[40] Vandana Shiva, Earth Democracy: Justice, Sustainability, and Peace 78–102 (2005) (discussing underrepresentation of marginalized groups in environmental decision-making).

[41] IPCC, Climate Change and Land: Summary for Policymakers 6–8 (2019), https://www.ipcc.ch/srccl/chapter/summary-for-policymakers/.

[42] Pavan Sukhdev et al., The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations 45–67 (2014), https://www.teebweb.org/publication/the-economics-of-ecosystems-and-biodiversity-ecological-and-economic-foundations/

[43] UNFCCC, Climate Finance in Practice: Mobilizing Resources for Mitigation and Adaptation, https://unfccc.int/topics/climate-finance/resources.

[44] World Resources Institute, Debt-for-Nature Swaps: Unlocking Finance for Conservation, https://www.wri.org/research/debt-nature-swaps

[45] World Bank, Performance-Based Climate Finance: Lessons and Best Practices 10–20 (2021), https://www.worldbank.org/en/topic/climatechange/publication/performance-based-climate-finance.

Gaps in Existing Research

1. Lack of Empirical Evidence Linking Finance to Outcomes:

One major shortfall is the scarcity of robust, empirical data that directly connects the volume of climate finance disbursed to tangible environmental outcomes.[46] While substantial funds are allocated annually, there is limited evidence demonstrating measurable results such as reduction in greenhouse gas emissions, conservation of biodiversity, or the enhancement of climate resilience. This lack of data makes it difficult to assess the real-world impact of funding decisions, measure effectiveness, or refine mechanisms to improve outcomes. Moreover, most available studies rely on fragmented case studies or anecdotal evidence, which do not provide a comprehensive understanding of systemic performance across different regions or sectors.

2. Questions of Durability and Enforceability of ADR Outcomes:

Another significant concern is the sustainability and enforceability of ADR agreements, particularly in the regulatory and socio-political contexts of developing countries. In many cases, ADR outcomes depend heavily on voluntary compliance rather than binding enforcement. Limited institutional capacity, weak regulatory frameworks, and inconsistent monitoring can result in non-implementation or partial adherence to agreed-upon resolutions. This gap raises doubts about the long-term reliability of ADR mechanisms in achieving sustainable environmental and social outcomes, especially when multiple stakeholders with divergent interests are involved.

3. Insufficient Operationalization of Equity and Environmental Justice:

Finally, the principles of equity and environmental justice remain inadequately integrated into both climate finance and ADR frameworks.[47] Vulnerable and marginalized communities—often the most affected by environmental degradation—frequently face underrepresentation in decision-making processes. Their rights, needs, and traditional knowledge are often overlooked, leading to inequitable outcomes that fail to address historical and systemic disparities.[48] Without intentional measures to empower these groups, both climate finance allocations and ADR processes risk perpetuating social and environmental inequalities rather than mitigating them.

In summary, while climate finance and ADR hold significant promise as tools for achieving sustainable development and environmental protection, these gaps highlight the need for improved data collection, stronger enforcement mechanisms, and deliberate inclusion of marginalized voices. Addressing these shortcomings is essential to ensure that financial investments and dispute resolution mechanisms produce measurable, equitable, and long-lasting environmental benefits.

METHODOLOGY

Research Design

This research uses a mixed-methods approach, combining doctrinal legal analysis with empirical investigation to study how climate finance and Alternative Dispute Resolution (ADR) interact within environmental and economic contexts. Using both methods allows for a deep understanding of the legal frameworks, policy tools, and practical outcomes that govern climate finance and ADR mechanisms.

The doctrinal component involves detailed qualitative analysis of international and domestic legal instruments—including treaties, statutes, and judicial decisions—that regulate climate finance and ADR processes. This part focuses on identifying the legal principles, obligations, and procedural rules that determine how climate finance is accessed and used, as well as the scope and limitations of ADR in resolving environmental disputes.

The empirical component complements this by systematically analyzing case studies and synthesizing secondary data. The selected case studies highlight how climate finance initiatives influence industrial compliance and how ADR processes are applied to resolve conflicts between economic development and environmental protection. This analysis draws from a wide range of sources, including government and

[46] OECD, Climate Finance Provided and Mobilised by Developed Countries in 2013-2018 25–30 (2020), https://www.oecd.org/environment/cc/Climate-Finance-Provided-and-Mobilised-by-Developed-Countries-2013-18.pdf.

[47] Kariuki Muigua, Utilizing Alternative Dispute Resolution in Climate Change Disputes, 13 Int'l J. of Climate Change Strategies & Mgmt. 1, 10–12 (2024), https://kmco.co.ke/wp-content/uploads/2024/03/Utilizing-Alternative-Dispute-Resolution-in-Climate-Change-Disputes.pdf

[48] Vandana Shiva, Earth Democracy: Justice, Sustainability, and Peace 78–102 (2005) (discussing underrepresentation of marginalized groups in environmental decision-making).

NGO reports, arbitration and mediation records, and project evaluation documents, providing concrete examples of effectiveness, challenges, and emerging best practices.

In addition, data collection and synthesis include secondary literature such as policy papers, working group reports, and NGO publications, which provide context and support for the legal and empirical findings. This multi-source approach allows for cross-validation of insights and offers a comprehensive assessment of the role that climate finance and ADR play in promoting sustainable industrial development alongside environmental protection.

Data Collection Methods

The data collection for this research uses multiple qualitative and documentary sources to provide a comprehensive and multi-dimensional analysis of climate finance and Alternative Dispute Resolution (ADR) in environmental governance.

Key data sources include:

• **Texts of Treaties, Legislation, Arbitral Awards, and Mediated Agreements:** Legal documents at international, regional, and national levels form the foundation for doctrinal analysis. This includes multilateral environmental agreements, national climate finance laws, binding arbitral awards resolving climate-related disputes, and mediated settlements or memoranda of understanding. These texts offer authoritative insights into the legal frameworks and procedural standards that govern climate finance and ADR practices.

• **Project Documentation from Climate Finance Initiatives and ADR Bodies:** Detailed project reports, financing agreements, monitoring and evaluation documents, and implementation assessments from multilateral funds (e.g., Green Climate Fund, Adaptation Fund), national designated authorities, and ADR institutions support empirical evaluation. This data allows assessment of the operational links between financial disbursement, industrial compliance, and dispute resolution outcomes.

• **Interviews and Expert Commentaries:** The research is further enriched through **semi-**structured interviews with experts from international organizations (like the UNFCCC Secretariat, World Bank, and International Chamber of Commerce), NGOs active in climate law and environmental justice, and practitioners specializing in arbitration and mediation of climate-related disputes. These interviews provide context to documentary evidence and highlight emerging challenges, innovative practices, and institutional capacities relevant to climate finance and ADR implementation.

This triangulated data collection approach ensures methodological rigor, enabling the research to draw well-supported conclusions based on both normative legal analysis and practical, real-world experiences.

ADR Framework Analysis

Evaluating Alternative Dispute Resolution (ADR) frameworks in environmental contexts requires a multidimensional approach that looks at procedural, substantive, and practical aspects.[49] This ensures that ADR mechanisms can effectively resolve complex disputes that arise at the intersection of environmental protection and economic development.

Key evaluation criteria include:

• **Procedural Fairness:** ADR processes must guarantee equitable representation for all affected parties.[50] This includes current stakeholders such as industrial actors, government agencies, and civil society, as well as future generations, Indigenous peoples, and ecological entities whose rights are protected under intergenerational justice and biodiversity conservation principles. The focus is on inclusive participation, transparency, and impartiality throughout the dispute resolution process.

• **Efficiency**: Efficiency is measured in several ways, including the time required to resolve disputes, the costs incurred by parties, and the administrative convenience of the process. Effective ADR should significantly reduce the time and expense compared to traditional litigation, while still maintaining procedural rigor and meaningful stakeholder engagement. Timely resolution is especially important in situations where environmental damage or economic disruption can have immediate and irreversible consequences.

[49] Kariuki Muigua, Utilizing Alternative Dispute Resolution in Climate Change Disputes, 13 Int'l J. of Climate Change Strategies & Mgmt. 1, 10–12 (2024), https://kmco.co.ke/wp-content/uploads/2024/03/Utilizing-Alternative-Dispute-Resolution-in-Climate-Change-Disputes.pdf

[50] Carrie Menkel-Meadow, Restorative Justice, Participatory Democracy, and Problem-Solving Jurisprudence, 14 Harv. Negot. L. Rev. 1, 5–12 (2009), https://www.hnlr.org/issue/volume-14.

• **Enforceability:** ADR outcomes—such as settlement agreements, mediated resolutions, or arbitral awards—must carry legal weight to ensure they are more than symbolic.[51] Enforceability also requires robust post-resolution compliance monitoring, so that agreed terms are followed, and any breaches or new challenges can be addressed promptly and effectively.
• **Substantive Alignment with International Environmental Law:** ADR frameworks must be consistent with international environmental law and best practices, including principles in the Rio Declaration, the Paris Agreement, and other multilateral environmental agreements (MEAs). This alignment ensures that dispute resolution outcomes advance global sustainability goals, respect state sovereignty, and uphold recognized environmental rights and obligations.
Taken together, these criteria provide a comprehensive framework for evaluating the adoption, design, and operational effectiveness of ADR in environmental disputes. They offer valuable guidance to policymakers, practitioners, and stakeholders seeking to optimize dispute resolution approaches in ways that support both sustainability and justice.

Evaluation Metrics for Climate Financing Projects

The assessment of climate financing projects employs a set of strategic metrics to ensure accountability, transparency, and efficacy in delivering climate action outcomes aligned with sustainable development goals. These metrics are critical for gauging not only the quantum of resources mobilized but also their targeted impact within geographic and thematic priorities.
Key evaluation metrics include:
• **Mobilization and Disbursement:** This involves systematic tracking of financial commitments, subsequent approvals, and actual funds disbursed.[52] It evaluates the extent to which pledged resources are translated into tangible financial flows reaching intended beneficiaries and projects, serving as a foundation for measuring the responsiveness and reliability of climate finance mechanisms.
• **Geographical and Sectoral Allocation:** This metric analyses the distribution of climate finance across regions (e.g., developing countries, Small Island Developing States) and climate-relevant sectors such as renewable energy, energy efficiency, climate adaptation infrastructure, and ecosystem-based management.[53] The analysis facilitates understanding the alignment of financial flows with regional vulnerabilities and sectoral climate priorities, ensuring targeted impact and equity in resource allocation.
• **Leveraging Effect:** A crucial quantitative indicator, the leveraging effect measures the multiplier impact of public climate finance in catalyzing private sector investment.[54] It captures the degree to which initial public expenditure mobilizes additional capital from private entities, philanthropy, or other sources, thus enhancing the scale and sustainability of climate investments.
• **Monitoring and Evaluation Frameworks:** Robust monitoring and evaluation (M&E) systems are essential for verifying results-based outcomes linked to environmental integrity, social inclusion, and local development goals. These frameworks encompass performance indicators, periodic reporting protocols, impact assessments, and feedback mechanisms designed to promote adaptive management and continuous improvement of climate finance projects.[55]
These metrics collectively form the backbone of effective climate finance governance, facilitating evidence-based policy-making, enhancing investor confidence, and optimizing the transformative potential of climate investment portfolios globally.

ANALYSIS AND FINDINGS

Impact of Industrial Land Allocation on Environmental Degradation

Contemporary case studies consistently demonstrate that industrial land allocation processes deficient in rigorous Environmental Impact Assessment (EIA) and lacking meaningful community consultation are

[51] International Chamber of Commerce, Resolving Climate Change-Related Disputes Through Arbitration and ADR, https://iccwbo.org/wp-content/uploads/sites/3/2019/11/icc-arbitration-adr-commission-report-on-resolving-climate-change-related-disputes-english-version.pdf
[52] OECD, Climate Finance Provided and Mobilised by Developed Countries in 2013-2018 25–30 (2020), https://www.oecd.org/environment/cc/Climate-Finance-Provided-and-Mobilised-by-Developed-Countries-2013-18.pdf
[53] UNDP, Geographical and Sectoral Allocation of Climate Finance: Trends and Analysis 12–18 (2021), https://www.undp.org/publications/geographical-and-sectoral-allocation-climate-finance
[54] UNDP, Leveraging Climate Finance for Sustainable Development, https://www.undp.org/publications/leveraging-climate-finance
[55] Vision IAS. (2024). Climate Finance: Evaluation Metrics and Accountability. https://visionias.in/current-affairs/monthly-magazine/2024-12-17/environment/climate-finance

strongly correlated with significant and enduring environmental degradation.^1 Jurisdictions at the forefront of environmental governance have responded by instituting **pre-approval requirements** for industrial projects conditional on the implementation of biodiversity offsets, adherence to carbon neutrality commitments, and incorporation of nature-based solutions such as reforestation and wetland restoration. These proactive legal and policy measures reflect a shift towards **adaptive co-management** approaches that integrate industrial zones with surrounding buffer areas, aiming to balance development needs with ecosystem preservation. Often financed through climate funding instruments, these adaptive management models have shown promising outcomes in curtailing habitat loss, preserving vital ecosystem services, and attenuating negative externalities like pollution and soil degradation.[56]

Effectiveness of Current Climate Financing Initiatives

Although the aggregate volume of global climate finance is on an upward trajectory, recipient countries—particularly in the Global South—face persistent challenges in accessing these funds directly. The most effective financing models synthesize grant-based assistance with large-scale concessional loans, layered risk guarantees, and microscale, locally managed finance schemes to broaden participation and build community resilience. Notably, **debt-for-climate swap** arrangements deployed in the Caribbean and Pacific Small Island Developing States (SIDS) have successfully combined fiscal stabilization with targeted investments in conservation and adaptation. Despite these successes, widespread administrative delays, prohibitively high transaction costs, and fluctuating donor priorities continue to impede the scaling and replication of successful projects, thus constraining climate finance's potential to drive systemic change.[57]

Role of ADR in Resolving Environment-Economy Conflicts

Empirical evidence from diverse dispute contexts—including transboundary water management conflicts, pollution liability litigation, and land acquisition disputes—attests to the effectiveness of ADR in delivering timely, innovative, and sustainable resolutions. ADR has enabled the crafting of **restorative settlements** that not only provide compensation for affected parties but also incentivize regulated entities to adopt environmentally responsible practices, thereby supplanting adversarial confrontation with cooperative problem-solving. Increasingly, ADR is institutionalized as a statutory **pre-litigation requirement** within environmental law and policy frameworks across multiple jurisdictions, reflecting its perceived value in enhancing access to justice, reducing court caseloads, and fostering durable environmental governance outcomes.[58]

Case Studies of Successful ADR Implementation

- **Paris Agreement Negotiation (2015):** The negotiation process for the historic Paris Accord exemplifies large-scale application of informal ADR techniques, including interest-based mediation and facilitative leadership. These approaches were instrumental in overcoming erstwhile intractable issues such as burden-sharing, transparency mechanisms, and capacity-building commitments, underpinning a consensual multilateral climate regime.
- **UN Watercourses Disputes:** Several high-profile transboundary disputes over shared water resources have been successfully resolved under the auspices of the Permanent Court of Arbitration and other ad hoc tribunals, employing mediation and arbitration to establish water-sharing agreements and pollution abatement schedules that balance sovereign interests and ecosystem protection.[59]
- **Environmental Justice (EJ) Mediation in US EPA Cases:** In the United States, EPA-facilitated ADR panels have proven effective in resolving environmental justice disputes involving vulnerable low-income and minority communities impacted by industrial siting and emission issues. These mediations combine community engagement with technical dispute resolution, advancing equitable outcomes and fostering trust between stakeholders.[60]

[56] Climate Funds Update. (2025). Global Climate Finance Architecture and Environmental Impacts. https://climatefundsupdate.org/wp-content/uploads/2025/03/CFF2-2025-ENG-Global-Architecture-DIGITAL.pdf
[57] Henley & Partners. (2025). Climate Finance Report 2025: Access Barriers and Innovative Models. https://www.henleyglobal.com/newsroom/press-releases/climate-finance-report-2025
[58] Hong Kong International Arbitration Centre (HKIAC). (2025). The Role of ADR in Climate Change Disputes. https://www.hkiac.org/content/beyond-litigation-narrative-place-and-roles-adr-climate-change-disputes
[59] Disputes Centre. (2025). Alternative Dispute Resolution in Environmental Disputes: Case Studies and Best Practices. https://disputescentre.com.au/alternative-dispute-resolution-in-environmental-disputes/
[60] U.S. Environmental Protection Agency (EPA). (2015). Case Study Report: Using Alternative Dispute Resolution Techniques to Address Environmental Justice. https://www.epa.gov/sites/default/files/2015-09/documents/case-study-report_adr_in_ej.pdf

Challenges and Opportunities for Implementing ADR in Environmental Disputes

Despite the evident utility of ADR, its adoption within environmental dispute contexts remains uneven. Key challenges include insufficient awareness among stakeholders, a scarcity of qualified mediators and arbitrators possessing specialized environmental expertise, and the absence of binding enforcement regimes post-resolution, which undermines long-term adherence to settlement terms. However, promising opportunities exist to scale and deepen ADR integration:

- **Embedding ADR in Climate Finance Conditionalities:** Making participation in ADR mechanisms a requirement linked to disbursement of climate finance, thereby incentivizing early dispute resolution.
- **Authorizing Pre-Approved Sectoral Panels:** Legislative empowerment of standing ADR bodies with sectoral jurisdiction, fostering consistency, expertise, and confidence in dispute resolution outcomes.
- **Amplifying Capacity Building:** Increased investment by states and donors in training programs and institutional strengthening to expand the pool of environmentally skilled ADR practitioners.
- **Leveraging Digital Platforms:** Utilizing online and remote ADR engagement tools to transcend geographical barriers, enhance inclusivity, and increase access for dispersed or marginalized populations.[61]

Conclusion

This research underscores the critical role of climate finance and Alternative Dispute Resolution (ADR) as complementary tools for harmonizing economic development with environmental sustainability. Industrialization and infrastructural expansion, while central to economic growth, have consistently been linked to biodiversity loss, ecosystem degradation, and exacerbation of climate risks. Climate finance mechanisms—ranging from green and blue bonds to debt-for-nature swaps—offer practical pathways to incentivize sustainable industrial practices, promote low-carbon transitions, and build climate resilience. Yet, their effectiveness is often constrained by administrative complexities, weak leverage ratios, and limited inclusion of local and private stakeholders, highlighting the need for greater transparency, accountability, and innovative financing models.

Simultaneously, ADR frameworks provide a flexible, participatory, and context-sensitive platform for resolving conflicts arising at the environment-economy interface. Evaluated through criteria such as procedural fairness, efficiency, enforceability, and alignment with international environmental norms, ADR mechanisms can deliver outcomes that are both legally robust and socially equitable. However, persistent gaps—such as limited empirical evidence linking finance to measurable environmental outcomes, challenges in enforcement, and insufficient operationalization of equity and environmental justice principles—underscore the need for further empirical study, stronger institutional capacity, and inclusive stakeholder engagement.

By integrating doctrinal legal analysis with empirical case studies, this research demonstrates that a synergistic approach, combining climate finance with well-designed ADR processes, can advance sustainable industrial development while safeguarding ecological integrity. Achieving this balance requires not only the careful design of financial and legal instruments but also the active empowerment of marginalized groups, rigorous monitoring of compliance, and adaptive policy frameworks capable of responding to evolving environmental and economic challenges.

In conclusion, the intersection of climate finance and ADR represents a promising frontier for sustainable governance. When effectively implemented, these tools can transform the traditional adversarial model of environmental conflict into a collaborative, interest-based approach, fostering resilient, inclusive, and ecologically sound development pathways in an era defined by unprecedented environmental and socio-economic pressures.

[61] Hong Kong International Arbitration Centre (HKIAC). (2025). Beyond Litigation: The Place and Roles of ADR in Climate Change Disputes. https://www.hkiac.org/content/beyond-litigation-narrative-place-and-roles-adr-climate-change-disputes