ADDRESSING GLOBAL INEQUITIES: ENHANCING GREEN DEVELOPMENT THROUGH TECHNOLOGY TRANSFER AND CLIMATE FINANCE

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ABSTRACT

The widening Global North-South gap paints an urgent and ugly reality: as the South bears the escalating impacts of global warming and struggles with commitments beyond its capacity, the North must rise, leading with effective, sustainable measures and lending help to countries in dire situations. This calls for measures to bridge this gap, securing a sustainable future for the future. It becomes imperative to ensure that poor southern nations do not bear the burden of escalating public debt and climate crises caused by the rich northern nations. The ever-mounting public debt and the worsening climate crisis pose a dual challenge of critical importance, especially for developing nations. A potential solution to this pressing challenge is entrenched in technology transfer and climate financing, offering pathways to shared responsibility and sustainable development. Since the advent of the Industrial Revolution, the Global North has been responsible for almost half of the global emissions, while the South has always had a less than equal share in deriving the benefits of non-renewable resources for energy consumption. Technology transfer has evidently contributed to enhancing green innovation technologies in the worldwide context. In the context of the developing world, Green Technology or Eco-Friendly Technology is embedded in the concept of Sustainable Development Initiative. The article evaluates the potential and possibilities of promoting innovation and transfer to green technologies in the post-Paris Agreement era.

Keywords: Green Technology, Climate Financing, Technology Transfer, Sustainable Development, Carbon Neutrality

I. INTRODUCTION

As the world grapples with the realities of the increasing temperature, depletion of resources, and degradation of the environment, green development has proven to be the linchpin to a suitable concept to lead the way towards sustainability. The green development vision stands firmly on two pillars: "**Green finance"** and "**Technology transfer"**. These mechanisms are expected to accelerate green development by empowering vulnerable nations, reducing disparities, and fostering a united global response to the climate-related crisis. With an infusion of new technology coupled with climate finance, the international framework would achieve sustainable development for all categories, mainly aiding the least developed nations for climate change. Such a framework will ensure that the benefits of a low-carbon future will not be confined to the developed regions solely.

Technology transfer is envisioned as one of the key aspects of addressing global inequities by accessing green innovations that aid in mitigating environmental degradation and building resilience. According to the "**United Nations Office for Outer Space Affairs"** ("UNOOSA"), through its *Space4ClimateAction* initiative underscores the constructive use of advanced technologies towards achieving Sustainable Development Goal 13 ("Climate Action").[1] However, the reality is stark: a report by the International Institute for Environment and Development ("IIED") on fair carbon sharing budget has listed the major barriers faced by low-income countries comprising of technological, institutional, and economic barriers, to the uptake of these solutions. For instance, though solar and wind technologies have become cheaper, their deployment across sub-Saharan Africa, where 600 million people lack electricity, remains a huge challenge due to poor infrastructure and lack of skills.[2] The report noted that developing countries are saddled with the various consequences of climate change, such as rising seas, extreme weather, and economic disruption, on account of historical emissions almost wholly emanating from industrialized nations. Without equal mechanisms of transfer, the digital and technological gap stands threatened with widening, forcing marginalized populations further behind.

Climate finance is a fundamental pillar for a concerted climate action strategy, allocating

[1]U.N. Off. for Outer Space Affs., *Climate Technology Transfer and Sustainable Development Goal,* Space4ClimateAction, https://space4climateaction.unoosa.org/zh/content/climate-technology-transfer-and-sustainable-development-goal (last visited Mar. 13, 2025).
[2] *Id.*

funding for reducing greenhouse gas emissions and adapting to the increasing challenges presented by climate change. Global climate finance flows averaged almost $1.3 trillion in 2021–2022, falling massively short of the $8.1–9 trillion per year estimated by the Climate Policy Initiative ("CPI") to be needed through 2030 to meet the goals of the "United Nations Framework Convention on Climate Change" ("UNFCCC") and the Paris Agreement[3]. Its stated purpose is to close the gap in financing for low-carbon infrastructure and resilience building in developing countries like India, Kenya, and Bangladesh, which are more at risk because of their resource constraints. However, there is a disparity in the allocation, as only about 5% of tracked funds (USD 63 billion) targeted adaptation, which is important for such countries, in 2021-2022.[4] This dilemma requires an urgent shift: from one where climate finance only acts as breadwinners for decarbonization to one where it acts as reparations for the historic inequities in global climate responsibility. Therefore, it becomes evident to address global inequities encompassing green development. It is not merely a technical challenge but extends to political and ethical considerations as well. The years after 2015 ushered in initiatives such as the **2030 Agenda**, calling for more concerted efforts aligning technological innovation and equitable financing to curb the legacies of exploitation dividing the world since the beginning of time. Only in this way could humanity build on that platform a sustainable future that gives meaning to the dignity and possibilities of all nations.

II. HISTORICAL EMISSIONS RESPONSIBILITY ACCORDING TO INTERNATIONAL ENVIRONMENTAL LAW

The fundamental question concerning the ambit of environmental law is: "Who is responsible for historical emissions of carbon?" Carbon dioxide ("CO2") emissions are due to fossil fuel burning, deforestation, and various industrial activities, which have been emitted into the atmosphere since the beginning of the Industrial Revolution- acting as one of the major causes of global warming. International climate law has recognized that nations have a common duty to combat climate change, notwithstanding their differentiated responsibilities based on their capacity and their contributions. *Principle 7 of the 1992 Rio Declaration*[5] for the first time envisioned that states have a "**Common but Differentiated Responsibility**" ("CBDR"),

[3] Barbara Buchner et al., Climate Pol'y Initiative, *Global Landscape of Climate Finance 2023* (Nov. 2, 2023), https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2023/.
[4] *Id.*
[5] Rio Declaration on Environment and Development, princ. 7, U.N. Doc. A/CONF.151/26 (Vol. I) (Aug. 12, 1992).

recognizing that developed countries bear a greater responsibility for the global environment due to "the pressures their societies place on the global environment and the technologies and financial resources they possess". The UNFCCC codified CBDR by calling on parties to act "on the basis of equity and in accordance with their CBDR and respective capabilities" and explicitly called on the Global North to take the lead in tackling climate change.[6]

CO2 traps heat and raises the temperature, causing global warming. Hence, carbon emissions are directly responsible for carbon emissions. The concept of "carbon budget" is employed to estimate the emission rates of CO2 before breaching the specific temperature threshold, such as the 1.5°C target set by the Paris Agreement.[7] The carbon budget has been nearly exhausted by the United States, the European Union, and other early industrializers, which means the possibility of acting collectively now is dwindling. This recognizes that industrialized countries have been historically responsible for emitting a large share of greenhouse gases ("GHG") leaving a shrinking window for global action. Under these principles, industrialized countries have committed to reduce their emissions first and support developing countries. However, the extent of legal responsibility for historical emissions remains controversial. No international agreement mandates direct liability to countries for climate damage. When the Paris Agreement was signed, the parties reached an agreement that its article on "loss and damage" did not provide a basis for liability or compensation. Industrialized countries insisted on this to evade legal redress for the massive losses caused by earlier emissions. Beyond the UN climate regime, general international law contains the "*no-harm rule*."[8] under this, the states were obligated to prevent activities within their jurisdiction from causing substantial harm to other states. In theory, this could also apply to climate change, but in practice, it is difficult to place legal blame for a volatile global problem.

As a result, historical accountability in climate law has been reflected in political principles such as the CBDR rather than recoverable compensation. The Paris Agreement is based on this collective goal of limiting climate change while, allowing nations to come up with their own targets ("Nationally Determined Contributions", or NDCs). It is thus clear that developing

[6] United Nations Framework Convention on Climate Change art. 3, ¶ 1, May 9, 1992, 1771 U.N.T.S. 107.
[7] Carbon Brief*, Analysis: Which Countries Are Historically Responsible for Climate Change?,* https://www.carbonbrief.org/analysis-which-countries-are-historically-responsible-for-climate-change/ (last visited Mar. 13, 2025).
[8] U.N. Framework Convention on Climate Change, Rep. of the Conf. of the Parties on Its Twenty-First Session, Held in Paris from 30 November to 13 December 2015, Addendum, Decision 1/CP.21, ¶ 51, U.N. Doc. FCCC/CP/2015/10/Add.1 (Jan. 29, 2016).

countries continue to apply these principles to tolerate their demand for increased action and push towards assistance from the industrialized North, framing climate change as a question of environmental justice rather than equal obligation. The recent establishment of a "*Loss and Damage*" fund for vulnerable nations can be seen as a tentative step towards recognizing historical damage, although still lacking formal accountability. Overall, international law establishes differentiated climate obligations but is reluctant to hold historical emitters legally liable for the greenhouse gases of the past.

III. TRANSFER OF TECHNOLOGY FOR GREEN DEVELOPMENT

Technology transfer for green development is crucial for sustainable development to allow countries to adopt new technologies, such as renewable energy and clean manufacturing, to address climate change. More than 90% of the 1.5°C carbon budget has been used up, leaving less than 200 GtCO2. Hence, urgent action is necessary. However, this is slowed down by variations in access and ability. It is not merely about the equipment but about knowledge-sharing and local adaptation. But, high costs, intellectual property rights ("IPR"), and poor infrastructure stand in the way, especially in developing countries.

Legal frameworks significantly influence technology transfer. International agreements, such as the "Paris Agreement"[9] and the UNFCCC, encourage countries to share clean technologies, especially with developing countries. UNFCCC[10] Technology Framework, for instance, promotes cooperation, but there are no binding agreements behind it. Nationally, regulations vary from tax incentives for green technologies to cast iron IPR that barred access. India provides a case study of this in which the *2016 National Policy on Intellectual Property* attempted to mediate the dilemma between innovation and access, but today, many rural firms are finding it hard to access patented solar technologies.[11] This gap illustrates the disparity between the intent of the law and the practical ramifications thereof.

The knowledge transfer of technology is characterised by manifold difficulties, primarily among them are the financial constraints in developing countries. They, generally lack

[9] Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.
[10] Conf. of the Parties Serving as the Meeting of the Parties to the Paris Agreement, Decision 15/CMA.1, Technology Framework Under Article 10, Paragraph 4, of the Paris Agreement, U.N. Doc. FCCC/PA/CMA/2018/3/Add.2 (Dec. 15, 2018).
[11] Dep't for Promotion of Indus. & Internal Trade, Gov't of India, *National Intellectual Property Rights Policy* (2016).

sufficient means to acquire or innovate certain technologies. Although the patenting of intellectual commodities enhances innovation in the industrial world, it gives way to cartels that inhibit affordability elsewhere. Coupled with this would be cultural and technical mismatches as well. For instance, a solar panel system designed in consideration of the climate in Germany may be highly inappropriate for a similar endeavour in the heat of the Sub-Saharan areas unless adapted locally. Current positions kick off from two extremes: while the developed push for market-based transfers, and the developing regions' demand for more grants and relaxed patents, as seen in tracking at the debates in COP28 in 2023.[12]

As such, the present scenario stands between advancement and retrogression. Even as the Global Green Growth Institute extrapolated that the renewable energy tech transfers improved by 20% between 2015 and 2020, here China stands as the basic exporter of solar panels. However, only 30% of transferred technologies are used to their full potential, as they are not well organized to allow the technologies to flower; undertrained or poorly organized infrastructure bears part of the blame for these shortcomings. A case in point is the *Lake Turkana Wind Power project in Kenya*, which is hailed as a great success: the project sacrificed 365 turbines that added energy of 310 MW.[13] However, any smaller initiatives under its ambit will all wither in grace without other forms of support. Hence, this differentiation hints that while the quantity of transfers may not guarantee equity, dividend, or any greater good to people, it questions that who is actually reaping the benefits. To analyse, one realizes that the system is caught in a contradiction of its own making. There exists a global commitment to the cause, but lack of efficient implementation proves to be the bane, as every nation acts upon its own somewhat opposed interests. The development has, above all else, an established priority of profit and IPR, but the developing fight on the basis of equitable opportunity without much bargaining power. The GDRC (2015) contended that technology transfer was just "*a gadget of immaturity*," but the imposition of this knowledge was truncated by an unequal power relationship. Such a view is also reinforced, by way of information UNCTAD reported in 2021, that 80% of the patents on green technologies are held by five countries, namely the USA, Japan, Germany, SK, and China. This consolidation widened the gap in green development,

[12] U.N. Framework Convention on Climate Change, Rep. of the Conf. of the Parties on Its Twenty-Eighth Session, Held in the United Arab Emirates from 30 November to 13 December 2023, U.N. Doc. FCCC/CP/2023/11.
[13] *The Biggest Wind Farm in Africa Is Officially Up and Running*, CNBC (July 22, 2019), https://www.cnbc.com/2019/07/22/the-biggest-wind-farm-in-africa-is-officially-up-and-running.html.

which made many poor nations much more relied upon than empowered.

III.I. SOLUTIONS AND SUGGESTIONS

To bridge these gaps, there is a need for a multi-varied approach: a mixture of policy reform, financial innovation, and capacity building. First, the legal frameworks ought to reform themselves through an amendment to the UNFCCC incorporating mandatory quotas for technology transfer, which would be a way of pushing accountability. Pairing this with a global fund like the Green Climate Fund (specifically earmarked for a subsidised tech transfer) by doubling its figure of $10 billion currently every year, all adaptation costs could be covered.

Secondly, the transfer process has to be localized and democratized. The transfer process could also be complemented by relaxed patent rules for critical technology such as solar and wind in the least-developed countries. While critics may claim this hampers innovation, evidence suggests otherwise, showing that collaboration often spurs new ideas. It turns the analysis into a moving partnership wherein the focus is no longer on transfer as a transaction but rather on building self-reliance rather than charity.

Finally, making it tax-efficient for corporations to engage in green technologies that are openly shared could, in combination with public-private partnerships, speed up such endeavours. The challenge is scaling such efforts while ensuring that benefits reach the poorest, not just the powerful. Service to the balance of these is an adaptation to learning from past failures, a system established for future resilience.

IV. INTERNATIONAL TRADE LAWS AND TECHNOLOGY TRANSFER

An important North-South divide in climate collaboration is the transfer of clean technologies. Developing countries require cost-effective access to renewable energy, climate adaptation tools, and related technologies, but patents and intellectual property rights which are owned largely by corporations from developed countries, can present legal hurdles. The WTO Agreement on "**Trade-Related Aspects of Intellectual Property Rights"**[14] ("TRIPS") mandates that members provide patent protection (usually for 20 years) for inventions, which can include critical climate technologies. This has raised concerns that stringent IP enforcement

[14] Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Apr. 15, 1994, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) [hereinafter TRIPS Agreement].

might hinder the proliferation of solar, battery, carbon capture, and other low-carbon innovations in the Global South without the required permissions, potentially keeping the prices high. International intellectual property law offers some instruments to overcome these barriers. In particular, Article 31[15] of the Agreement allows governments to grant compulsory licenses to use a patent without the owner's authorization in certain situations - e.g. in a "national emergency or other exigent circumstances". In the past, this mechanism has been used in public health emergencies, and the climate crisis has developed into a global crisis in a similar vein," leading some to consider whether compulsory licenses for green technology could be justified.

To date, no country has issued a compulsory license for climate-only technologies, but legal experts point out that this is a viable option if the effects of climate change are considered an emergency. In addition, transitional exceptions apply to the least developed countries[16] under the TRIPS agreement (currently until 2034), allowing them to defer full enforcement of patents, a relaxation that could aid the deployment of climate technologies in the poorest countries. Further, beyond mandatory measures, there are calls for innovation-sharing mechanisms. For example, the concept of a "*Global Technology Pool for Climate Change*" was raised during the climate negotiations - a multinational pool in which the proprietors of green technologies would be obliged to place pertinent IP in order to make it available to developing countries on favourable or royalty-free terms. Similarly, "*humanitarian licenses*" and open-source approaches have also been proposed so that important climate innovations (such as drought-resistant seeds or efficient solar concepts) can be widely disseminated. Knowledge-sharing platforms such as the UNFCCC's Climate Technology Centre & Network ("CTCN") and WIPO Green have also been created to bring together suppliers and demanders of climate technologies, but they are based on voluntary cooperation and do not override patent rights.[17] Hence, international trade laws and IPR agreements, especially the TRIPS Treaty, define how clean technologies are transferred to developing countries. Although there are compulsory licenses and transitional exceptions that may offer solutions for overcoming patent barriers, their use for climate technologies remains untested. Such voluntary mechanisms as technology pools and knowledge-sharing platforms may stimulate cooperation but have no authority to bypass IP restrictions. Currently, the balancing act between an incentive to innovate and equal

[15] *Id.* art. 31.
[16] Council for Trade-Related Aspects of Intellectual Property Rights, Extension of the Transition Period Under Article 66.1 of the TRIPS Agreement for Least Developed Country Members, Decision of 29 June 2021, IP/C/88 (June 29, 2021).
[17] World Intell. Prop. Org., *WIPO GREEN: The Marketplace for Sustainable Technology*, https://www.wipo.int/wipogreen/en/ (last visited Mar. 13, 2025).

access remains a daunting task in the North-South divide associated with climate collaboration.

V. CLIMATE FINANCE AS A CATALYST

Climate finance has emerged as one of the critical tools to address the escalating challenges of climate change by ensuring funding for sustainable technologies to mitigate GHG emissions, marking a low-carbon future. Moreover, climate finance is essential since the investment required for developing countries to implement their climate plans, including the transition away from fossil fuels and adaptation to a warming planet, is estimated at $455-584 billion annually until 2030, as per the second Needs Determination Report under the UNFCCC. Thus, reinforced by legal frameworks like the UNFCCC and the Cancún Agreements' goal of jointly mobilizing $100 billion per year by 2020 to support climate action in poorer countries, an urgent need for climate financing arose. The rationale behind this is supported by the principle of CBDR. It holds the historical emitters accountable while enabling global cooperation. Hence, Climate finance is not solely viewed as a finance mechanism; rather, it is envisaged with a legal and ethical lens to catalyse sustainable development and decarbonisation in all parts of the globe.

Climate finance behaves as a catalyst for funds towards sustainable technologies such as renewable energy, energy-efficient systems, and carbon capture, which are essential in reducing emissions. The "I**nter-American Development Bank's 2013**" report under the title, "*The Role of National Development Banks in Catalysing International Climate Finance,*" indicates how National Development Banks ("NDBs") leverage public and private capital for sustainable innovations.[18] In 2011, NDBs in Latin America and the Caribbean held close to $1 trillion in assets, using financial instruments like loans and guarantees and unlocking private investment in low-carbon projects.[19] A case study in the report gives an account of **Mexico's FIRA** setting up the $18 million *FONAGA Verde guarantee fund*, thereby boosting over $11.2 million in private investment into renewable energy and biofuels by 2011, and projecting to reach $200 million in future.[20] This shows climate finance's importance in bridging the gap between high up-front costs and sustained long-term benefits, thus making sustainable

[18] Diana Smallridge et al., *The Role of National Development Banks in Catalysing International Climate Finance* (Inter-Am. Dev. Bank 2013).
[19] *Id.*
[20] Diana Smallridge et al., *The Role of National Development Banks in Intermediating International Climate Finance to Scale Up Private Sector Investments* 102–03 (Inter-Am. Dev. Bank, Discussion Paper No. IDB-DP-249, Nov. 2012).

technologies viable within areas of the market that would stall otherwise.

This addresses a symbiotic relationship: firstly, sustainable technologies require capital for scaling, and second, climate finance needs tangible outcomes to justify its deployment. Global climate finance flows reached almost $1.3 trillion in 2021–2022, according to data by the CPI, with $1.15 trillion allocated to mitigation, in areas such as solar and wind.[21] However, this is still dwarfed by the annual $8.1-9 trillion that the CPI estimates is needed through 2030.[22] What we have today is functionally faulty: while the financial chart accelerates, its distribution favours developed markets, leaving the developing countries underserved as technology adoption is most critical there. So, while climate finance could be a major player in climate action, it has to mould itself to provide an equitable platform to deliver the expected impact of the sustainable innovation ideology.

The concept of green finance is a relatively new part of climate finance, with increasingly broader ambits related to environmentally beneficial projects. It finances the decarbonization by funding the shifts from carbon-intensive systems to cleaner alternatives. This is pointed out by the fact that the green bonds in 2021 alone, worth approximately $517 billion, have been channelled toward decarbonization efforts like electric vehicles, among so many other things such as solar energy and renewable energy grids.[23] The practice of this is best illustrated in **El Salvador** with *BANDESAL,* which, through its Empresa Renovable program, deployed $11 million in loans and $308,408 in grants by 2012, channelling $6 million in private funds financing solar and small hydro projects.[24] This strategy notably enhanced energy access while reducing local dependence on fossil fuels and greenhouse emissions.

The analysis shows that the development of green finance enables the decarbonization process by risk-proofing those investments that private markets are unwilling to underwrite by themselves. The International Energy Agency ("IEA") data depicted that in 2022, renewable energy backed by green finance had 90% of the new power capacity, leading to a 2% drop in global energy-related CO2 emissions in the same year when the economy grew. Nevertheless, current operational gaps expose the system: in 2021, only 17% of the green finance reached

[21] Buchner et al., *supra* note 3.
[22] *Id.*
[23] Climate Bonds Initiative, *$500bn Green Issuance 2021: Social and Sustainable Acceleration: Annual Green $1tn in Sight: Market Expansion Forecasts for 2022 and 2025* (Jan. 31, 2022), https://www.climatebonds.net/news-events/blog/500bn-green-issuance-2021-social-sustainable-acceleration-annual-green-1tn-sight-market-expansion-forecasts-2022-2025.
[24] Smallridge et al., *Intermediating International Climate Finance*, *supra* note 22, at 100-01.

low-income countries, despite their urgently needed decarbonization. This imbalance suggests that while green finance affords a powerful lever in decarbonization, its effectiveness depends on reaching those high-emission, low-resource areas where sustainable technology has the potential to deliver sizeable reductions in carbon emissions.

Currently, climate finance functions through a mix of public funds (Green Climate Funds, GCF"), private investments, and hybrid mechanisms such as NDBs. Despite this, its scale and reach are far from adequate. Since its launch under the UNFCCC, the GCF has been envisaged as a key channel for the $100 billion annual goal. Nevertheless, pledges to the Fund stood at only about $12.8 billion by December 2023, reflecting shortfalls in donor contributions.[25] However, NDBs in LAC are a more agile model: NDB guarantees are estimated to leverage up to 8 times in private capital at market-rate fees, and up to 25 times where they are financed by grants.[26] The leverage is critical as the private capital must fill the void left by the strangling of public budgets after COVID-19.

The future potential is vast, but it requires specific refinement. A potential step can be blending climate finance with microfinance, which could unlock more capital for small-scale green projects in developing nations and provide a boost to decarbonization at the grassroots level.[27] This shifts the focus from top-down megaprojects to decentralized solutions. Imagine solar microgrids in rural Africa versus large, centralized wind farms. Coordination poses a challenge: national policies, international funds, and private actors need to be on the same page to level up these efforts. Therefore, the present patchwork approach is working progressively in certain niches such as LAC, but is simply inconsistent globally. This urges for a more unified approach to unlock the power of climate finance as a real catalyst for sustainable technology and decarbonization.

V.I. PUBLIC DEBT AND CLIMATE FINANCE

Climate-vulnerable countries face a double crisis: climate impacts (such as hurricanes, droughts, and floods) that cause economic damage and increasing public debt that impedes

[25] Green Climate Fund, *COP28: Green Climate Fund Reaches Record Funding Level* (Dec. 3, 2023), https://www.greenclimate.fund/about/news-and-updates/cop28-green-climate-fund-reaches-record-funding-level.
[26] Smallridge et al., *Intermediating International Climate Finance, supra* note 22, at 107-08.
[27] Peter Zetterli, Max Mattern & Jahda Swanborough, *8 Billion Reasons: Inclusive Finance as a Catalyst for Climate Action* (CGAP, June 2024), https://www.cgap.org/research/publication/8-billion-reasons-inclusive-finance-catalyst-for-climate-action.

their response capacity. This has led to a "*climate debt trap*" or a "*doom loop*": Calamities and the cost of adaptation drive the developing countries to borrow more, but large repayments of debt then drain funds for climate action, exposing them more to any future disasters.[28] Legal and financial innovations are being developed to break this deadlock by associating debt relief with progress in climate policy. One approach is the debt-for-climate swap (or debt-for-nature swap), which has already been used in previous contexts of environment and development.[29] In such a swap, a developing nation has part of its external debt forgiven or bought off by creditors if the country allocates the released funds to climate-related projects. In this way, debt repayments are primarily converted into domestic climate financing. For instance, in 2023, Ecuador negotiated the world's largest "*debt-for-nature*" swap by restructuring around 1.6 billion dollars of its debt to provide 450 million dollars for the protection of the Galápagos Islands.[30] Similarly, Belize and the Seychelles have implemented swaps where the savings are placed in marine conservation trust funds.[31]

Another mechanism is the inclusion of climate-resilient debt clauses in loan agreements. These clauses, developed by some Caribbean countries (and recently included by Barbados in its bond issues), provide that in the event of a severe natural disaster, debt repayments can be deferred automatically for a specified period to provide contingency funds.[32] This is essentially an on-demand debt relief, reflecting the reality of climate disasters. International financial authorities are also taking the initiative: the IMF's new Resilience and Sustainability Trust is offering concessional loans to susceptible countries for climate adaptation,[33] and the World Bank is considering options to take climate vulnerability into account in lending and disaster relief.[34]

The key is that climate finance from high-income countries should supplement these efforts

[28] World Res. Inst., What the World Bank's Country Climate and Development Reports Tell Us About the Debt-Climate Nexus in Low-Income Countries, https://www.wri.org/technical-perspectives/what-world-banks-country-climate-and-development-reports-tell-us-about-debt (last visited Nov. 8, 2026).
[29] Juan G. Giráldez et al., Bringing Nature into Sovereign Debt, Cleary Gottlieb Steen & Hamilton LLP, https://content.clearygottlieb.com/sovereigns/sovereign-debt-articles/bringing-nature-into-sovereign-debt/ (last visited Nov. 8, 2026).
[30] Press Release, Pew Charitable Trs., Pew Bertarelli Ocean Legacy Applauds Plan to Preserve the Galápagos Islands (May 9, 2023), https://www.pew.org/en/about/news-room/press-releases-and-statements/2023/05/09/pew-bertarelli-ocean-legacy-applauds-plan-to-preserve-the-galapagos-islands.
[31] Giráldez et al., *supra* note 31.
[32] *Id.*
[33] Int'l Monetary Fund, *Proposal to Establish a Resilience and Sustainability Trust*, IMF Policy Paper No. 2022/013 (Apr. 2022), https://www.imf.org/-/media/Files/Publications/PP/2022/English/PPEA2022013.ashx.
[34] Factsheet, World Bank, World Bank Group Announces Comprehensive Toolkit to Support Countries After Natural Disasters (June 22, 2023), https://www.worldbank.org/en/news/factsheet/2023/06/22/comprehensive-toolkit-to-support-countries-after-natural-disasters.

and discourage unsustainable debt accrual. The UNFCCC's funding mechanism (operated by agencies such as the "Global Environment Facility and the Green Climate Fund") was established to channel grants to developing countries engaged in mitigation and adaptation to climate change.[35]

VI. LEGAL DEVELOPMENTS

An alliance of countries led by Vanuatu in 2023 was able to petition the ICJ for an advisory opinion on the legal commitments of countries to combat climate action, including the question of whether inaction could result in state accountability.[36] This request is aimed at clarifying how the current international law framework shall be applied to climate damage. Although judicial pronouncements of ICJ are non-binding, such a decision could positively impact future decisions where major polluters owe "care of duty" and pay damages to affected states. Similarly, a group of small island states has formed a commission to submit questions to the "International Tribunal for the Law of the Sea" (ITLOS) on the impact of climate change on the marine environment. In a landmark advisory opinion issued in 2023, ITLOS unanimously stated that under the UN Convention on the Law of the Sea, states must take all necessary measures to prevent marine pollution from greenhouse gas emissions and that this also means ensuring that the activities under their control are in compliance with the objective of mitigating climate change. The ITLOS reiterated that climate change "falls within the scope" of states' existing environmental obligations, implicitly emphasizing that high-emitting states could be in violation of international law if they ignore climate change mitigation measures.

In addition to international courts, climate litigation is also gaining importance in national courts in the Global South. One such case is *Lliuya v RWE*,[37] brought against Germany's largest electricity supplier by a Peruvian farmer. The farmer, whose village is at risk of flooding from a glacial lake outburst flood (due to glacial melt as a result of global warming), is suing RWE for its proportionate share of this risk. In 2017, a court in Germany admitted the claim, and by 2022, the taking of evidence had been completed (the judges even visited the glacier), although no decision had yet been made on the matter. On 28 May 2025, however, the Higher Regional Court of Hamm dismissed the claim because the risk to the claimant's property was not sufficiently concrete, while holding that, in principle, a major emitter can be liable under

[35] *See* UNFCCC, *supra* note 6, art. 11, ¶ 1; Paris Agreement, *supra* note 9, art. 9, ¶ 8.
[36] G.A. Res. 77/276, U.N. Doc. A/RES/77/276 (Mar. 29, 2023).
[37] *Lliuya v. RWE AG*, No. 2 O 285/15 (Landgericht [LG] Essen Dec. 15, 2016) (Ger.).

German property law for climate harms abroad.[38] This recognition of liability in principle could open the floodgates to similar lawsuits against polluters. Even though such lawsuits face jurisdictional challenges (proof of causation, jurisdiction, etc.), they put pressure on governments and companies to address their carbon footprint. They also serve to look at climate change from the standpoint of legal responsibility and retributive justice, not just aid.

Developing countries have further been considering the idea of using trade law for climate accountability. There are discussions about carbon border tariffs and investor-state dispute settlements. As diplomatic channels are insufficient to remedy climate change, some countries and governments are beginning to turn to trade law. This trend sometimes referred to as 'climate justice,'[39] where courts and tribunals may contribute to closing the accountability gap left by international political processes. The SC of India in the landmark case of Rural Litigation and Entitlement Kendra v. State[40] and the National Green Tribunal (NGT) in India in several cases has emphasized that the right to a clean and stable climate is linked to the constitutional right to life. In a similar vein, courts in Kenya and Colombia ruled that failure to tackle climate change negatively impacts the marginalised communities to a greater extent. Although these decisions seem to be specific to certain countries, they contribute to the emergence of a legal precedent that climate change is not just a mere political issue but a legally enforceable malfeasance. As climate litigation gains traction, the courts could increasingly force national governments to take tough action to reduce carbon emissions, bypassing deadlocked international negotiations.

VII. CONCLUSION

Addressing global inequities in green development is a complex problem that requires a multi-layered effort that includes technology transfer, climate finance and inclusive policy reform. The current gap between developed and developing nations to access sustainable green technology hinders progress towards achieving global climate goals. While initiatives such as the Kyoto Protocol and the Paris Agreement have laid the groundwork for the global climate agenda, the implementation is lacking in various areas.

The US withdrawal from the "Paris Agreement in 2017", which however was reversed in 2021,

[38] *Lliuya v. RWE AG*, No. 5 U 15/17 (Oberlandesgericht [OLG] Hamm May 28, 2025) (Ger.).
[39] Simon Caney, *Climate Justice*, *in* Stanford Encyclopedia of Philosophy (Edward N. Zalta ed., Winter 2021), https://plato.stanford.edu/archives/win2021/entries/justice-climate/ (last visited Mar. 13, 2025).
[40] *Rural Litigation & Entitlement Kendra v. State of Uttar Pradesh*, A.I.R. 1985 S.C. 652 (India).

has clearly demonstrated the fragility of global climate commitments. It emphasized the importance of sustainable and binding agreements instead of voluntary pledges. This backtracking not only weakened global climate efforts but also signalled a lack of accountability among countries that have caused high levels of carbon emissions in past. Without strong legal commitments, developing countries remain vulnerable as they bear the brunt of climate change but receive inadequate support for mitigation and adaptation. Bridging this gap requires tech transfer agreements to be strengthened.