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Why are we not walking? Introspective reconstructions of the north–south global climate change conundrums

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Effective climate change adaptation and mitigation (CCAM) require strong cooperation between countries in the global north (GN) and global south (GS). However accomplishing this is often constrained by power asymmetries and conflicting interests. This disjunction and lack of selfless willingness to assimilate practically implementable interventions are a challenge that needs to be collectively addressed. This paper draws on a systematic review of 35 peer-reviewed studies to demonstrate how global guidelines frequently prioritize GN interests, impose disproportionate costs on the GS, and overlook local contexts and indigenous knowledge. Key barriers include the GN's reluctance to acknowledge historical responsibility for greenhouse gas emissions, short-term energy security concerns that drive a return to fossil fuels, the “*classification conundrum*” surrounding emerging economies such as China and corruption and conditional aid that undermine climate finance. Despite these challenges, the study identifies actionable pathways. A just energy transition that links renewable energy expansion with social equity can align global mitigation efforts with development needs. Incorporating nature-based and locally adapted solutions fosters legitimacy and community ownership, while South–South cooperation provides complementary avenues for sharing technologies and indigenous practices. The paper urges international organizations to reform climate finance by favoring grants over debt-inducing loans and to enhance inclusive decision-making to combat “*carbon colonialism*” and greenwashing. By synthesizing these insights, the study offers an evidence-based framework for equitable North–South collaboration, presenting practical strategies to bridge divides and accelerate progress toward global sustainability goals.

KEYWORDS

adaptation, climate change, global change, mitigation, north–south divide, mutual agreements

Introduction

Climate change (CC) is a global challenge that affects everyone in a manner that requires international cooperation by all countries in the Global North (GN) and Global South (GS) (Gajjar, 2020). While progress has been made in certain areas, the gains have been insufficient and short-lived, falling short of the transformative and sustained efforts required to meet the ambitious goals set forth in the 2015 Paris Agreement (Lecavalier et al., 2023). The literature on strategies ascribed to addressing climate crisis falls into two broad categories: mitigation and adaptation. Mitigation strategies focus on reducing GHG emissions and other pollutants (Kamal, 2019), while adaptation strategies focus on adapting to and managing the impacts of

CC (Tan et al., 2021). It is important to recognize that each major climate-action strategy has its own distinct benefits and limitations.

Mitigation sets clear global greenhouse gas targets and can drive deep emission cuts through renewables, efficiency and carbon pricing (Le Billon and Kristoffersen, 2020; Peszko et al., 2020). However, it is often discredited for favoring technologies from the GN (McAfee, 2012), requiring high upfront costs and risking ‘carbon colonialism’ (Stoddard et al., 2021). Additionally, mitigation remains vulnerable to political backsliding when energy security concerns arise (Peszko et al., 2020). In contrast, adaptation is recognized for promoting nature-based solutions, strengthening local resilience and providing biodiversity and livelihood co-benefits when grounded in local knowledge (Le Billon and Kristoffersen, 2020; Muchaku et al., 2023). Nevertheless, many adaptation projects are poorly aligned with indigenous ecologies, may appropriate traditional practices or introduce invasive species (Peszko et al., 2020). Finally, justice-centered approaches that embed principles of equity and political legitimacy reduce social resistance and support enduring sustainability (Calabrese Barton and Tan, 2020). However, they require extensive institutional reforms and redistributive commitments that are often politically challenging to achieve (Fernando, 2020).

Although these strategies are often presented as the most effective ways to mitigate the adverse impacts of CC, evidence points to critical flaws in these strategies, most of which arise because they continue to be compromised by the lack of willingness of various players to implement the interventions envisaged, and their limited capacities (Akoleowo, 2022). This disjunction has always invoked polarized arguments on who should take the lead in confronting the adverse effects of CC, with this polarity persuading some to subscribe to the view that the GN and GS are equally responsible (Dong et al., 2021) while others, as illustrated later by Zhang et al. (2023) contend that the GN is largely accountable. These north–south (N-S) tangential views explain why tractable cooperation is lacking on how to address the challenges of CC (Sugiyama et al., 2020). This bipolarity has come to be the norm, with countries like the United States (US), Canada, Australia, New Zealand, Japan, and those in Western Europe being recognized as constituting the GN even though some of them are not geographically situated in the north and all others being universally categorized as belonging to the GS irrespective of their hemispherical positioning (Maslin et al., 2023; Koch, 2021). This primary debate undermines the implementation of CC mitigation interventions. This article examines the commitment and role of these two worlds in addressing the carbon conundrum and achieve net-zero emissions by 2050.

Although several developed countries have stepped up efforts to address the threats of global warming by reducing greenhouse gas (GHG) emissions, reports of renewed interest in non-renewable energy shed doubts on whether there is a serious commitment to do this (Shahsavari and Akbari, 2018; Lees, 2021). The main point of contention between the GS and the GN regarding CC mitigation is based on the fact that, because 79% of GHG emissions between 1850 and 2011 were caused by developed countries, they must contribute more to the costs of implementing CCMA strategies (Dong et al., 2021; Del Ponte et al., 2023). The contribution of developed countries to the accumulation of GHGs is so because of the historical concentration of industries in the developed countries (Burton-Chellew et al., 2013; Dong et al., 2021). On the contrary, there are arguments that this situation has changed, with developing countries

now contributing 63% and the developed countries contributing the remaining 27% of GHG emissions (Del Ponte et al., 2023). This suggests that developed countries bear greater responsibility for the current climate crisis, while developing countries are now contributing to the problem by replicating the same practices that developed countries employed in the past to achieve their own development goals.

Another policy that has been proposed to reduce the impacts of CC on vulnerable communities is the implementation of climate-friendly adaptation strategies (Scoville-Simonds et al., 2020). This policy approach involves using drought-resistant crops, water conservation methods and improved irrigation systems to help communities cope with the effects of CC (Akoleowo, 2022; Muchaku et al., 2023). It is important to note that these strategies seek to enhance the resilience of communities to changing conditions and be better prepared for the impacts of CC (Tan et al., 2021; Zhang et al., 2023). However, in some cases, developing countries have questioned the appropriateness of specific approaches that have proven inappropriate and socially unacceptable in some scenarios (Falkner, 2016; Lees, 2021).

Despite numerous policy instruments and substantial funding pledges, N-S cooperation remains constrained by contested responsibilities, inappropriate one-size-fits-all solutions, and financial mechanisms that can exacerbate inequity. Most existing work either (a) models’ technical emission pathways (Fernando, 2020), (b) evaluates discrete policy instruments, or (c) offers case studies of adaptation projects (Calabrese Barton and Tan, 2020). This paper combines systematic literature reconstruction with Critical Discourse Analysis (CDA) to trace how published knowledge, international guidelines, and institutional narratives reproduce GN–GS asymmetries and classification ambiguities. This mixed conceptual - discursive method does three things differently: (1) it foregrounds power and rhetoric, (2) it synthesizes empirical evidence on maladaptive outcomes, and (3) it uses the literature to propose governance reforms that address conditionality, classification and legitimacy, linking discourse to policy design in ways that many technical studies do not.

Scholars note that current global governance arrangements often produce voluntary, uneven outcomes that fall short of the transformational change required to meet Paris targets. It is important to note that despite the ongoing debate, the costs of not addressing the impacts of CC significantly impact countries in both the GN and GS (Muchaku et al., 2023; Sugiyama et al., 2020). While it is an undeniable fact that the climate crisis affects the GN and GS with differing levels of severity, developing countries are disproportionately impacted, yet developed countries are not entirely immune to its effects (Slayi et al., 2024). This view is supported by scholars such as Akoleowo (2022) and Msimanga and Mukwada (2022), who argue that CC impacts often lead to significant changes in local livelihoods and resource management practices. Therefore, clarifying the debates between the GN and GS helps to bring to the fore the underlying issues that place the two regions at greater risk of CC. This debate potentially contributes to better understanding while creating avenues for dialogue that can enhance collaboration in developing and implementing joint CCMA strategies between the two regions.

This research systematically examines CCMA dynamics between the GN and GS, focusing on structural inequalities, implementation barriers, and opportunities for equitable collaboration. Covering the period 2000–2022, the study analyzes

peer-reviewed literature on how historical emissions, global guidelines, indigenous knowledge and finance mechanisms shape North–South CCMA outcomes. The research aims to provide actionable insights for fostering just, locally grounded and sustainable climate strategies that address global responsibilities and local realities.

Theoretical framework

This paper used Critical Discourse Analysis (CDA) as a theoretical framework to interrogate the discursive narratives about the North and South (N-S) divide into actionable CCMA strategies with N-S denoting developed and developing countries, respectively. CDA emerged in the late 1980s as a programmatic development in European discourse studies led by Wodak and Meyer (2009). By focusing on the relationships between power and identity, CDA enables researchers to uncover the underlying ideologies and discourses that shape people's thoughts and actions CCMA (Chukwumerije and Coventry, 2016). CDA can be used, for example, to examine how discourses of the N-S divide are used to justify specific actions or inactions concerning CCMA. In this context, CDA can be used to identify power dynamics and trace how these power dynamics shape the decisions and actions of different actors in N-S countries. Through this analysis, CDA can help uncover how different actors in the NS divide are positioned about CCMA and how these positions are used to advance specific interests. In this way, CDA provides a powerful tool for understanding the complex dynamics of the N-S divide on CCMA strategies. This divide is problematic because it continues to undermine the adoption of climate-friendly adaptation strategies. To address this challenge, we hypothesize that the best way forward is to adopt adaptation strategies that are premised on the tenets of the polluter-pay principle, with the GN contributing more because it has been at the forefront of GHG emissions.

Materials and methods

The methodology used consists of a systematic review of the literature on CC debates between countries in the GN and GS. The current study relied exclusively on secondary sources, drawing insights from existing literature and theoretical analyses without collecting new empirical data. This methodology was purposefully designed to identify peer-reviewed publications that address CC. This identification was conducted by using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) tool to ensure transparency and reliability (Moher et al., 2009; Kacowicz, 2007; Odeh, 2010). Table 1 shows the sequence of steps that were followed in this screening process and the number of papers that were identified in the Scopus database by using Boolean operators. Table 1 provides an overview of a methodical, stage-by-stage approach to utilizing Boolean operators (AND, OR, NOT) to precisely control the inclusion and exclusion of publications, ensuring a targeted and refined search outcome. The criteria yielded a final sample of 35 relevant papers from the sampling universe of 171.

Sequence of steps that were followed in the screening process and the number of papers that were identified in the Scopus database using Boolean operators.

Flow chart above shows a sequential screening and deduplication of publications, conducted in a stage-by-stage manner.

In the steps shown in Figure 1 and the extraction procedure shown in Table 1, we purposefully considered peer-reviewed articles in the Scopus database because of its excellent navigation skills to quickly identify internationally accredited publications. The exclusion of irrelevant papers was done through a multistep criteria-based rigorous screening process, which was purposefully designed to ensure that the selected publications were reasonably representative of the prevailing situation. As shown in Table 1, the initial search yielded 171 articles which were broadly relevant to the study. Thereafter, these papers were screened to exclude 38 publications by only including those that were published between 2012 and 2023. These cut-off dates were preferred because articles that were published before 2012 were reasoned to be outdated and unrepresentative of current perspectives and understandings and those published in 2024 were excluded because our search ended before this year was over. This screening yielded 133 publications. In the second phase, only peer-reviewed articles were targeted. This screening yielded 80 publications by excluding 53 which did not meet the inclusion criteria (contextual relevance) of this study. In the third stage, 2 papers were further eliminated because they were not published in English. This screening yielded 78 publications. In the last stage, 43 publications were excluded because they were not downloadable to produce 35 articles, which provided this study's final compilation of relevant publications.

Analysis of data

ATLAS.ti23 (a software that is used to analyse qualitative data) was used to conduct a thematic analysis of the qualitative data in which these data were electronically coded and then organized into themes, patterns, and relationships. The software allowed the researchers to examine the data, identify emergent themes, and develop an understanding of the data. In addition, the software was used to create visual representations of the data, such as network diagrams, which provided a clearer understanding of the connections between the different types of qualitative data.

Results

A central theme in the literature is the asymmetrical between the GN and GS. The principle of “*common but differentiated responsibilities*” (CBDR) attempts to reconcile historical responsibility and current capability (Deleuil, 2012), but its implementation is contested, particularly regarding country classification and burden-sharing among emerging economies that fall between developed and developing categories. These classification ambiguities undermine predictable finance and responsibility allocation. This article contends that bridging the gap between climate commitments and actions requires collective action among Paris Agreement signatories to address the carbon conundrum.

The literature review on debates between the GN and GS divide on CCMA revealed some noteworthy findings.

Concerning the debate over CCMA, findings from the literature point to the unequal inter-group distribution of responsibilities and

capacity between the GN and GS (Sugiyama et al., 2020). Although the economic diversity of the GS has increased and its collective economic power has increased, its relative income rankings remain unchanged, and they continue to vociferously pronounce dissatisfaction because they have a long way to go before they can be able to achieve parity with the GN (Lees, 2021). This positioning requires non-partisan and nuanced adoption of a collective approach in addressing the challenges associated with global warming and CC. Although the GN has repeatedly affirmed its commitment to aiding the GS in combating CC, evidence suggests that the opposite is happening. We have so far witnessed a lot of symbolic commitments that should be respected. The Table 2 provides an informed synopsis of this disconnect's incoherence.

Overall, the outcomes from all international frameworks and globally endorsed agreements paint a grim picture which indicates that little has been accomplished beyond repeated expressions of interest to confront the challenges of CC. None of the frameworks and agreements has been able to meet their targets with modest gains that are being realized tending to be reversed by recourse to resource use practices that increase GHG emissions, creating a pattern akin to 'one step forward and two steps backwards'. After signing the Paris Agreement in November 2015, for example, the US, the world's largest emitters of GHG withdrew from the same agreement 5 years later in 2020 (Chukwumerije and Coventry, 2016). These 'in-today, and outside-tomorrow' inclinations point to failures by the global community to consistently tow a line that is commensurate with the

TABLE 1 Stage-by-stage Boolean filtering for publication inclusion and exclusion.

Boolean operator	Criteria	Articles
TITLE-ABS-KEY ("Climate change" AND developed AND developing OR ((north AND south AND global AND "less income" AND industrialized)) AND debates OR ((challenges)) AND adaptation) AND strategies AND countries	Keywords	171
TITLE-ABS-KEY ("Climate change" AND developed AND developing OR ((north AND south AND global AND "less income" AND industrialized)) AND debates OR ((challenges)) AND adaptation) AND ALL (strategies AND countries)) AND PUBYEAR > 2011 AND PUBYEAR < 2023	Year	133
TITLE-ABS-KEY ("Climate change" AND developed AND developing OR ((north AND south AND global AND "less income" AND industrialized)) AND debates OR ((challenges)) AND adaptation) AND ALL (strategies AND countries)) AND PUBYEAR > 2011 AND PUBYEAR < 2023 AND (LIMIT-TO (DOCTYPE, "ar"))	Article type	80
TITLE-ABS-KEY ("Climate change" AND developed AND developing OR ((north AND south AND global AND "less income" AND industrialized)) AND debates OR ((challenges)) AND adaptation) AND ALL (strategies AND countries)) AND PUBYEAR > 2011 AND PUBYEAR < 2023 AND (LIMIT-TO (DOCTYPE "ar")) AND (LIMIT-TO (LANGUAGE, "English"))	Language	78
Final sample (after further screening)	–	35

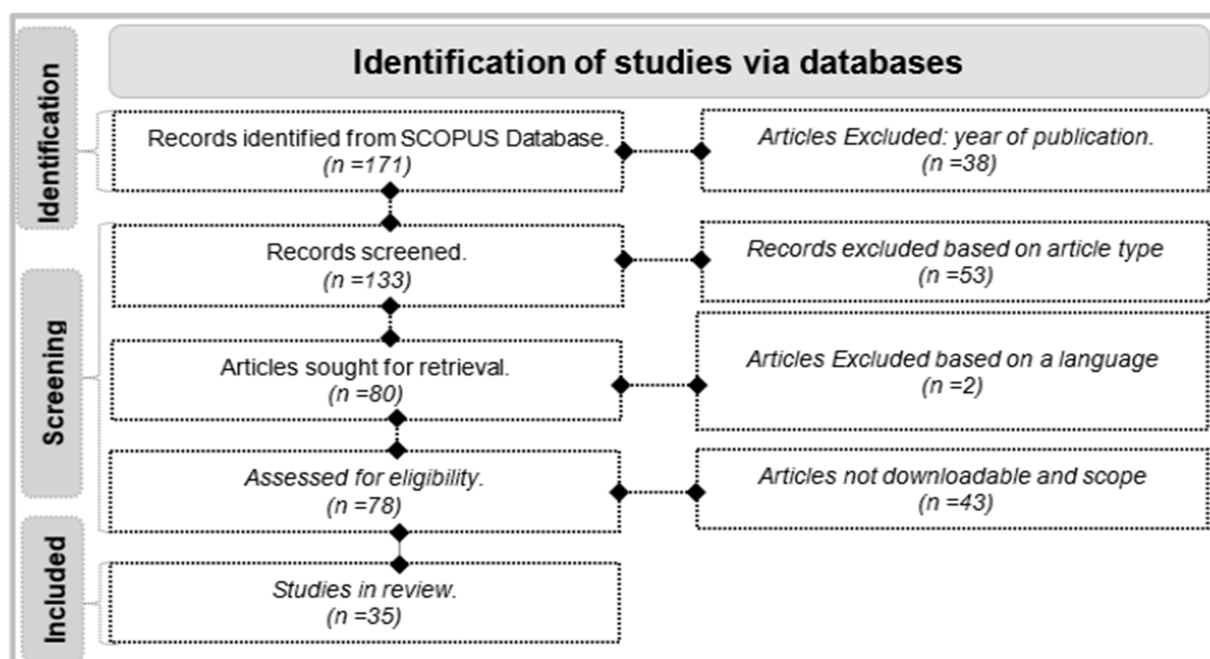


FIGURE 1
Multi-stage screening and duplication of publications.

overdue need to implement collective CCMA strategies. The most recent studies published through research and activities that were commissioned through the Paris Agreement (2023) warned that ‘the world is not on track to meet the long-term goals of the Paris Agreement, and our planet is boiling’ (Lee, 2023).

While it is true that many international frameworks and agreements on CC have struggled to meet their ambitious targets, it is equally important to recognize the measurable progress that has been made through collective efforts. For example, Annex I countries have successfully achieved their collective goal of reducing greenhouse gas (GHG) emissions, reaching levels more than 6% below 1990 levels by the year 2000, as reported in The Paris Agreement on CC: Analysis

and Commentary (Klein, 2017). This achievement shows that the international frameworks have contributed to significant progress despite limitations and setbacks in some areas. Such successes underline the potential of international cooperation when commitments are fulfilled and supported by appropriate implementation mechanisms. However, it is also clear that these gains must be sustained and strengthened to meet the ongoing challenges of resorting to resource use practices that exacerbate GHG emissions. This requires a nuanced understanding of both achievements and limitations and emphasizes the need to strengthen frameworks to ensure a more inclusive, impartial and durable implementation of CC plans.

TABLE 2 Internationally endorsed agreements and their accomplishments and failures.

International CC frameworks and globally endorsed agreements	Scope of the framework, nature of the agreement and, objectives/aims	Outcomes to date	Source
Intergovernmental Panel on Climate Change (IPCC)	The aim is to enhance the capacity of governments, organizations, and individuals to understand and respond to climate change.	- Some progress has been made on capacitation and the establishment of a reporting framework which provides information on greenhouse gas emissions and removals using common categorization and definitions. - Responses are inadequate, some being reversed by doing the opposite, such as opening new coal mines, drilling new oil wells, and continuing to explore for more.	Maizland (2023)
The United Nations Framework Convention on Climate Change (UNFCCC) - was adopted in 1992 and entered force in 1994.	It aims to reduce the concentration of atmospheric greenhouse gases.	- After 25 years, progress on reducing global emissions has been slow and emissions have increased by 60% since 1994. - In 1994, about 80% of the global primary energy supply came from fossil fuels. This figure now stands at 82% (Karakosta et al., 2010). - CO₂ emissions increased by ~38% since 1992. - The allocation of resources to fully implement the agreement has not been sufficient.	Reuben (2021)
The Paris Agreement- was adopted in 2015 and entered into force in 2016.	- It aims to reduce greenhouse gas emissions and adapt to the impacts of climate change. - The agreement aims to limit global warming to below 2, preferably by 1.5 °C, compared to pre-industrial levels.	- Does not specify how much different countries must contribute to achieve GHG reduction goals. <i>Yet, this is specified in the nationally determined contribution of each country.</i> - The US's announced intention to withdraw implies failure. <i>On the first day of taking office, President Biden ratified US participation.</i> - Managed to encourage the EU and countries like Japan, China, and to set carbon neutrality goals and embrace net zero targets but it cannot enforce them. - It has created a collaborative community of countries.	Naham (2023)
The Kyoto Protocol: Adopted in 1997 under the UNFCCC & entered into force in 2005.	It sets binding targets for 37 industrialized countries and the European Union to reduce greenhouse gas emissions.	- Developing countries, including China, were not required to reduce their emissions, and yet China and the US were the largest emitters of all. - Does not include binding agreements from significant greenhouse gas emitting countries such as the USA and China. - It does not have the tools to drive global collective action to combat climate change	Bassetti (2022)
The Kigali Amendment: This is an amendment to the 2016 Montreal Protocol	- It is an international treaty to protect the ozone layer. - It provides measures to phase out hydrofluorocarbons (HFCs) and greenhouse gases.	- Developing countries have lagged in the ratification process due to a lack of technical and financial support. - Countries often lack the necessary coordination to meet national commitments.	Loris and Schaefer (2018)

Discussion

There is much evidence to show how the inequalities between these two worlds are fueling discords in designing and implementing global guidelines on CCMA (Moher et al., 2009; Kacowicz, 2007; Odeh, 2010). The literature is replete with evidence suggesting that several global CC guidelines favor developed countries (Degele and Pedregal, 2022; UNESCO 7426, 2016). This bias explains the ambivalence over collaboration between the GN and GS on CCMA (Littleton, 2009; Owusu and Asumadu-Sarkodie, 2016). As shown by the results of this initiative, although some progress has been made in areas like capacitation, some of the major factors that continue to undermine the assimilation of actionable CCMA strategies include the lack of adequate momentum due to (1) persistent disagreements on how this must be done, (2) reluctance by the GN to accept they are obliged to shoulder the burden of containing the deteriorating climatic conditions, (3) lack of a selfless willingness to cooperate which is largely driven by the undeclared focus on immediate short term interests, and (4) the tendency by international organisations to pursue strategies that unjustifiably transfer a sizeable proportion of CCMA costs to the GS without due consideration of the fact that their contribution to GHG emissions is marginal compared to that by the GN. The following sections attempt to address these and other issues in a manner that can provide shareable insights on the way forward.

The debate on achieving a just energy transition

One of the key findings on the GN-GS debate highlights the critical need for a just transition (Figure 2). Renewable energy sources such as solar, wind, and hydropower can reduce GHG emissions and help mitigate CC impacts (Shahsavari and Akbari, 2018). These policies provide an alternative to traditional fossil fuels, contributing significantly to global warming (Lees, 2021). Despite the progress made in some countries in the field of renewable energy and the reduction of GHG emissions, some countries of the GN have been criticized for returning to non-renewable energy sources (Sharma et al., 2021). For example, since the outbreak of the ongoing war in Ukraine for example, one good thing that has been happening for CC

is that the EU countries have been moving away from Russian gas by shifting to and pledging to double the use of renewable energy this decade (Karakosta et al., 2010; Koch, 2021; Gürsan and Gooyert, 2021; Lees, 2021). Unfortunately, however, other countries like the US are backsliding and trying to meet the energy shortages triggered by this conflict by doing the opposite, with Germany expanding one of its coal mines (Karakosta et al., 2010; Lees, 2021). and the US government opening the door to the drilling of new oil and gas in the Gulf of Mexico and Alaska (Koch, 2021; Gürsan and Gooyert, 2021).

In some cases, the carbon conundrum has been spelt as they are also calls to promote 'just energy transition' in developing countries. This concept calls for more leniency to allow the GS time to transition to clean energy by ensuring that the shift is equitable and inclusive, considering social and economic impacts on communities in the GS (Shahsavari and Akbari, 2018; Tan et al., 2021). An additional argument is that this moratorium is essential because developing countries have the right to close the development gap between themselves and those in the GN (Kamal, 2019). According to the GN, however, the GS must limit its GHG emissions because repeating the GN's past mistakes will lead to irreversible increases in global warming (Kamal, 2019). According to this view, its experiences are supposed to serve as a yardstick for formulating collective CC response strategies (Roos, 2024) and accepting equal accountability for the climate crisis (Koch, 2021; Tan et al., 2021) because the benefits of collective action are global and not excludable (Dolsak and Prakash, 2018). These issues pose formidable challenges that make CC mitigation difficult to realize by raising a finger-pointing standoff as the developing countries are arguing that the developed countries must bear more the burden in the financing of CC mitigation and have no excuse for not doing so (Chukwumerije and Coventry, 2016). Therefore, it is essential to consider the factors that could encourage these countries to refrain from negating their commitments to reduce greenhouse gas emissions.

Global guidelines vs. nature-based solutions

Research into the CCMA strategies that have been collectively assigned to countries from both GN and GS point to persistent reluctance to assimilate implementable and sustainable development interventions (Shahsavari and Akbari, 2018; Kamal, 2019). According

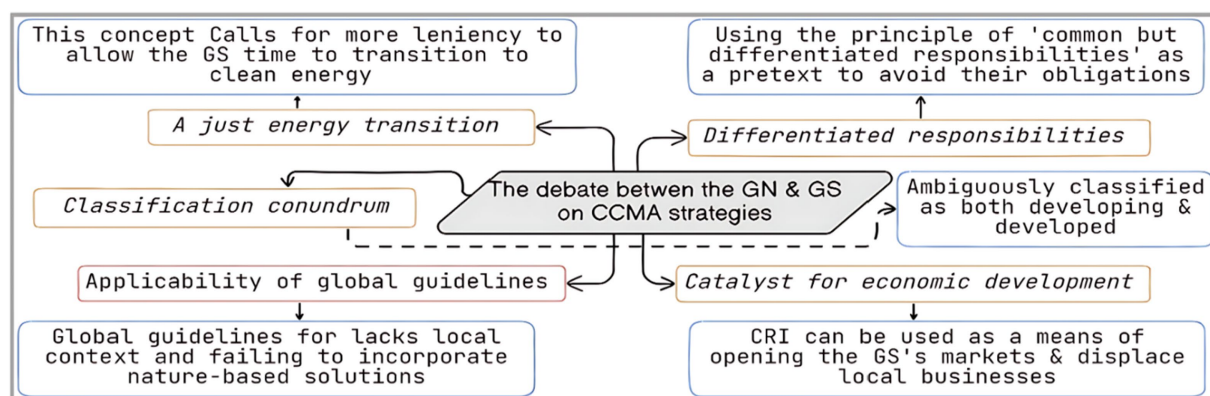


FIGURE 2
Key points of contention in the GN-GS debate.

to the existing literature, global guidelines have been criticized for lacking local context and failing to incorporate nature-based solutions, resulting in inconsistent outcomes across regions (Roos, 2024). While they may be effective in some areas, they often yield suboptimal results in others (Shahsavari and Akbari, 2018; Kamal, 2019), highlighting the need for more tailored and adaptive approaches. This narrative is premised on and informed by the fact that most of the intervention strategies tend to focus on reducing GHG, increasing energy efficiency, and making lop-sided investments in renewable energy sources without considering how this can be achieved (Lees, 2021). Although these strategies may be effective, they are considered fragile. For instance, geopolitical shocks like the Russia–Ukraine war highlight how easily global climate commitments can falter when energy security is at risk. In response to sudden disruptions in gas and oil supplies, many countries, including those that had pledged significant emissions cuts, reverted to coal, expanded fossil fuel subsidies (Le Billon and Kristoffersen, 2020), or signed new long-term hydrocarbon contracts to safeguard their economies (Peszek et al., 2020). This behavior exemplifies the “tragedy of the commons,” where each state acts rationally to secure immediate national interests but collectively undermines the shared goal of limiting global warming. From a collective-action perspective, as the costs of cooperation increase, states resort to self-help, revealing that climate pledges without enforceable mechanisms are vulnerable to geopolitical and market shocks.

The developed North is accused of advocating for CCMA methods that are incompatible with other cultures and environments in developing countries. For example, the propagation of non-native plants, such as the invasive *Lantana camara* shrub, was castigated as more harmful than beneficial as demonstrated by its established competition with and replacement of indigenous species through allopathic suppression (Hariharan et al., 2024; Muchaku et al., 2023), and reduction of biodiversity and interruption of natural regeneration processes (Rajat, 2020). The exclusion of indigenous approaches highlights deep-rooted power imbalances, often referred to as “carbon colonialism,” in which institutions and elites from the GN impose climate solutions that overlook local knowledge and priorities. In contrast, strategies grounded in local traditions and community practices foster greater stakeholder ownership, enhance cultural legitimacy and lead to more sustainable, context-specific climate outcomes. The ineffectiveness of some global guidelines in addressing the climate crisis has prompted scholars to promote the ‘*Think global, act locally*’ approach. This philosophy argues that CCMA guidelines must be adapted to address local needs, fostering ownership and participation among community members in the development of strategies. This localized approach is expected to enhance the effectiveness and sustainability of CCMA initiatives. On the other hand, the GS has faced criticism for promoting outdated strategies that fail to resonate with modern society, eroding confidence in its ability to address contemporary challenges (Muchaku et al., 2023). Examples include but not limited to spiritual or ritualistic approaches to climate management, which may not be recognised or valued in modern scientific frameworks (Rahmah and Sulistyono, 2024).

Principle of ‘common but differentiated responsibilities’

The debate surrounding global climate action also centers on the roles of GN and GS countries. These ongoing disputes illustrate the

challenges faced by the principle of *common but differentiated responsibilities* within the UNFCCC. This principle, while foundational, struggles to remain effective in today’s negotiations, as economic power no longer aligns neatly with the traditional North–South divide. One of the prevailing arguments is that since the GN is responsible for most of the GHG emissions, it should wield most of the costs associated with transitioning from fossil fuels to clean energy sources (Kamal, 2019). This perspective argues that from the beginning of the industrial revolution up to the present, countries of GN have been and most significant consumers and producers of GHG compared to their GS counterparts because of their high fossil fuel-based energy requirements (Maslin et al., 2023; Hickel and Slamersak, 2022). Colenbrander et al. (2022) reinforces this by pointing out that major emitters such as China and Brazil have a significant responsibility to contribute to global climate efforts. Conversely, Moellendorf (2014) emphasizes that GS countries should also share the burden responsibly, considering their growing emissions. GN’s stance is that CC affects everyone and thus requires a collective effort from all nations. In view of the preceding discussion, countries should not use the principle of ‘common but differentiated responsibilities’ as a pretext to avoid their obligations. Analyzing GN–GS dynamics in CCMA through a postcolonial and environmental justice lens reveals historical and structural power imbalances that sustain “carbon colonialism.” This concept highlights how GN interests shape global guidelines and impose unequal burdens on the South. Environmental justice further emphasizes the need for fairness in distributing climate risks, responsibilities, and resources. This perspective underscores the importance of locally grounded, culturally appropriate, and equitable CCMA strategies for achieving sustainable outcomes. Another view considered in address this imbalance by scholars such as Qi and Qian (2023) suggest that GS countries can enhance GN efforts through South–South cooperation, fostering a more equitable approach to tackling CC. However, addressing these challenges requires a comprehensive, human-centred, and sustainable policy review that ensures joint N and S efforts in addressing the impacts of CC and climate justice.

The classification conundrum

A notable finding from this literature review is the ‘*classification conundrum*’, where countries face challenges in self-identifying as either developed or developing, undermining the roles and functions of the signatories to the Paris Agreement. Closely related to this is the view that although China is widely considered to be a developing country, it is also ambiguously classified as both developing and developed and deemed to have the highest per-capita contribution to emissions than that of GN countries like France, Germany, Japan and United Kingdom (Colenbrander et al., 2022). Although this upgrading has its own merits, Beijing still prefers to call itself developing in order to continue getting preferential treatment (Mayer, 2023). China’s dual identity as the world’s largest emitter and a self-declared developing nation creates ambiguity in climate governance. This situation enables China to avoid binding donor obligations while still reaping the benefits of concessions available to developing countries, complicating the enforcement of climate-finance commitments. This explains why there is increasing international pressure for it to upgrade its climate ambitions in a manner that reflects its upper-middle-income status and ranking as the world’s

second largest economy (Liu and Liu, 2023; Rachman, 2010). Implicit in this observation is the fact that blanket measures and criteria are not the most appropriate means to determine which countries should be providing climate finance.

Climate-resilient infrastructure as a catalyst for economic development

Another policy that has been proposed to reduce the impacts of CC is the informed use of climate-resilient infrastructure (CRI) (Littleton, 2009; Karakosta et al., 2010). This approach has, however, been criticized for its tendency to promote the economic interests of the GN at the expense of the GS (Vadrot, 2020; Lees, 2021). Although these strategies have the potential to significantly reduce GHG emissions (Shahsavari and Akbari, 2018; Kamal, 2019), there are concerns that most of them are too costly for developing countries (Hayward and Roy, 2019; Sugiyama et al., 2020), to the extent that they may lead to further economic disparities (Scoville-Simonds et al., 2020). By way of explanation, critics argue that CRI can be used as a means of opening the GS's markets to products and services from the GN and displace local businesses (Hayward and Roy, 2019; Lees, 2021). Going by this view, instead of supporting the GS, the GN has viewed this lack as a timely opportunity to market its green technologies (Scoville-Simonds et al., 2020). In addition, CRI projects can be expensive and challenging to implement (Karakosta et al., 2010; Sun and Yang, 2016), leading to a need for more resources for other development projects. These arguments are further supported by Sun and Yang (2016), who argue that technological solutions are confounded by the challenge of problem shifting, which creates new ones that exacerbate the CC challenges they are trying to address. Selected examples include nuclear power generation produces CO₂ vacuum sucking and nuclear energy which are expensive, energy-hungry, and have significant limitations.

On the other hand, the GS continues to assume a victim mentality, engaging in a *cat-and-mouse* game of evading responsibility to mitigate the impacts of CC. Despite the vocal concern of the GS about insufficient climate finance, developing countries also bear responsibility. In some cases, aid intended for well-intentioned initiatives such as carbon offsets is being exploited by opportunists who artificially inflate greenhouse gas emissions in order to receive payments. Corruption is an important issue. Recent evidence shows that the 10 countries receiving the most climate finance (44.77% of total funding) have an average Corruption Perceptions Index of 33.36 (Lyeonov et al., 2023). This indicates a high level of corruption in the public sector. Practical examples are (a) between 7 and 15% (\$1–2bn) of multilateral climate funds allocated to the water sector are lost annually due to corruption, (b) about 35% of the budget for climate projects in Bangladesh was stolen or embezzled in 2029 and bribes were paid for more than 25% of solar energy projects in India. Clearly, the two sides often have very different goals and perspectives on CC. Given that the current economic landscape significantly impacts the ability of the developed North and the developing South to reach a consensus on action on CC (Chukwumerije and Coventry, 2016), it is essential to reflect on these critical aspects that promote global cooperation.

Areas for potential cooperation between the GN and GS

Climate change is a global issue requiring cooperative action between the GN and GS to achieve effective and equitable CCMA strategies (Hayward and Roy, 2019). While individual nations must independently advance CCMA initiatives, global policies should prioritize collective efforts to meet ambitious mitigation targets (Hormio, 2023). The GN possesses the resources and technologies needed for effective implementation, while the GS offers critical local and indigenous knowledge for managing risks and adapting sustainably to changing climates (Muchaku et al., 2023). For instance, agroecology, prevalent in Latin America, combines traditional and organic farming practices, providing sustainable solutions to food production challenges (Vadrot, 2020; Akoleowo, 2022). Therefore, collaboration between the GN and GS has the potential to yield mutually beneficial outcomes, such as reducing GHG emissions through increased access to clean energy (Kamal, 2019). However, these efforts must consciously acknowledge the principle of climate justice, ensuring that the GS is not disproportionately burdened by technologies or commitments it cannot afford. Meaningful and enforceable commitments from both regions are essential to address CC effectively and ethically, guided by equitable dialogues that recognize existing power asymmetries (Koch, 2021). Critical Discourse Analysis (CDA) sheds light on how these asymmetries shape CC debates, offering insights into creating more inclusive and balanced solutions. By fostering trust, promoting collaboration, and addressing systemic inequalities, the GN and GS can jointly advance sustainable and just CCMA strategies.

The role of international organizations

The role of international organizations (IOs) in mediating CC adaptation (CCA) efforts between the Global North (GN) and Global South (GS) is increasingly critical as climate impacts intensify and the urgency for coordinated action grows. Literature on this mediation role reveals mixed perspectives. On one hand, IOs, such as the United Nations Framework Convention on Climate Change (UNFCCC), have been instrumental in fostering dialogue and trust between the GN and GS, as demonstrated in the successful negotiation of the 2015 Paris Agreement (Falkner, 2016; Kamal, 2019; Zhang et al., 2023). On the other hand, critiques highlight perceived biases favoring the GN, with IOs often accused of inadequately representing GS interests in climate negotiations (Vadrot, 2020). Addressing these challenges requires greater transparency, equitable representation, and stronger mechanisms to ensure that the voices of the GS are integrated into decision-making processes.

A critical issue in the CCA financing landscape is the conditionality of aid provided by IOs. Although such organizations claim to offer significant support, these funds often come with strict terms, such as high-interest loans, rather than grants, which exacerbate inequalities and burden GS nations disproportionately (OXFAM International, 2022). This imbalance underscores the need for a restructured global climate finance system that prioritizes equitable grants over debt-inducing mechanisms. Moreover, *greenwashing* practices by major polluters and corporations undermine global sustainability goals by creating a misleading narrative of progress while diverting attention from meaningful action (Karakosta et al.,

2010; Planet Tracker, 2020). Robust regulatory frameworks and independent verification mechanisms are essential to counter these deceptive practices and foster accountability.

The debate over energy transitions further highlights the tension between GN and GS priorities. Critics argue that GN nations pressure GS countries to abandon coal while simultaneously expanding their oil and gas ventures, a hypocritical approach labeled “*carbon colonialism*” (Koch, 2021; Gürsan and Gooyert, 2021). For instance, while the UAE commits to achieving net zero by 2050, it simultaneously plans to double its fossil fuel exports by 2030 (Karakosta et al., 2010). GS countries, such as India, resist transitioning away from coal due to concerns over energy security and the potential setbacks to socio-economic progress, including food security, education, and healthcare (Bhattacharya et al., 2023). These conflicting priorities reveal the challenges of reconciling global energy policies with diverse development needs. Ultimately, the pursuit of globally inclusive approaches to CCMA remains hampered by deep-seated conflicts of interest and geopolitical dynamics. Overcoming these barriers will require fostering mutual trust, enhancing financial equity, and adopting practical strategies that accommodate the developmental realities of the GS while advancing global climate goals.

Contribution of the study

This study highlights the ongoing power imbalances between the GN and Global GS, which influence the design and implementation of CCMA strategies. The findings reveal uneven adoption of CCMA interventions, driven by several interconnected factors; (a) the GN’s historical responsibility for greenhouse gas emissions and its reluctance to bear a fair share of the costs; the enforcement of generic global guidelines that overlook local contexts and indigenous knowledge; and the GS’s limited ability to finance, implement, and enforce climate strategies effectively. Additionally, systemic issues such as conditionalities in climate finance and conflicting national interests worsen implementation gaps, demonstrating that technical solutions alone are inadequate without addressing the political, economic, and social aspects of N–S climate relations. This analysis shows that achieving sustainable and equitable CCMA outcomes requires strategies that are culturally appropriate and locally grounded, supported by strong international cooperation, just-transition policies, and enforceable accountability mechanisms that acknowledge historical and capacity-related differences. This paper conducts a systematic literature review of studies from 2000 to 2022, revealing ongoing inequalities between the GN & GS in CCMA. It notes that existing guidelines frequently prioritize GN interests while neglecting indigenous and context-specific solutions. Major barriers identified include unequal burden-sharing, weak enforcement of emissions targets and financial mechanisms that worsen corruption and inequity. The study emphasises the necessity for just-transition strategies, equitable climate finance and locally rooted approaches to achieve sustainable and inclusive CCMA outcomes.

Conclusions and recommendations

The findings of this study on the debate about who should bear the responsibility of mitigating the impacts of CC between the GN and

GS suggest that because the GN is mainly responsible for most of the GHG emissions, they must carry most of the burden of mitigating the impacts of CC. Accomplishing this requires the GN to take the lead by providing the required resources, technologies, and operational mechanisms that enable the GS to play its part without being cornered to bear the burden of CCMA. These requirements argue for the urgent need to provide practically implementable strategies that enhance a just transition from unabated reliance on fossil fuels to sustainable sources of climate-friendly green energy. This transition cannot be accomplished by adopting the one-size-fits-all approach in which everybody is required to contribute without morally acknowledging the disproportionately distributed provenance of GHG and the historically determined differences in capacities to assimilate and translate different CCMA strategies into actionable interventions.

Overall, North–South cooperation continues to be hamstrung by a laundry list of formidable challenges that include but are not limited to (1) universal absence of enforceable emissions targets, (2) lack of effective mechanisms to deter non-compliant practices (3) reluctance by big players to accept accountability for the accumulation of GHGs (4) absence of effective reporting, monitoring, and verification systems that prevent shirking by members and climate financiers that claim to be making tangible contributions, (5) prevalence of conflicting interests that are difficult to reconcile (6) differential capabilities to mobilize climate finance, and (7) deep seated resentments to challenge the UNFCCC’s standing as the most potent forum for negotiating climate policies and action, (8) failures by international agreements to drive down emissions to levels that are within the targets that are required for containing global warming, (9) inability to induce and pressurize major financiers and other players to honor their commitments and, (10) lack of attractive and implementable mechanisms to incentivize major polluters to back-track on the continued use of fossil fuels, (11) persistence of the entitlement narrative in which the GS is insisting that the GN is obliged pay for the present CC which it instigated without themselves being required to immediately sever their dependence on fossil fuels in order to give them ample space to develop their economies and, (12) conspicuous absence of a level playing field and proliferation of undeclared self-centred aspirations by different coalitions and IOs.

The study also took a comparative approach by examining the GS and the GN perspectives. This comparative analysis revealed unique challenges and areas of convergence between these regions. This understanding could be used to suggest innovative and effective CCMA strategies or interventions. The take-home message from this contribution is that collective effort is needed, and the need for action is long overdue. Although the findings of this investigation are exclusively based on insights from journal articles published between 2000 and 2022, the objective way they were sampled and analysed provides a reasonable justification to conclude that they are reliable and adequately representative of the global situation. Overall, the method we used allowed us to systematically collate information on why we have not been able to assimilate and effectively implement CCMA. It is also appealingly adaptable in tracking how we are responding to the challenges of CC because it is objective and userfriendly. Although useful as outlined above, the major limitation of this paper is that it is exclusively based on papers that were published in English, but we are convinced that they provide a representative overview of major north–south global CC conundrums. We conclude by urging the scientific community to complement our

efforts by providing innovative strategies that can be used to motivate policymakers, practitioners, and other stakeholders to embrace a collective approach in responding to and addressing the challenges of global change.

Author contributions

SM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. LZ: Supervision, Resources, Writing – review & editing.

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References

- Akoleowo, V. O. (2022). Climate change and sustainable agriculture in Africa: a gendered agrarian philosophical approach. *J. Afr. Stu. Sust. Dev.* 5, 79–97.
- Bassetti, F. (2022). Shared socioeconomic pathways – Scenarios are not predictions [Blog post]. Available online at: <https://www.climateforesight.eu/seeds/shared-socioeconomic-pathways> (Accessed February 2, 2025).
- Bhattacharya, A., Stern, N., and Soubeyran, E. (2023). Developing countries are key to climate action. Available online at: <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/11/A-Climate-Finance-Framework-IHLEG-Report-2-SUMMARY.pdf> (Accessed March 5, 2025).
- Burton-Chellew, M. N., May, R. M., and West, S. A. (2013). Combined inequality in wealth and risk leads to disaster in the climate change game. *Clim. Chang.* 120, 815–830. doi: 10.1007/s10584-013-0856-7
- Calabrese Barton, A., and Tan, E. (2020). Beyond equity as inclusion: a framework of “rightful presence” for guiding justice-oriented studies in teaching and learning. *Educ. Res.* 49, 433–440. doi: 10.3102/0013189X20927363
- Chukwumerije, O., and Coventry, P. (2016). Climate justice and the international regime: before, during, and after Paris. *Clim. Justice Int. Regime* 7, 834–851. doi: 10.1002/wcc.419
- Colenbrander, S., Pettinotti, L., and Cao, Y. (2022). A fair share of climate finance? An appraisal of past performance, future pledges and prospective contributors (ODI Working Paper). *Overseas Development Institute*. Available online at: <https://odi.org/en/publications/a-fair-share-of-climate-finance-an-appraisal-of-past-performance-future-pledges-and-prospective-contributors/>
- Degele, P. E., and Pedregal, B. (2022). North–south dialogue on territorial policies and discourses: insights for the future of nature conservation. *Land* 11:994. doi: 10.3390/land11070994
- Deleuil, T. (2012). The common but differentiated responsibilities principle: Changes in continuity after the Durban conference of the parties. *Rev. Europ. Commun. Intern. Environ. Law*, 21, 271–281.
- Del Ponte, A., Masiliūnas, A., and Lim, N. (2023). Information about historical emissions drives the division of climate change mitigation costs. *Nat. Commun.* 14:1408. doi: 10.1038/s41467-023-37130-7
- Dolsak, N., and Prakash, A. (2018). The politics of climate change adaptation. *Annu. Rev. Environ. Resour.* 43, 317–341.
- Dong, Y., Ma, S., Zhang, B., Wang, W. X., and Pacheco, J. M. (2021). Financial incentives to poor countries promote net emissions reductions in multilateral climate agreements. *One Earth* 4, 1141–1149. doi: 10.1016/j.oneear.2021.07.006
- Falkner, R. (2016). A minilateral solution for global climate change? On bargaining efficiency, club benefits, and international legitimacy. *Perspect. Polit.* 14, 87–101. doi: 10.1017/S1537592715003242
- Fernando, J. (2020). From the Virocene to the Lovecene epoch: multispecies justice as critical praxis for Virocene disruptions and vulnerabilities. *J. Political Ecol.* 27:685. doi: 10.2458/v27i1.23816
- Gajjar, S., (2020). Nature-based solutions to climate change in coastal cities: African perspectives global insights. Occasional paper 308. Available online at: <https://saiaa.org.za/wp-content/uploads/2020/08/Occasional-Paper-308-gajjar.pdf> (Accessed December 12, 2024).
- Gürsan, C., and Gooyert, V. D. (2021). The systemic impact of a transition fuel: does natural gas help or hinder the energy transition? *Renew. Sust. Energ. Rev.* 138:110552. doi: 10.1016/j.rser.2020.110552
- Hariharan, T. S., Ganesh, L. S., Vijayalakshmi, V., Sharma, P., and Potdar, V. (2024). Archetypal representations of dilemmas concerning invasive alien species management—a case of invasive *Lantana camara* in the protected areas of Nilgiri biosphere reserve, India. *Syst. Res. Behav. Sci.* 41, 640–664. doi: 10.1002/sres.2999
- Hayward, B., and Roy, J. (2019). Sustainable living: bridging the north–south divide in lifestyles and consumption debates. *Annu. Rev. Environ. Resour.* 44, 157–175. doi: 10.1146/annurev-environ-101718-033119
- Hickel, J., and Slamersak, A. (2022). Existing climate mitigation scenarios perpetuate colonial inequalities. *Lancet Planetary Health* 6, e628–e631. doi: 10.1016/S2542-5196(22)00092-4
- Hormio, S. (2023). Collective responsibility for climate change. *WIREs Climate Change*, 14:e830. doi: 10.1002/wcc.830
- Kacowicz, A. M. (2007). Globalization, poverty, and the north–south divide. *Int. Stud. Rev.* 9, 565–580.
- Kamal, U. M. (2019). Nuclear energy, environment, and public safety: north–south politics. *Strateg. Plann. Energy Environ.* 38, 31–41. doi: 10.1080/10485236.2019.12054410
- Karakosta, C., Doukas, H., and Psarras, J. (2010). Technology transfer through climate change setting a sustainable energy pattern. *Renew. Sust. Energ. Rev.* 14, 1546–1557. doi: 10.1016/j.rser.2010.02.001
- Klein, D. (2017). The Paris agreement on climate change: Analysis and commentary. Oxford: Oxford Academic.
- Koch, F. (2021). Cities as transnational climate change actors: applying a global south perspective. *Third World Q.* 42, 2055–2073. doi: 10.1080/01436597.2020.1789964
- Le Billon, P., and Kristoffersen, B. (2020). Just cuts for fossil fuels. Supply-side carbon constraints and energy transition. *Environ. Plan. A* 52, 1072–1092. doi: 10.1177/0308518X18816702
- Lecavalier, E., Arroyo-Currás, T., Bulkeley, H., Borgström Hansson, C., Chowdhury, S., Lenhart, J., et al. (2023). Can you standardise transformation? Reflections on the

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- transformative potential of benchmarking as a mode of governance. *Local Environ.* 28, 918–933. doi: 10.1080/13549839.2023.2165053
- Lee, S. Y. (2023). Net-zero transitions for all? Considering applications in Asia. *Sustain. Sci.* 18, 2053–2058. doi: 10.1007/s11625-023-01409-x
- Lees, N. (2021). The Brandt line after forty years: the more north–south relations change, the more they stay the same? *Rev. Int. Stud.* 47, 85–106. doi: 10.1017/S026021052000039X
- Littleton, M. (2009). The TRIPS agreement and transfer of climate-change-related technologies to developing countries. *Nat. Res. Forum* 33, 233–224. doi: 10.1111/j.1477-8947.2009.01228.x
- Liu, M., and Liu, H. (2023). Influence of climate change on carbon emissions during grain production and its mechanism. *Sustainab* 15:10237. doi: 10.3390/su151310237
- Loris, N. D., and Schaefer, B. D. (2018). The Kigali Amendment offers little benefit to the climate, great cost to the U.S. economy. Heritage Foundation. Background No. 3309. The Heritage Foundation. Available online at: <https://www.heritage.org/sites/default/files/2018-04/BG3309.pdf>
- Lyenonov, S., Toušek, Z., Bozhenko, V., and Kérmárki-Gally, S. E.. (2023). The impact of corruption in climate finance on achieving net-zero emissions. *J. Intern. Studies*, 16, 142–159. doi: 10.14254/2071-8330.2023/16-1/142-159
- Maizland, L. (2023). Council of Foreign relations, global climate agreements: successes and failures. Available online at: <https://www.cfr.org/background/paris-global-climate-change-agreements> (accessed March 15, 2024).
- Maslin, M., Lang, J., and Harvey, F. A. (2023). Short history of the successes and failures of the international climate change negotiations. *UCL Open: Environment* 5:59. doi: 10.14324/111.444/ucloe.000059
- Mayer, B. (2023). Can rights-based litigation bolster climate action? *Climate Law*, 13, 57–81. doi: 10.1163/18786561-bja10036
- McAfee, K. (2012). The contradictory logic of global ecosystem services markets. *Dev. Chang.* 43, 105–131. doi: 10.1111/j.1467-7660.2011.01745.x
- Moher, D., Liberati, A., Tetzlaff, J., and Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann. Intern. Med.* 151, 264–269. doi: 10.7326/0003-4819-151-4-200908180-00135
- Moellendorf, D. (2014). *The moral challenge of dangerous climate change: Values, poverty, and policy*. Cambridge University Press.
- Msimanga, L., and Mukwada, G. (2022). Themes in climate change and variability within the context of rural livelihoods. A systematic literature review. *Res. Glob.* 5:100101. doi: 10.1016/j.resglo.2022.100101
- Muchaku, S., Magaiza, G., and Hamandawana, H. (2023). Translating indigenous knowledge into actionable climate-change adaption strategies: a case study of Maluti-a-Phofung local municipality, Free State Province, South Africa. *Sustainability* 15:1558. doi: 10.3390/su15021558
- Naham, J. (2023). Failures and successes of the Paris agreement, Alliance for citizen engagement. Available online at: <https://ace-usa.org/blog/research/research-foreignpolicy/failures-and-successes-of-the-paris-agreement/> (accessed March 29, 2024).
- Nsenkyire, E., Nunoo, J., Sebu, J., Nkrumah, R. K., and Amankwanor, P. (2025). Bindings to pledges—a review. *Millennial Asia* 22:09763996221141546. doi: 10.1177/09763996221141
- Owusu, P. A., and Asumadu-Sarkodie, S. (2016). Review of renewable energy sources, sustainability issues and climate change mitigation. *Cogent Engineering* 3, 1–14. doi: 10.1080/23311916.2016.1167990
- OXFAM International. (2022). True value of climate finance is a third of what developed countries report. Available online at: <https://www.oxfam.org/en/press-releases/true-value-climate-finance-third-what-developedcountries-report-oxfam> (accessed May 23, 2023).
- Peszko, G., Van der Mensbrugge, D., Golub, A., Ward, J., Zenghelis, D., Marijs, C., et al. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. Washington, DC, London: World Bank Publications.
- Planet Tracker. (2020). Traceable Returns: Traceability Could Add 60% to Global Seafood Profits. *Planet Tracker*. Available online at: <https://planet-tracker.org/wp-content/uploads/2021/08/5.-Traceable-Returns.pdf>
- Qi, J., and Qian, H. (2023). Climate finance at a crossroads: It is high time to use the global solution for global problems. *Carbon Neutral.* 2:31. doi: 10.1007/s43979-023-00071-7
- Rachman, G. (2010). *Zero-Sum World: Politics, Power and Prosperity After the Crash*. Atlantic Books.
- Rahmah, M., and Sulistyono, A. (2024). “The integration of traditional knowledge and local wisdom in mitigating and adapting climate change: different perspectives of indigenous peoples from Java and Bali Island” in *Traditional knowledge and climate change: An environmental impact on landscape and communities*. eds. A. Penteado and S. P. Chakrabarty (Singapore: Springer Nature Singapore), 61–80.
- Rajat, S. (2020). Interplanetary Relationship with Some Parameters of Two Planets Based on the Angular Diameter of the Sun. *Intern. Astronomy Astrophysics Res. J.* 10–27.
- Roos, R. (2024). The role of frames in shaping the representation of local knowledge and concerns in scientific texts. *Front. Clim.* 6:1358503. doi: 10.3389/fclim.2024.1358503
- Scoville-Simonds, M., Jamali, H., and Hufty, M. (2020). The hazards of mainstreaming: climate change adaptation politics in three dimensions. *World Dev.* 125, 104683–104610. doi: 10.1016/j.worlddev.2019.104683
- Shahsavari, A., and Akbari, M. (2018). Potential of solar energy in developing countries for reducing energy-related emissions. *Renew. Sust. Energ. Rev.* 90, 275–291. doi: 10.1016/j.rser.2018.03.065
- Sharma, D. G., Tiwari, A. K., Erkut, B., and Mundi, H. S. (2021). Exploring the nexus between non-renewable and renewable energy consumptions and economic development: evidence from panel estimations. *Renew. Sust. Energ. Rev.* 146, 1–17. doi: 10.1016/j.rser.2021.111152
- Slayi, M., Zhou, L., Nyambo, P., Jaja, I. F., and Muchaku, S. (2024). Communally established cattle feedlots as a sustainable livelihood option for climate change resilience and food security in sub-Saharan Africa: a systematic review. *Front. Sustain. Food Syst.* 7:1325233. doi: 10.3389/fsufs.2023.1325233
- Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., et al. (2021). Three decades of climate mitigation: why haven't we bent the global emissions curve? *Annu. Rev. Environ. Resour.* 46, 653–689. doi: 10.1146/annurev-environ-012220-011104
- Sugiyama, M., Asayama, S., and Kosugi, A. (2020). The north–south divide on public perceptions of stratospheric aerosol geoengineering? A survey in six Asia-Pacific countries. *Environ. Commun.* 14, 641–656. doi: 10.1080/17524032.2019.1699137
- Sun, J., and Yang, K. (2016). The wicked problem of climate change: a new approach based on social mess and fragmentation. *Sustainability* 8:1312. doi: 10.3390/su8121312
- Tan, X., Zhu, K., Meng, X., Gu, B., Wan, Y., Meng, F., et al. (2021). Research on the status and priority needs of developing countries to address climate change. *J. Clean. Prod.* 289, 1–18. doi: 10.1016/j.jclepro.2020.125669
- UNESCO 7426. (2016). Schools in action, global citizens for sustainable development: a guide for teachers. Available online at: <https://unesdoc.unesco.org/ark:/48223/pf0000246888> (accessed March 11, 2014).
- Vadrot, A. B. (2020). Multilateralism as a 'site' of struggle over environmental knowledge: theThe north-south divide. *Crit. Policy Stud.* 14, 233–245. doi: 10.1080/19460171.2020.1768131
- Wodak, R., and Meyer, M. (2009). “Critical discourse analysis: history, agenda, theory, and methodology” in *Methods for critical discourse analysis*. eds. R. Wodak and M. Meyer (London: Sage), 1–33.
- Zhang, H., Luo, M., Pei, T., Liu, X., Wang, L., Zhang, W., et al. (2023). Unequal urban heat burdens impede climate justice and equity goals. *Innov.* 4:100488. doi: 10.1016/j.xinn.2023.100488