

# Climate Change and Inequality: The Effectiveness and Potential Improvements of the Existing Approaches

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**Abstract:** This paper examines the relationship between climate change and inequality, evaluates three existing approaches from both macro principles and micro practices, and proposes the potential improvements for those approaches. Available evidence indicates that climate change exacerbates inequality globally and the existing approaches are insufficient and still need to be more aggressive. More specifically, the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) in the United Nations Framework Convention on Climate Change (UNFCCC) is blunt to effectively address climate change and respond to inequality even by distributing the common responsibilities differently to the individual countries. Developed countries should take the responsibility to finance climate change due to the principle “the polluter pays” and the obligation to protect human rights; however, developed countries have not yet met their climate finance obligations. Similarly, the international carbon market has been viewed as a feasible measure, while additional actions are still needed to respond to the inequalities exacerbated by climate change.

## 1. INTRODUCTION

### 1.1. The Inequality Exacerbated by Climate Change

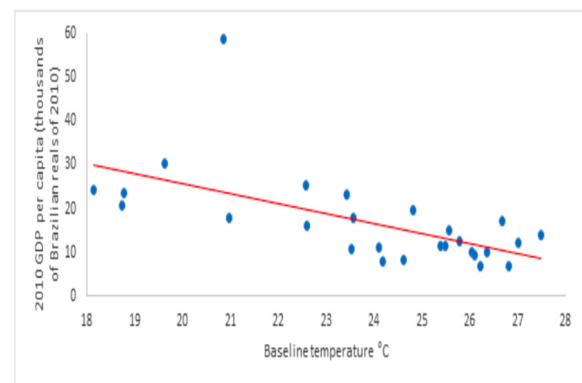
Climate change has negatively affected human beings all over the world, but it more negatively impacts developing countries than developed countries. According to the International Monetary Fund (IMF), unmanaged climate change hurts global economic growth by “damaging poverty eradication efforts and disproportionately affecting the poorest regions and people.”[1] As pointed out by Bridget Hoffman, there are two main reasons why climate change brings inequality and poverty[2]: First, climate change and natural disasters affect the economy of poorer countries, regions, and people more than rich countries. Less developed countries and people in poverty tend to lose more money when the natural disasters caused by climate change hit them since many people in poor regions heavily depend on activities that may be vulnerable to climate change including agricultural practices, fisheries, and forestry. Second, poorer countries and people with fewer resources are more vulnerable and less able to respond to the negative consequences of climate shocks than those rich countries, which have more developed technologies and corresponding laws and policies.

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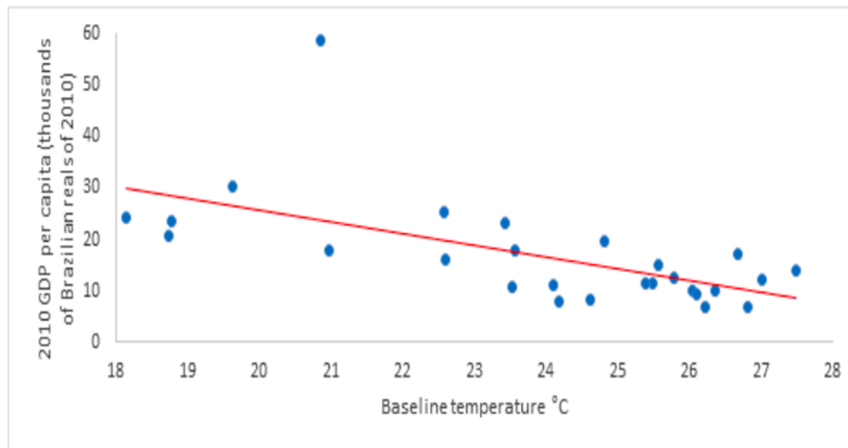


**Figure 1:** GDP Per Capita and Baseline Temperature of Latin America Countries [2] Source: IDB staff calculations based on Burke et al. (2015).

Not only does climate change bring poverty and inequality to poor countries, but it also exacerbates the existing inequality and poverty. According to Hoffman’s research, GDP per capita is negatively correlated with the baseline temperature of Latin American countries, implying that poorer countries are more likely to be exposed to high temperatures (Figure 1). As temperatures continue to rise due to global warming, those high-poverty regions will be further impacted by high temperatures and other climate-related impacts such as natural disasters, including heavy rainfalls and flooding. In this case, with

the continuously increasing temperature, these poor regions suffer more from climate change and lose greater wealth. Brazilian states have the same pattern in which the higher the temperature, the lower the GDP per capita, thus emphasizing that poor states are more likely to be exposed to the consequences of rising temperature (Figure 2). When climate change disasters hit, the economies of those

less developed countries, depending more on agriculture, are more affected than the developed countries are. Exposed to natural disasters, these developing countries are more vulnerable to dealing with economic and ecological loss. Climate change, therefore, does not equally affect everyone, but it makes more negative impacts directly on the people in poor regions.

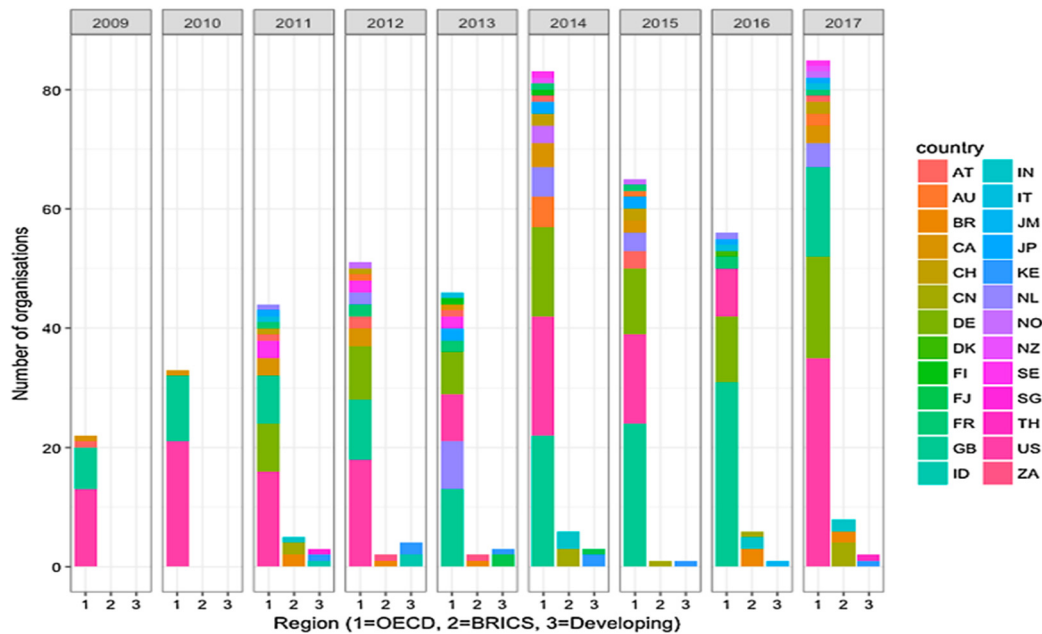


**Figure 2** : GDP Per Capita and Baseline Temperature of Brazilian States [2] Source: IDB staff calculations based on the University of Delaware (reconstruction data assembled by Willmott and Matsuura (2018)) and the Brazilian Institute of Geography and Statistics (IBGE) (2010)

### 1.2. Developing Countries' Underrepresentation of Climate Change Science

Not only is inequality manifested in the economic vulnerability of poor countries, but it is also represented in their limited scientific participation. In addition to the people directly suffering from poverty and inequality, the experts of developing countries have lower involvement in climate mitigation science, which is essential for global environmental law and policy making. Developing countries should play a major role in agenda-setting since they are most vulnerable to climate change. However, their concerns are not sufficiently conveyed in the scientific assessment reports that are politically significant. For instance, Frank Biermann and Ina Möller point out that the experts that write the IPCC reports are mainly based in North America and Europe, according to recent IPCC analyses[3]. Based on the assessment reports published between 1990 and 2007, Ho-Lem et al. (2011) found that “only 3.1% of IPCC authors are from Africa or South America, compared to 35.6% and 37.2% from Europe and North America.”[3] Moreover, in the developing world, the other 45% of all countries, no

author has ever contributed to IPCC processes, according to the finding of Corbera et al. (2016).[3] The overrepresentation of the Global North implies the dominance of developed countries in climate science. Figure 3. provides the data about the geographical origin of organizations in the events of climate engineering. Most organizations are based in more developed countries such as the United States, the United Kingdom, and Germany.[3] China, India, and Brazil have 3 to 4 active organizations in the database of the BRICS countries. “With only 12 organizations distributed across Fiji, Indonesia, Jamaica, Kenya, Singapore, and Thailand, other developing countries show much less participation.” In this case, it is clear that the organizations from developed countries dominate in the science of climate change, yet those from developing countries are underrepresented. Since developing countries' experts do not sufficiently have a voice in the science of climate change, developing countries' interests, special circumstances, and vulnerabilities will be hardly considered. Thus, to enable developing countries to directly participate in improving their global environmental law and policy, the global community should reinforce equity, justice, and fairness by guaranteeing the access to international negotiations for the representatives from the least developed countries.



**Figure 3:** Distribution of countries in the climate engineering discursive process, based on institutions represented at more than one climate engineering event (in the capacity of speakers). Countries are coded based on the International Naming Convention [3]

### 1.3. The Importance of Appropriate International Responses to Developing Countries on Climate Change

Based on the principle of sovereign equality that grants each country the same vote in international law, the least developed countries have considerable influence in intergovernmental negotiations the same as developed countries do. However, “existing frameworks that aim to promote mitigation and adaptation are inadequate”, argued by vulnerable nations.[4] Therefore, “loss and damage”, an international mechanism dealing with residual climate change impacts, is necessary.[5] “Loss and damage” refers to “the actual and/or potential manifestation of impacts associated with climate change in developing countries that negatively affect human and natural systems, including impacts from extreme events such as heatwaves and slow-onset events such as sea-level rise and glacial retreat.”[4] With fewer resources, the developing countries are less able to adapt to natural disasters caused by climate change and they suffer more than the developed countries do. For instance, building infrastructure such as flooding defenses is essential when flooding hits, but less developed countries are not sufficiently empowered to provide enough time and money for the people to transfer, therefore minimizing the loss and damage. Adaptation may not be sufficient enough to prevent the negative consequences of current and future climate change, as argued by some developing countries.[4]

“The Paris Agreement reinforced the Warsaw International Mechanism for Loss and Damage as the main vehicle under the UNFCCC process to avert, minimize, and address loss and damage associated with climate change impacts.” (Article 8)[6] Improving less developed countries’ ability to deal with the negative

consequences of climate shocks is significant. Developed countries need to assist the most vulnerable when natural disasters hit. The issue will be resolved effectively only by explicitly considering inequality and involving the less developed countries in decision-making. Since transnational challenges like climate change cannot be solved by either one developing country or developed country alone, they require collective action coordination and commitment by all states together.

## 2. APPROACH ONE: THE PRINCIPLE OF COMMON BUT DIFFERENTIATED RESPONSIBILITIES AND RESPECTIVE CAPABILITIES (CBDR-RC)

### 2.1. Introduction

Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) is a fundamental principle within the UNFCCC that acknowledges the disparity of socioeconomic capabilities and differentiated responsibilities of individual countries in addressing the common existential challenge of humanity—climate change and the concurrent issue—inequality. The principle of CBDR-RC was formalized and enshrined in the UNFCCC of Earth Summit in Rio de Janeiro, 1992, which has called for the widest possible cooperation between the countries to deal with the rising threat of climate change based on the principle of CBDR-RC. The UNFCCC Article 3.1 has stated that: “The Parties should protect the climate system for the benefit of present and future generations of humankind, based on equity and in accordance with their common but differentiated responsibilities and respective capabilities.” Therefore, it has been further added that the developed countries should take the leading responsibilities.

## 2.2. Categories

In specific, parties have been categorized into Annex I Parties, Annex II Parties, Non-annex I Parties, and Least Developed Countries based on their different levels of capacities in addressing climate change as mentioned in the UNFCCC Article 4.3, 4.4, and 4.5. Table 1 shows the categorization of the parties with description of their duties.

The principle of CBDR-RC has been then implemented into multiple future climate change protocols and agreements. In the Kyoto Protocol, the developed countries were asked to reduce their emission to a certain extent while the developing countries only needed to report their emission inventory.

**Table 1:** The Categorization and Description of the Parties[7]

Category	Description
<b>Annex I Parties</b>	Including the industrialized and relatively more economically developed countries such as the members of the OECD (Organization for Economic Co-operation and Development) in 1992, the countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States. They are legally binding to reduce greenhouse gas emissions and are required to report the annual greenhouse gas inventory by the April of every year.
<b>Annex II Parties</b>	Consisting of some of the Annex I members. Beyond the requirements of Annex I, they are also required to provide financial resources to enable and assist developing countries to undertake mitigation and adaptation under the Convention. With higher overall capacity, they are also responsible to provide funding and promote technological development and transfer to other developing Parties in the Convention.
<b>Non-annex I Parties</b>	Mostly developing countries, they are either recognized by the Convention as being especially vulnerable to the negative impacts of climate change or vulnerable to the potential negative economic impacts of climate change response measures. Their activities will be supported by the Annex I and Annex II Parties when necessary.
<b>Least Developed Countries</b>	The 49 Parties classified as least developed countries (LDCs) by the United Nations are given special consideration under the Convention on account of their limited economic and social capacity to enact mitigation and adaptation to climate change. Other parties should support the LDCs through funding and technology transfer.

The development status and the overall capacities of the Parties have been changing over time. Their responsibilities have also been amended. The Convention has been amended, adding Kazakhstan into the Annex I Parties as it proposed for inclusion in 1999. Moreover, the

Paris Agreement in 2015 required all parties to take certain actions and reduce their greenhouse gas emission, which is still based on the principle of CBDR-RC but amended the responsibilities of developing countries this time since they have gradually become more capable of addressing climate change. (UNFCCC)

## 2.3. What Does CBDR Still Lack and How to Improve?

The principle of CBDR-RC is blunt and insufficient to effectively address climate change and respond to the concurrent issue of inequality even by distributing the common responsibilities differently to the individual countries based on their social and economic capacities.

### 2.3.1. The Issue of Domestic Social Inequality

The main cause of climate change is greenhouse gas emissions, and every individual on earth will contribute to the greenhouse gas emission to some extent. The principle of CBDR-RC does make all parties recognize and alleviate the problem of inequality between countries while responding to climate change by differentiating the responsibilities between them; however, although the inter-countries inequality has been put on the agenda of international discussion, the principle of CBDR-RC is still not sufficient enough to address the climate change and inequality fully and effectively because the domestic “social inequality”[8] has not received as much attention as it should. People within countries have different levels of greenhouse gas emissions due to various factors such as income level. It is important to identify the greenhouse gas emission more specifically and differ the mitigation and adaptation burden to the “individual level” (see, for example, Chakravarty et al. 2007)[9] to improve the effectiveness, which will require much more domestic and international efforts.

### 2.3.2. The Principle of CBDR-RC, Moral Hazard, and Free Rider

It should be admitted that the more developed parties are generally the main contributors to recent years’ greenhouse gas emissions with the gain of economic growth, which as the principle of CBDR-RC stated, it is reasonable that as the more capable parties, they should take the lead on addressing the climate change with the legally binding greenhouse gas emission reduction. However, the principle of CBDR-RC may arise the problem of moral hazard in the developing parties because of the lack of incentive to act since they are not legally binding to the greenhouse gas emission reduction and developed parties are mainly responsible to address the issue. In this case, the developing parties will have an “unfair economic advantage.”[10]

Under the commitments of reduction promised by the developed parties, the developing parties will emit to meet their maximum yield, which will undermine the



effectiveness of international cooperation in addressing climate change. It is also important to note that developing countries are at a defining stage of climate change. Their mindsets of energy consumption will determine their future energy transformation from conventional energy use to renewable energy use. Setting a baseline and enhancing the responsibilities are essential to stimulate the developing parties to act on climate change and increase the overall effectiveness of international cooperation. The Paris Agreement in 2015 has shown a good start in improving the principle of CBDR-RC by requiring all parties to take action.

According to the game theory of prisoner's dilemma, rational parties might not cooperate even though it would yield the best overall result. Parties will prioritize considering their own interest, and every party has an incentive to free ride on greenhouse gas emission reduction in other countries without contributing on its own. In this case, the principle of CBDR-RC is useless since no matter what the responsibilities of the parties are, they might free ride, resulting in the ineffectiveness of international cooperation and the tragedy of commons. In 2010, the Russian Federation indicated that it would not intend to assume a quantitative emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol.

### **3. APPROACH TWO: CLIMATE FINANCE**

The analysis shows that the developed countries should finance climate change due to the “the polluter pays” principle and the commitment to protect human rights; however, developed countries have not yet met their climate finance obligations. Two suggestions are made to promote climate finance.

#### **3.1. Who should provide funding for climate change?**

The following analysis shows that the developed countries should take the burden to finance climate change because of the “polluter pays” principle and the obligation to protect human rights.

##### **3.1.1. “The polluter pays” principle**

The principle “the polluter pays” relates historical and current greenhouse gas emissions to the money each country should pay to address climate change[19]. The developed countries started the industrial revolution early and therefore have historically emitted climate change pollution for a longer time. Their pollution starting from industrialization to nowadays has resulted in a large amount of climate pollution to the environment, shown by the fact that the developed countries caused 79% of historical carbon emissions[12]. The US and the European States collectively have contributed over half of the total pollution. These historical carbon emissions with the “the polluter pays” principle constitutes the first reason for paying.

#### **3.1.2. Obligation to protect human rights**

Additionally, the developing countries are now unequally suffering from climate change.

From a human rights perspective, the UN High Commissioner for Human Rights has warned that climate change can prevent people from enjoying their human rights[11]. Health rights, for example, are included in international human rights law as an inclusive right [13]. When facing health-threatening situations like diseases, the developing countries, however, lack the technical expertise and resources, and public health systems to deal with the problems[14]. Since human rights as a universal right that should be protected regardless of nationality, developed countries should promote efforts to protect human rights in developing countries.

#### **3.2. Past contributions and necessary resources**

In 1992, 154 nations signed the UNFCCC, of which Article 4.7 states that developing country Parties rely on the financial resources and technology of developed country Parties to fulfil their pledge. The first implementation of the UNFCCC was the Kyoto Protocol signed in 1997, under which the idea that developed countries should offer financial resources to developing countries. In 2009, developed nations promised to achieve yearly funding of \$100 billion by 2020 at the 15th Conference of Parties (COP15). Yet, so far, most developed countries have not achieved this goal [15]. Until 2019, the total amount has just been close to \$80 billion [16]. In 2015, the Paris Agreement replaced the Kyoto Protocol. The Paris Agreement requires each country to report contributions, yet it has not required the amount that countries should pay. Countries are asked to submit NDCs to keep improving their contributions[17].

#### **3.3. Mechanism for finance climate change solutions**

Under the current financial mechanism, according to the UNFCCC, the operation can be delegated to several present international entities, including the Green Climate Fund (GCF) and the Global Environmental Facility (GEF). The current mechanism is accountable to the Conference of the Parties (COP) [18].

#### **3.4. Problems of Existing Climate Finance**

The primary problems of existing climate finance are the insufficiency of funds and the ineffectiveness of the climate finance mechanism.

Firstly, the finance gap between existing funds and the funds is needed to prevent the most significant impacts from happening and to constrain global warming to 1.5°C. More specifically, a 590% increase in annual climate finance is required to avoid the most dangerous impacts of climate change. Moreover, the adaptation fund, until 2021, is still far from enough [19]. Most of the adaptation fund is from the public sector yet it was only 14% of public finance. The adaptation fund of USD 46 billion in 2019 at

least needs to triple to reach the minimum estimated cost [19].

Secondly, the existing climate finance mechanism contains internal ineffectiveness. For now, climate finance was transported to developing countries based on individual mitigation or adaptation projects. It is pointed out that this approach is not effective enough when climate finance increases by a significant amount and a sectoral or national plan will be needed [20]. Moreover, since the use of funds is now determined by receiving countries, it disincentivizes the donors as they do not have control or visibility of their funds.

### 3.5. Potential Improvements for Climate Finance

Referring to some insights from the existing papers, this part gives three suggestions for improving the current situation of climate finance, both in terms of the finance amount and the effectiveness of finance.

Firstly, the climate funds should appeal to more donors to join climate finance. The impact of climate finance will depend on the donors' efforts. It is suggested that if next-to-traditional donors (emerging developing countries) like China also guarantee notable amounts of funding to the GCF, they can pressure the traditional countries to increase their contributions [21].

Secondly, the climate finance mechanisms can give some control over the use of funds for the donors after careful consideration. For now, one of the two climate finance mechanisms GCF requires the fund to be equally distributed for adaptation and mitigation. Moreover, it is country-driven, meaning that the receiving countries will decide the use of funds for programs. It is argued that the lack of control for donors makes them less incentivized to donate [21]. However, it is worth noting that the control given to donors needs to be carefully designed since there should still be a fair balance between adaptation and mitigation efforts.

Thirdly, it can be considered to reduce the interval between submitting a new NDCs plan.

It is very urgent to achieve the 2030 goal of climate change to constrain global warming under 1.5 °C, which means that there will only be two more proposals before 2030. A 5-year gap between two NDCs plans might hinder the promotion of funds needed for developing countries to adapt to climate change or mitigate its impact. On the other hand, if the interval between two NDCs plans reduces, countries can share more information and thus might promote the funds needed to achieve the 2030 goal.

Fourthly, developed countries can shift a bigger portion of their budget to make a bigger pledge to provide climate finance. The obligation to protect human rights from being hurt by climate change has not spread vastly, yet it is indeed a huge concern. This obligation can be used together with the "the polluter pays" principle together to call for huger funding in countries. One potential way of providing climate finance is to impose a carbon tax on domestic high-polluting firms and to use that revenue for climate finance, which has the positive externality of disincentivizing high-polluting industries, promoting domestic firms to transform into low-polluting ones.

## 4. APPROACH THREE: GLOBAL CARBON MARKET

### 4.1. Introduction

To reduce global greenhouse gas emissions, economists devised carbon markets by creating a financial incentive. The global scheme has evolved from "cap and trade" under the Kyoto Protocol 1997 to the Clean Development Mechanism (CDM). Then in 2015, 190 countries signed up for the Paris Agreement and set emissions reduction targets. They agreed to set up a voluntary global carbon market under Article 6 of the climate treaty, hoping to avoid the flaws that led to the CDM's demise. The notion is that one country might cut its emissions by funding the construction of carbon-reducing initiatives in a second country and counting these reductions toward its goals.

Countries are still hammering out the rules six years later and are far from reaching an agreement. Fortunately, the United Nations Climate Change Conference in Glasgow in 2021(COP26) ultimately handed us a strong Paris Agreement framework for international collaboration through carbon markets. They urged countries to adopt concrete and immediate steps to combat hazardous climate change. It is an answer to climate change, but this additional ambition will still not be enough to meet the Paris Agreement's goals. Additional actions should be taken to address the challenges caused by pre-existing inequalities.

### 4.2. The operation of carbon markets under Art.6

Parties to the UNFCCC have fundamentally altered the modalities of international collaboration (via market and non-market measures) with Article 6 of the Paris Agreement. Parties can pursue both cooperative measures involving the use of internationally transferred mitigation outcomes (ITMO) between Parties (Article 6.2) and mitigation and sustainable development mechanism involving public and private sector actors (Article 6.4). Also, the non-market approach is stipulated in Article 6.8 to "boost countries' mitigation, adaptation, finance, technology transfer, and capacity-building resisting climate change in no trade involved situations"[22]. Before utilizing this approach, countries must prepare a work program on such approaches. Therefore, this paper focuses on those contemporary opportunities in Articles 6.2 and 6.4.

#### 4.2.1. Cooperative approach

Under Article 6.2, parties can directly collaborate with each other. This first enables emission reduction measures to be performed in one nation, and the resulting emission reductions are transferred to another country and credited against the latter's NDC. This demands a transparent technique as well as a precise emission reduction accounting. The new regulations make it illegal to count emission reductions twice, such as in the nation's

emissions inventory where the reductions are carried out and the country's emissions inventory where the emission reductions are transferred. It also enables national and regional instruments to be linked to similar programs to create a single, cross-border carbon market. While international oversight of these cooperative efforts is not planned, stringent reporting and accounting procedures have been implemented with the goal of ensuring long-term development gains while avoiding undesirable consequences. States engaging in mitigation activities, for example, must demonstrate that the activity is compatible with the host country's sustainable development goals, that negative impacts are minimized, and that human rights and other rights are maintained.

#### **4.2.2. New mitigation and sustainable development mechanism**

Using the recently developed mechanism contributing to the mitigation of greenhouse gas and sustainable development is another option for collaboration according to Article 6.4. Then, the emission reductions can be transferred from the country in which they were achieved to another country and counted towards its NDC, much as the bilateral cooperation options outlined in Article 6.2. Unlike Article 6.2, which enables direct bilateral collaboration, this mechanism will be overseen by a body established by the Conference of the Parties. Furthermore, the Conference of the Parties approved norms, modalities, and processes that must be followed while carrying out Article 6.4 activities. As a result, standardized procedures are followed in the planning, implementation, and verification of emission reduction operations. For example, before activities may be registered with the Supervisory Body after successful validation by an independent verification agency, they must first be permitted by the host country. The mechanism's purpose of mobilizing the private sector to participate in climate change mitigation by offering adequate incentives is another distinctive feature. As a result of the Paris Agreement, the subnational level actors can directly use the system established under Article 6.4.

### **4.3. Evaluation of the international carbon market**

#### **4.3.1. The effectiveness: meet the goals of PA**

Two explicit goals of the Paris Agreement are supported and contributed by the carbon market under Article 6: (1) delivering emission reductions and (2) mobilizing investments. If countries set up the rules correctly, countries using these relevant measures can meet and beat their carbon emission reduction targets while channeling increased investment in sustainable development, accelerated by Article 6[23]. Such market approaches will aid in decreasing the costs of achieving specific low-carbon goals, mobilizing more local and international resources to sustain low-carbon benefits, and delivering extra benefits such as accelerated technology transfer and

diffusion, enhanced energy security, and increased competitiveness.

#### **4.3.2. The deficiency: Implementing challenges caused by pre-existing inequalities**

In the context of global cooperation on combating climate change and the establishment of carbon markets, the unequal administrative capacities call upon challenges. Take the literature on the EU's policy implementation as an example, policy implementation can be separated into three major stages. The first is policy transposition, which requires national governments to incorporate international accords into their domestic legislation. The efforts to operationalize and practice the abstract international agreement and national public policies are the second step. The third stage is defined by the implementation of policies. Depending on the policy in question, this may entail a variety of operations, for instance, on-the-spot inspections, permission issuance, or the coordination of various private and governmental players. Accordingly, well-established administrations are essential to the effective functioning of public policies. In other words, administrative capacities are indispensable for the smooth operation and delivery of policies. The extent to which implementing authorities can carry out the respective activities depends on their human capacity and the financial, technical, and organizational resources available[24].

At this stage, low-capacity countries have to implement a completely new policy on the national bureaucracy, together with new administrative structures and procedures. Compared with high-capacity countries, it is unequal to those low-capable countries, which may make it hard to build up the required institutional structures quickly and precisely. For instance, based on their weaker administrative foundation, lack of sufficient degree of expertise, supporting staff, and resources, it is tough to create an eligible policy to participate in carbon markets successfully. What is worse, the unequal basis will, in turn, lead to unequal consequences as well.

## **5. CONCLUSION**

Climate change exacerbates inequality globally, and international cooperation and the existing approaches have to be improved to effectively address the issues. Developing countries overall are more vulnerable and less prepared to address climate change and inequality. The mechanism of the principle of CBDR-RC is a decent start in addressing climate change and the concurrent issue of inequality. However, the differentiation of responsibilities is not sufficient enough and still needs to be refined to avoid the moral hazard and free rider, and effectively address these two tough common issues, which in this case, more international efforts are needed. The analysis shows that climate finance is an essential tool to address climate change since the developing countries do not have enough capability to solve the problems solely on their own. However, the developed countries are not fulfilling their pledge. It is urgent for them to act so that climate change

will not worsen in the future. The carbon market is a decent answer to the emergent climate change, but this additional ambition is still not sufficient enough to keep the world under a 1.5-2°C temperature rise. Further actions are still essential in propelling the global ambition to meet the Paris Agreement's goals. For the inequalities of the administration, all climate agreements involving both developed and developing countries and promoting carbon markets should ensure that all parties are able to develop the essential bureaucratic infrastructure to successfully participate in emission trading. Other parties and international organizations should intervene and assist the countries when missing those capacities. Overall, more aggressive and comprehensive international cooperation is needed in order to solve the two defining challenges of humanity.

## Acknowledgement

All the authors contributed equally to this work and should be considered co-first authors.

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