

A Criticism of the Kyoto Protocol with an Objective Approach

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Abstract – The Kyoto Protocol, established to reduce greenhouse gas emissions, one of the human-induced causes of climate change, imposes obligations on developed countries. In this study: 1) what obligations the articles of the Kyoto Protocol impose on the countries that are party to the protocol, 2) whether the articles of the protocol are impartial, equal, and fair in their obligations to the contracting countries and their binding, 3) how the economic support of developed countries to reduce emissions to developing countries can be evaluated in the context of the principle of equality/justice, 4) it has been discussed whether the non-bindingness of the countries those are not party to the protocol. Considering all protocol items, the discussion was made from a critical but constructive point of view. It can be said that the obligations arising from the Kyoto Protocol bring disadvantages for some countries compared to others.

Keywords – Kyoto Protocol, global climate change, greenhouse gas emission, equality, justice

1. Introduction

Approximately 90% of academic studies show evidence of global climate change. Unfortunately, scientists have not fully agreed on the causes and consequences of global climate change as they have on the problem's existence. Therefore, today, the problem is still discussed. As a matter of fact, the authors state that there is not such a strong consensus among scientists in answering the questions "why", "how", and "how much" [1]. While some scientists argue that climate change is a natural process and that there have been thermal and ice ages in the past [2], some scientists say that the problem is caused by humans and is caused by gases that are known to have a greenhouse effect as a result of fossil energy sources use. IPCC reports are at the forefront of making this claim. Al-Amin et al. [3] state, "The impact of climate change and global warming is a product of human greedy activities and begins with technological mastery, which over time has dangerous consequences on the environment and has repercussions."

Global climate change seriously threatens the naturalness and compatibility of our planet in terms of meteorological events and, accordingly, humans and other living life, particularly in the last few decades. In order to overcome such a serious problem that globally affects life and the quality of life, governments, scientific circles, non-governmental organizations, and all sectors can inevitably contribute to the solution of the problem with global participation. Research on climate change is carried out, and meetings are held by wide circles, especially the scientific community. As a result of these efforts, the Kyoto Protocol was accepted among the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 1997 at the 3rd Conference of the Parties in Kyoto and entered into force in 2005. Currently, 191 countries, including

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EU countries, are parties to the protocol. The protocol consists of 28 articles. In addition, the Paris Agreement was signed in 2015 within the scope of the UNFCCC to reduce climate change and adapt to the problem and entered into force in 2016.

In UNFCCC, the countries parties to the convention are classified into two groups: industrialized countries and countries transitioning to a market economy. The Kyoto Protocol (KP) constantly refers to this classification, bringing various binding obligations between developing and developed countries, resulting in some sanctions.

Brunnée [4] states that "the success or failure of KP's market-based mechanisms largely depends on the balance in the rules governing these mechanisms." Vanderheiden [5], on the other hand, argues that climate change can be seen as a question of intergenerational justice and is a useful framework for discussing the ideals of equality and responsibility set by the 1992 UNFCCC and international climate policy architecture. However, according to Falkner [6], demands for fairness in sharing the burden of climate change mitigation have been at the center of international climate negotiations since the late 1980s. Similarly, even more assertively, Demirci [7] states, "After the KP, there was a certain burden distribution on the countries that were party to the protocol, but since there was dissatisfaction with almost all parties in the context of justice, climate change was constantly discussed in the negotiations held after the protocol in terms of financial and benefits." Santos [8] also expresses his concerns on the issue, saying that the protocol only sets emission reduction targets for industrialized countries according to the principle of differentiated responsibilities, and this situation leads to a deep division in the views of developed and developing countries on cooperation and equality issues. Güneş [9], on the other hand, criticizes the KP as "it is a contract that imposes significant restrictions on production and trade in the functioning of the private sector, based on market mechanisms, and carries much heavier obligations, which has serious economic consequences compared to other environmental agreements." Böhringer [10] pointed out the flexibility of the Protocol and thought that the flexibility must be emphasized. From an economic point of view, globalization in production is fundamentally reshaping how a "just" solution to the problem of climate change should be created [11]. Based on all these, the study's main purpose is to question whether the obligations imposed by the KP on the countries that are parties to the protocol are equal and fair, and to reveal the necessity of eliminating any situations contrary to the principles of equality and justice. With this approach, the authors emphasize the need for a fair distribution of obligations. This study has tried to understand whether the comments made are reasonable and sufficient by evaluating the few studies that have included criticisms that KP may have created some injustices. In addition, how to approach these evaluations from different angles and whether new interpretations can be brought has been another aim of this study. The Kyoto Protocol articles formed the study's main material, and other studies were also supportive. The necessary analyses were made and the issues that could cause problems were tried to be determined, and then suggestions were made on what can be done to solve these problems.

2. International Emission Amounts and Kyoto Protocol

The countries that bear the highest responsibility for environmental pollution are some G8 countries, which are the USA, Canada, Russia, Germany, Japan, and England, with 10-20 tons of CO₂ emissions per capita [12]. While only a few of the developing countries group announced their digitized emission and limitation targets in the ongoing negotiations around the KP, it remains uncertain how the United States (USA), which is not a party to the KP, can contribute to the ongoing negotiations based on the protocol [13]. Rosen [14] expresses this situation as follows: More questions may arise as to why policymakers chose to focus on an agreement that had little impact on key players for 15 years, even though there are countries not bound by the KP, such as China and the United States, which together are responsible for around 40 percent of global carbon dioxide emissions.

However, we believe that this statement contradicts the rates given above. Because if China and the USA alone cause emissions by 40%, it seems too ambitious to say that middle-income developing countries mostly cause emissions when the emission rate or volume of Japan, EU countries and other developed countries is

considered. It could not be put into effect for a long time because at least 55 countries were responsible for a minimum of 55% of the total emissions in 1990, which is the condition for the protocol to come into force for the KP to reach its goals officially, are party to the protocol. The countries in question have not signed the protocol [16]. Many countries have heavily discussed the protocol as it does not include much detail about the design and execution of flexibility mechanisms [17].

The first conference of the parties was held in Berlin in 1995. At this meeting, the parties decided to protect the climatic system with a harmonious and equal attitude but with differentiated responsibilities [18]. However, the greenhouse gas emissions of people living in developing countries are very small compared to those of people living in developed countries, and there are serious inequalities in greenhouse gas production between countries [19]. It can also be thought that the fact that the UNFCCC was signed with the participation of almost all countries is related to the fact that the reduction targets and duties were not determined very specifically within the scope of the contract [20].

The USA, which is the country with the highest emission level in the studies revealed and did not accept to ratify the protocol despite signing the protocol, opposed a decision that creates an obligation in the international context and demanded that the emission reduction amounts of the countries be at their initiative [21].

A static partial equilibrium model developed at Center for International Climate and Environmental Research – Oslo (CICERO) predicts that without the USA, KP would reduce only 0.9 percent of emissions globally [22].

According to the UNFCCC, global climate change is anthropogenic. In order to minimize the problem, it is claimed that the KP, which was accepted among the contracting countries, imposes heavy obligations on the parties [9]. We do not fully agree with this claim, but it can be said that the protocol imposes an obligation, even if it is not heavy. In our opinion, the main problem is not the heavy obligations brought by the protocol but the insecurity and concern that these obligations are not shared with a fair approach, both in the articles and the implementation of the articles. For this reason, this study has tried to examine what kind of problems may arise in terms of both the protocol articles and the fair approach required by the universal and ethical rules for the parties or non-parties in the case of the implementation of these articles, and whether there are noticeable problems when the protocol articles are evaluated with an egalitarian approach. Scientific studies on KP have been reviewed with great sensitivity and a wide literature review. In the literature review, many studies were found about KP. Still, it was seen that there were not many studies that handled the protocol with an egalitarian approach with the method followed in this study. In this respect, it is thought that supporting the literature with a study that evaluates the issue with this approach is important in creating constructive suggestions for the KP, which has the participation of almost all countries and aims to solve a crucial problem such as global climate change.

3. Discussion of the Literature Related to the Subject

The success of KP is associated with the balanced rules of the protocol mechanism [4]. This assessment is considered quite reasonable and necessary. In terms of the countries subject to the protocol, it is considered extremely important that the obligations brought by the rules of the protocol mechanism have a delicate balance and impose fair sanctions on all parties. Furthermore, it is essential that the sanctions are proportionally distributed and that the sanctioned countries are determined in a way that they cannot exceed their power and can easily apply. In terms of states, it is thought that the possible arguments and objections that may occur with the opinion that the protocol has these features will be minimized. Therefore, the protocol articles will be implemented more easily.

It is thought that it would be beneficial to evaluate the ideals determined within the scope of UNFCCC with an egalitarian approach in terms of climate policy architecture [5]. This approach is important for the applicability of the UNFCCC and KP. When the architectural structure of KP is handled and discussed to contribute, it will enable some improvements in having a fair structure.

It is stated that after the burden distribution between the countries that are party to the protocol, there is dissatisfaction in the countries, and this causes discussions in the negotiations [7]. This situation can be considered a natural consequence of the formation of doubts among the parties to the protocol about whether the obligations brought by the KP are positioned fairly.

It is stated by Böhringer [10] that the architectural structure of the KP causes serious flexibility and therefore needs to be considered. The flexibility mechanism of the protocol can be partially removed and made more effective. The fact that the protocol formation has a clear and specific structure, and its rules are clear and applicable will impact its healthy workability. Explanation of the flexibility, which must be mandatory in terms of implementation, together with the reasons, will increase the acceptability of the protocol.

From a financial point of view, it is stated that the globalization of production over time essentially reshapes the issue of finding just solutions to climate change [11]. Unless a fair solution to the problem is brought with the KP, the KP itself will become the problem. Since it affects all life sectors, from agriculture to energy, both individually and socially, the protocol, which aims to eliminate or reduce the problem of climate change, requires sensitive and fair planning regarding the obligations that the parties must fulfill.

Although the USA is the country that bears the highest responsibility for CO₂ emissions [12], it is stated that it is unclear how the USA's non-participation will affect the climate change negotiations [13]. These concerns and criticisms are thought to be quite justified. The fact that the USA, which has the greatest impact on environmental pollution in terms of emitted CO₂ (please see Table 1 and Figure 1), is not a party to the KP and naturally does not assume any obligations is one of the biggest concerns of the parties. This concern stems from the suspicion that the protocol cannot be implemented, cannot achieve its goals even if it is implemented, and will be far from justice and equality.

Table 1 shows the total greenhouse gas emissions of some countries with the highest and least greenhouse gas emissions for 2016. The data was obtained from the official website of the Turkish Statistical Institute (TUIK) for 2016. The table helps readers to more easily significant the position of the USA in terms of total greenhouse gas emissions compared to other countries. Here, the five countries with the highest and lowest emissions from the countries shared by TUIK are considered [23]. For the same aim, Figure 1 has been generated from the data in the first part of Table 1. The figure makes the position of the USA more visible among the five countries with the highest total greenhouse gas emissions [23].

Table 1. Total greenhouse gas emissions of some countries with the highest and least greenhouse gas emissions, 2016 (Million tons CO₂ equivalent) [23]

Countries with the Highest Total GreenhouseGas Emissions	Total Greenhouse Gas Emissions (Million tons CO₂ equivalent)
United States of America	6511.3
Russian Federation	2643.8
Japan	1304.6
Germany	909.4
Canada	704.2
Countries with the Least Total GreenhouseGas Emissions	Total Greenhouse Gas Emissions (Million tons CO₂ equivalent)
Latvia	11.2
Luxembourg	10.0
Iceland	4.7
Malta	1.9
Liechtenstein	0.2

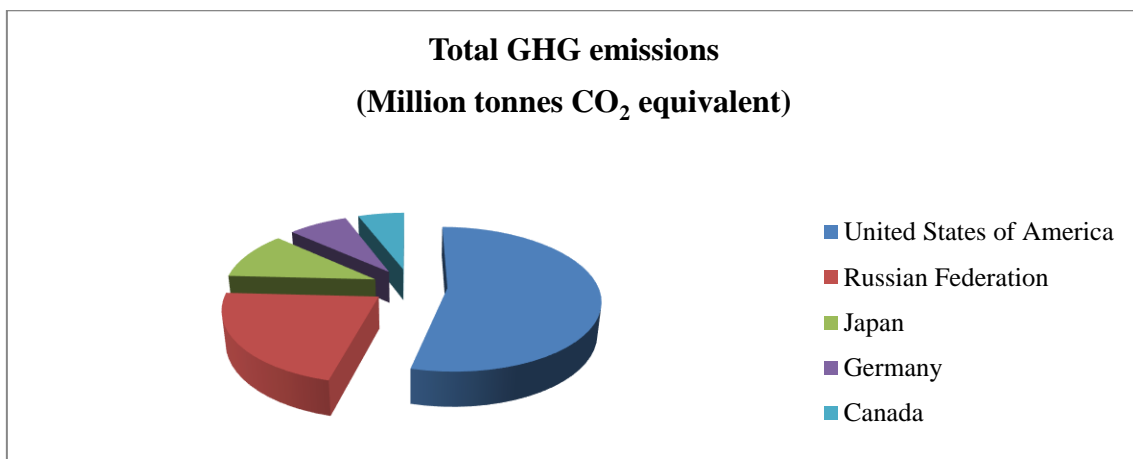


Figure 1. The relative shares of the five countries with the highest greenhouse gas emissions [23]

Akkale [16] states that the condition for the country's participation with a certain emission volume/rate, which is necessary for the KP to enter into force, could not be fulfilled for a long time. It can be said that the prolongation of this process is due to the above-mentioned concerns. On the other hand, Türkeş et al. [17] claim that the protocol's flexibility mechanisms cause serious discussions because it does not have enough details. It can be thought that the protocol has been designed very comprehensively, but it should still have details in a way that does not leave any question marks in terms of states. However, details may complicate the applicability of the protocol. In that case, the articles should be detailed enough not to leave any question marks and simple enough not to hinder their implementation.

Greenhouse gas emissions can show serious differences depending on the technological level that the countries have reached and their level of development. It can be argued that this situation is to be considered by the protocol articles among the countries party to it. However, because all countries in the world cause CO₂ emissions with a low or high level, but not all countries are party to the protocol, there may be questions about whether there is an egalitarian approach to the distribution of obligations. The reason for the incomplete participation in the KP and that almost all countries signed the UNFCCC can be evaluated as the uncertainty in the protocol articles and the insecurity in the implementation.

The fact that the country or countries with the highest amount of emission do not approve the protocol causes the emission reduction obligations to remain on the countries that cause less emission rather than the country that causes it the most. This causes the countries that are party to the protocol to think they are being treated unfairly. It is considered extremely important for the operability of the protocol that the states that are the most responsible for climate change, which threatens human life on a global basis, are more sensitive. As mentioned above, it is stated that some models predict that if the USA is not a party to the protocol, global emissions can only be reduced by 0.9 percent [22]. This rate indicates that even if the parties to the protocol fully fulfill their emission reduction obligations, this will be insufficient on a global scale.

4. Assessments on the Protocol Items

Some articles of the KP are controversial regarding the sanctions it imposes regarding its inclusiveness and applicability. The principle of "common but differentiated responsibilities" is frequently referred to in the protocol text. Paragraph #1 of the third Article of the Protocol obliges Annex I countries to reduce their total greenhouse gas emissions to at least five percent below the 1990 level. Although it seems to be an equal approach, it is impossible for some countries to decrease below the 5% level of 1990, even though they reduce by the same amount in total. To reach the mentioned percent they need to go further reduction. Therefore, even if the obligation to reduce at the same rate seems to be an equal approach, it isn't easy to evaluate it fairly. Instead, it is not proportional; it can be considered as a more equitable approach to create liabilities according to the total emission amounts values. In this way, it will be possible to balance the emissions of all countries at the same level.

On the other hand, the principle of differentiated responsibilities and flexibility also brings the convenience of not meeting this rate due to force majeure. Thus, any country may put forward a force majeure according to its own and may not fulfill its commitment. Therefore, this principle brings the risk that the parties cannot act impartially in a situation requiring a unanimous or majority vote. It may be recommended to remove this principle to prevent countries from abusing it. If this article is removed, fewer countries will take refuge in force majeure, and countries will make more efforts to fulfill their obligations under the article.

In Article #3 of the Protocol at sixth paragraph, it is stated that the Conference of the Parties will provide a certain degree of flexibility to the parties in the transition process to the market economy in Annex-1 in terms of fulfilling the commitments of the protocol. Such flexibility may cause legitimate objections by those not transitioning from party countries to market economies. Therefore, the protocol should be more rigid because such flexibility may mean that the protocol moves away from rigidity. A full, clear and transparent detail has not been made about the extent of the flexibility specified in the article's relevant paragraph. In other words, what its limits will be is not clear.

Article #17 of the Protocol states that the parties included in Annex-B can participate in emissions trading to fulfill their commitments. The issue of climate change, a common problem of all humanity, should be evaluated with great sensitivity by all interlocutors. The transfer of this issue, which is so closely related to the whole earth, humanity, and all living habitats and directly related to the transfer of the natural environment to future generations in a healthy way, to commercial arenas is considered ethically problematic by some circles. It can also be considered that this situation will provide an advantage to economically powerful countries in line with their stake. Therefore, it should not be overlooked that the emissions trading mechanism may cause certain problems in terms of equality and justice for all countries, both parties and non-parties to the protocol. On the other hand, it is considered necessary to develop an alternative to this article in order to help underdeveloped and developing countries make their investments. If an alternative cannot be developed, additional articles or clauses are needed to implement the existing article transparently and fairly.

5. Discussion

5.1. Why was the Kyoto Protocol Needed?

Şen [24] states, "In order for living things to continue their lives, different chemical components must be present in certain proportions, especially in the atmosphere." Carbon emission is one of the main human-induced causes of global climate change. Today's technology releases greenhouse gases, especially CO₂, into the atmosphere. Solar energy reaches the atmosphere as shortwave radiation (in the form of ultraviolet rays and with high energy and light). The ground has less energy, reflecting this energy as longwave radiation in the form of infrared rays. The greenhouse gases prevent reflection; therefore, the earth keeps longwave radiation and warms up.

Van der Geest and Warner [25] present perspectives and data on the loss and damage caused by the adverse effects of climate change. This context shows that climate change has serious economic, social, cultural, and health consequences. However, he is of the opinion that the way to prevent the dangerous consequences of climate change and disaster risks is the investments to be made in this field.

The KP was activated as a result of the need for joint work and organization on issues that could create a dilemma, such as by whom the support and investments to be created at the international level for the solution of the climate change problem, at what level they will be, what kind of way to follow in this regard. Differences such as the different contributions of different countries to the causes of global climate change, the negative effects of the problem being felt at different levels in each country, the fact that each state has different power in the implementation of the sanctions to be brought to the countries required the preparation of the KP in a very inclusive way.

Stories that describe any future event are called scenarios [26]. There are extensive uncertainties in climate

change's future impacts and responses, necessitating scenarios to explore the potential consequences of different response options [27]. Conducting extensive studies on these scenarios, the IPCC was established in 1988 within the United Nations. The IPCC includes various scenarios regarding the possible consequences of climate change in its reports. Among these reports, the Fifth Assessment Report (5th AR) mentions that the earth's temperature may increase to 2°C and possibly rise in sea level [28]. This increase in temperatures and rising sea water levels will seriously threaten the entire ecological environment and living life. Therefore, many articles of the UNFCCC include decisions to reduce greenhouse gas emissions. One of these resolutions aims to reduce human-induced emissions to 1990 levels. In order to control the temperature, increase or to minimize the acceleration of the temperature increase, the need for countries to limit their carbon emissions has arisen. KP is a collection of clauses with sanctions designed to help countries reduce their carbon emissions to a certain level. All countries must take responsibility to prevent or control these expected disasters. In this respect, it is clear that there is a serious need for KP.

5.2. Why Should the Kyoto Protocol be Fair?

The United Nations is an important authority that studies the determination of global problems and their solutions. With this mission, it has concluded that there are obligations that all governments should undertake with global participation in the issue of global climate change, which has become perhaps the most important problem of the world in recent years. It is difficult to make joint decisions on solving problems with global participation, since countries are independent and have decision-making processes and bodies in international relations. States are trying to take steps to protect their national interests regarding the global obligations they have undertaken, and they often try to evaluate the problems, especially from an economic point of view. Due to these situations, agreements and protocols reached with wide participation cannot be implemented or take a long time. To prevent such problems, it may be suggested that countries add a clause specific to climate change to their constitutions. KP also imposes large-scale sanctions on countries to control their greenhouse gas emissions and reduce them, and these sanctions have serious economic dimensions. Therefore, an agreement reached with such broad participation and serious sanctions should be positioned fairly to the parties. Otherwise, developed countries must pay this price by giving up their sustainable development partially or completely. Developing or undeveloped countries, which do not have a serious role in the world's pollution, pay this price by being affected by disasters.

5.3. Where is the Injustice?

It is an inevitable fact that industrial-based carbon emissions are much higher in developed countries than in undeveloped countries. Considering that global climate change is caused by human beings and the reason for this is the gases released into the atmosphere, the countries that cause the most emissions should have more responsibilities and, therefore, more obligations in this regard. For KP's obligations to be fair, there must be a clear, precise, and transparent distinction between developed and undeveloped countries. This transparency is most needed for gas emission reduction or emission and sink inventory. As mentioned above, according to many studies, the USA, which has the highest emission amount globally, has not yet approved the protocol. The lack of participation of the country that causes the most emissions in the scope of emission limitation makes it controversial that the KP has a fair mechanism. Economically, it creates risks for member countries. It may be suggested that the relevant articles of the protocol be revised in this respect. It is discussed by the countries in the relevant meetings that there are still uncertainties about financial sanctions and that the flexibility mechanism created does not impose fair obligations to the parties. It is necessary to seriously consider whether this situation is due to the fairness of the protocol, to the interests of all countries, to the fact that the countries are not sensitive enough to solve a global problem, or to the maneuvering abilities of the countries (which are circumscribed by the protocol articles). In addition, it should be remembered that complying with the Kyoto commitments has important economic consequences. As a result, non-compliance by some parties will raise competitiveness concerns to a large extent [4].

6. Conclusions

In the study, the Kyoto Protocol was evaluated from many aspects and possible improvements were tried to be put forward along with the problems identified in terms of contributing to the solution of the climate change problem. The smooth functioning of the KP is of great importance in making positive progress on the climate change problem. However, as a result of the study, it was concluded that KP has more advantages and disadvantages for some countries than others regarding obligations. In addition, developed countries have a greater impact on global climate change. All countries have a relative impact. However, countries that are not party to the protocol and subsequently left the protocol are not under responsibility. This may cast a shadow over the principles of equality and justice globally. These situations may have unhealthy consequences for the sustainability of the protocol. The flexibility mechanism, one of the protocol's crucial features, can create some situations that can be used in favor and against it. Therefore:

- 1) Even minor changes in the flexibility mechanism formation of the protocol will enable the protocol to turn into a more effective structure.
- 2) However, making the protocol text clearer and more specific and increasing its articles' applicability will benefit its healthy functioning.
- 3) Explaining in detail the flexibility required in terms of implementation, together with their reasons, will facilitate the acceptance of the protocol by the parties to the protocol.
- 4) While all these revisions are being made, the fact that the protocol items are so detailed that they do not create question marks and have a simple structure that will not pose a problem in terms of implementation will have positive results.
- 5) Concerning the issue of climate change, which is one of the most important problems of the whole world, it can be considered ethically problematic to convert the emissions of gases that cause greenhouse gas effects into a commercial field through trading. This situation can create unfair competition and disproportionate power sharing between countries with strong economies and developing countries. Therefore, ensuring that additional changes or alternative articles and clauses are included in the protocol article on this subject will create a more transparent situation regarding equality and justice.
- 6) As well known, the USA, which causes the most greenhouse gas emissions, is not under the Protocol's obligations. This makes the KP controversial concerning having a fair mechanism. In this respect, it is thought that it would be essential to review the relevant articles of the protocol.

Author Contributions

The second author directed the project and supervised this study's findings. The first author devised the main conceptual ideas and developed the theoretical framework. The first author wrote the manuscript with support from the second author. The second author reviewed and edited the paper. All authors read and approved the final version of the paper. This paper is derived from the first author's doctoral dissertation thesis supervised by the second author. The author read and approved the final version of the paper.

Conflicts of Interest

All the authors declare no conflict of interest.

Ethical Review and Approval

No approval from the Board of Ethics is required.

References

- [1] Z. F. Toprak, N. Hamidi, Ş. Toprak, Z. Şen, *Climatic identity assessment of the climate change*, International Journal of Global Warming 1 (5) (2013) 30–45.
- [2] W. M. Budzianowski, *Time delay of global warming*, International Journal of Global Warming 3 (3) (2011) 289–306.
- [3] A. Q. Al-Amin, F. Kari, G. M. Alam, *Global warming and climate change: Prospects and challenges toward long-term policies in Bangladesh*, International Journal of Global Warming 1 (5) (2013) 67–83.
- [4] J. Brunnée, *The Kyoto protocol: A testing ground for compliance theories?*, Heidelberg Journal of International Law 63 (2003) 255–280.
- [5] S. Vanderheiden, *Climate change mitigation, a problem of injustice*, World Science Report (2013) 378–380.
- [6] R. Falkner, *The unavailability of justice—and order—in international climate politics: From Kyoto to Paris and beyond*, The British Journal of Politics and International Relations 2 (21) (2019) 270–278.
- [7] M. Demirci, *Climate change and distributive justice*, Eskişehir Osmangazi University Journal of Economics and Administrative Sciences 2 (8) (2013) 183–203.
- [8] M. Santos, *Global justice and environmental governance: An analysis of the Paris Agreement*, Revista Brasileira de Política Internacional 60 (1) (2017) 18 pages.
- [9] Ş. A. Güneş, *Ensuring compliance with climate change obligations: Kyoto Protocol compliance mechanism*, International Relations Journal 31 (8) (2011) 69–94.
- [10] C. Böhringer, *The Kyoto Protocol: A review and perspectives*, Oxford Review of Economic Policy 3 (19) (2003) 451–466.
- [11] J. Timmons Roberts, B. C. Parks, *Fueling injustice: Globalization, ecologically unequal exchange and climate change*, Globalizations 2 (4) (2007) 193–210.
- [12] S. Çınar, M. Yılmaz, T. A. Fazlılar, *Trade in polluting industries and the environment: A comparison of developed and developing countries*, Journal of Doğuş University 2 (13) (2012) 212–226.
- [13] N. Berberoğlu, *Climate change: Post-Kyoto negotiations and Türkiye*, International Journal of Economic Issues (33) (2009) 18–26.
- [14] A. M. Rosen, *The wrong solution at the right time: The failure of the Kyoto Protocol on climate change*, Politics and Policy 1 (43) (2015) 30–58.
- [15] C. Atici, *Reconciling the flexibility mechanisms of climate policies towards the inclusiveness of developing countries: Commitments and prospects*, Environment, Development and Sustainability 24 (2021) 9048–9067.
- [16] R. G. Akkale, *Kyoto Protocol and Turkey*, Mecmua 1 (2008) 493–515.
- [17] M. Türkeş, U. M. Sümer, G. Çetiner, *Kyoto Protocol flexibility mechanisms*, Journal of Plumbing (52) (2000) 84–100.
- [18] Ö. Dolu, *Flexibility and institutional capacity development of the Kyoto regime*, Master's Thesis Adnan Menderes University (2005) Aydın.
- [19] N. Konak, *Global climate change, Kyoto Protocol flexibility mechanisms, voluntary carbon market and Türkiye: A critical approach*, Alternative Politics 2 (3) (2011) 154–178.
- [20] B. Engin, *Kyoto protocol implementation mechanisms: Flawed or promising concepts?*, Journal of Social Sciences (2) (2010) 30–40.

- [21] V. Ş. Ediger, *The international relations dimension of global climate change and Turkey's policies*, Mülkiye 259 (17) (2008) 133–158.
- [22] C. Hagem, B. Holtsmark, *From small to insignificant. Climate impact of the Kyoto Protocol with and without US*, Oslo University Center for International Climate and Environmental Research 2001 (1) (2001) 10 pages.
- [23] Turkish Statistical Institute, Statistics in Environment, <https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Cevre-2016-27685>, Accessed 10 Mar 2024.
- [24] Z. Şen, *Climate change and Türkiye*, Journal of Environment City and Climate 1 (1) (2022) 1–19.
- [25] K. Van der Geest, K. Warner, *Loss and damage from climate change: Emerging perspectives*, International Journal of Global Warming 2 (8) (2015) 133–140.
- [26] W. L. Gregory, A. Duran, Scenarios and acceptance of forecasts, In Principles of forecasting, Springer, Boston, 2001, Ch. 16, pp. 519–540.
- [27] R. H. Moss, J. A. Edmonds, K. A. Hibbard, M. R. Manning, S. K. Rose, D. P. Van Vuuren, T. J. Wilbanks, *The next generation of scenarios for climate change research and assessment*, Nature 7282 (463) (2010) 747–756.
- [28] WCRP Report, IPCC AR5: Lessons learned for climate change research and WCRP, International Space Science Institute, Bern, 2015.