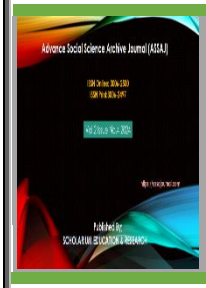

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# PAKISTAN AND THE PLANET: A ROLE IN GLOBAL CLIMATE DYNAMICS

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## ABSTRACT

The phenomenon of climate change is one that must be confronted on a global scale as it poses a threat that is not only diverse but also pressing with a number of nations being either part of the problem or part of the solution. Pakistan finds itself at a critical moment as it is working alongside the global community while tackling dire climate issues such as floods, severe heat waves and droughts. This paper looks at a more Pakistan focused approach by examining the nation's perspective on two facets of the problem: first, its role in causing climate change and secondly, its impact on the country that has now become Pakistan's reality. It explains the primary sources of greenhouse gas emissions in Pakistan while placing them into context with other countries namely energy generation, agriculture, processes of deforestation, growing demographics and construction. These geographical characteristics make Pakistan more vulnerable to climate effects that come along with the Himalayan glaciers and the Indus River basin which include water shortages, food insecurity, and flooding, displacement and health issues. The paper further discusses renewable energy programs along with improved energy efficiency approaches and Pakistan's strategy for disaster management as measures that the nation plans to take in responding to climate change. At the international level, Pakistan is insisting on climate change financing and technology from developed countries while gauging the implications of treaties like the Paris Agreement for the implementation of its domestic policies. This research assesses Pakistan's climate action policies, the success or challenges surrounding those plans, and simply how Pakistan has managed to integrate or rather contribute into the global fight against climate change.

**Keywords**: Climate Change, Pakistan's Vulnerability, Greenhouse Gas Emissions, Mitigation and Adaptation, Paris Agreement

## Introduction:

Climate change is one of the most pressing challenges of the 21st century, demanding unified and sustained efforts from all nations. The increasing frequency and intensity of natural disasters, including storms, hurricanes, floods, rising sea levels, and shifting climate patterns, highlight the escalating severity of the crisis (IPCC, 2021). Scientific evidence confirms that human activities, such as burning fossil fuels and deforestation, are major contributors to climate change (NASA, 2020). This paper examines the impacts of global climate change on ecosystems, the global economy, and human

health. As the international community continues to seek strategies to mitigate the adverse effects of climate change, it is crucial to understand the actions and responses of individual countries, particularly those most affected by this phenomenon.

Pakistan remained highly sensitive to climate change with all the indicators pointing towards the country as the most affected nation in the region. Of all the natural factors, the geographical conditions such as the glaciers in the Himalayan region, the broad area of the Indus plain and the large portion of the arid condition of the country makes it vulnerable to number of climate related problems (Government of Pakistan, 2016). Extreme climatic events for instance floods drought and heat waves have for instance increase in frequency and intensity thus posing negative impacts on the population and the economic wellbeing of the country (Khan et al. , 2019). For example, the floods in 2010 then evidenced with over 20 million affected people have shown some of the extreme effects the climate change in Pakistan has (UNDP, 2010). They also show some of the impacts of climate change thus stressing the importance of adaptation measures and efforts to eliminate exposure and sensitivity.

Given this context, this article seeks to explore a critical research question: This paper examines the roles and measures adopted by Pakistan to address climate change in the globe. This inquiry requires a number of factors on understanding Pakistan's greenhouse gas emissions and more so the major sources of these emissions, in the world as the energy sector, agriculture as well as deforestation (World Bank, 2021). It also assesses the vulnerability of Pakistan to climate and effects of climate change on socio-economic fabric of Pakistan on the issues such as food insecurity, health hazards and displacement (ADB, 2020). Furthermore, based on the relative scale, the article assesses Pakistan's mitigation and adaptation plans that include utilizing renewable energy, energy conservation plans, disaster response plans, and infrastructural development for adaptation (Government of Pakistan, 2021). Besides, it examines the position of Pakistan in climate change talks predominantly on the international instruments on climate change, on climate finance and technology transfer from the developed nations (UNFCCC, 2021). Analyzing these dimensions is thus the central aim of the article as it is hoped that they will reveal a clear picture of Pakistan as a climate change player and help frame future directions for the country's climate policy and undertaking.

**Pakistan in the Global Climate Change**

The direct implication of Pakistan in the global climate change is mainly due to the GHG emissions that originate from different sources such as energy, agriculture, and deforestation. Energy is the biggest source of emissions in Pakistan constituting over 50% of the total emission of GHG in the country. This is mainly because energy comes mostly from the fossil fuels like coal, oil and natural gas used in electricity production and industries (Government of Pakistan, 2021). The Agriculture industry is another major emitter through enteric fermentation, rice paddies, and synthetic fertilizer use. Changes in land cover and use particularly deforestation have a notable role since cutting forest implies the emission of stored carbon and also decreased carbon sink potential (Khan et al., 2021). Combined, these sectors capture diversified traits of

Pakistan's emission structure and complexity involved in managing each sector's emission reduction.

Expenditure on infrastructure development and population increase are other factors that have worsened GHG emission in Pakistan. As per World Bank data, India's population is more than 220 million and its growth rate is approximately 2% per annum; consequently, the need for energy, food and transportation infrastructure is increasing. The general enhancement of human activity in the course of urbanization and subsequent industrialization means larger energy demands and higher emission rates from transportation and manufacturing. New roads, new buildings, and many other construction projects result in increased fossil fuel consumption and further land degradation for new construction projects therefore leading to higher emission. Also, the increasing population density calls for more production of crops, which raises emissions from the sector. This combination of population and development implication shows that it is as a challenging task for a developing country like Pakistan to embark on reduction of emissions from sources because while development activities are being implemented, the economy of the country has to be grown as well. Pakistan is also not a very high emitter of GHGs as may be observed when comparing with other chief emitters in the world. Pakistan's total emissions of GHS according to the data obtained in 2018 were as low as 490, mm tone Co2 which is even lesser when compared to countries such as China, United States or India (World Resources Institute, 2020). But emission in Pakistan is increasing at a much faster rate because of Developmental requirements and absence of strict anti-environmental laws. On the other hand, the developed countries although having higher emissions are capable of having better technology and appropriate policies for curbing emissions. Furthermore, it can also be argued that Pakistan's per capita emissions are relatively low at the global level and way below other developed industrialized countries, which are more industrialized and have more industrial processes than agriculture-based countries such as Pakistan. Thus, it underlines the need to implement regionally differentiated climate policies with reference to specific socio-economic conditions in Pakistan on the background of the country's commitment to the international climate change agenda (UNFCCC, 2021).

**Pakistan's Vulnerability to Climate Change:**

The geographical position of Pakistan also put it at the receiving end when it comes to effects of climate change. It is inhabited by such representative forms of the fauna as Himalayan black bear, Tibetan wolf, snow leopard, lynx, Himalayan Tahr, musk deer, and others; the unique landscapes of the country include glaciers of the Great Himalayas, Karakorum, and Hindu Kush. They are important water reserves for the country supplying the Indus River system that is very important for Pakistan's agriculture and hydro electricity production (Shrestha et al ., 2015). The Indus River basin is a valuable resource in its own right, and even the water supply is a weakness because patterns of glacier melt and fluctuating river flows immediately affect the quantity of water. Besides, high levels of annual fluctuations and exposure to the looming of sea level and coastal erosion through Pakistan's great Arabian Sea lining

(Rasul et al., 2012). Therefore, together with the geographical position, it can be stated that Pakistan is endangered by a complex threat connected with climate change as it is vulnerable to the consequences that condition water supply, agricultural industry and stability of the environment.

The consequence of climate change in Pakistan is severe and varies in different sectors. An important emerging issue is fluctuation and uncertainty of monsoon season affecting negatively the crops and agriculture (Zhang et al., 2018). Another big problem is the lack of water; reduction in glacial size and fluctuating river supply remains a serious issue for drinking, agriculture, and industrial needs. Areas that experience severe weather conditions will be negatively affected by intense heat and even more destructive episodes such as recurrent heavy rain, storms and floods (Huq et al., 2019). This aspect of climate change will result in the displacement of millions of people living close to seashores as well as flooding of productive agriculture soils more often than not found close to shores. Such environmental changes influence other factors that exist in ecosystem and biodiversity's that are important in influencing ecological and agricultural production systems.

Thus, the impact of climate change on the socio-economic fabric of the country is severe and comprehensive. One of the issues that are of the significant concern include the food insecurity since the changes in the precipitation and in the water availability have an impact on crops and on the farming (FAO, 2020). This causes the food availability to reduce and the price of food to rise while the poverty level, as well as, the rate of malnutrition increases. Another important challenge is climate-induced migration where millions are likely to be displaced by natural calamities including floods, sea level rise, and land degradation (Ahmed, 2019). This internal displacement puts a stress on urban fabric and resources, hence, it creates social conflict situations and makes the affected population more susceptible to adverse conditions. The vulnerabilities to health are also compounded because the cyclones and the altered climate conditions increase the rates of vector borne diseases, heat injuries, and respiratory disorders (Khan et al., 2020). Altogether, these socio-economic consequences seek to worsen social equality and derail Pakistan's advancement plans, stressing the importance of proper climate change adaptation and resilience initiatives.

**Pakistan's Response to Climate Change:**

Several mitigation measures have been employed by the Pakistan in an effort to reduce the emission of greenhouse gases and fight climate change. One of the outlined strategies entails the use of targets of renewable energy that will help to minimize the use of fossil based energy. Currently, the contribution of the renewable energy sources is quite low as the government aims to increase the renewable investment to 30% of the total electricity generation mix by the year 2030 (Alternative Energy Development Board, 2019). That is; the promotion of wind, solar and hydroelectric power plants across the nation. Also, energy efficiency measures have been adopted with the aim of improving efficiency through the reduction of energy usage in the industrial, commercial and residential sub sectors. Some of these measures entail encouraging energy-efficient appliances' use, enhancing the industrial processes, and coming up

with building standards that reconsider energy utilization (Energy Efficiency and Conservation Authority, 2020). Another area the government is aiming at is enhancing the public transport as a way of lowering emissions from the transport sector that have major impacts on emissions and air pollution.

As for the adaptation policies and measures, Pakistan has undertaken disaster risk reduction and infrastructure improvement in order to minimize the vulnerability to climate change effects. The National Disaster Management Authority (NDMA) has been involved in formulating and the implementation of disaster risk reduction (DRR) strategies and frameworks to minimize damage of natural disasters like floods, droughts and heat waves among others (NDMA, 2019). Some of these intervention strategies are; the warning systems, the community-based disaster preparedness and the capacity building. Infrastructure development for resilience is another important sector, where funds have been provided to build climate resilient structures including flood protection embankments, efficient irrigation along with water storage infrastructure (Planning Commission of Pakistan, 2021). Further the government through Ministry of Climate Change is encouraging adoption of climate smart agriculture practices to assist farmers cope with the climatic changes in order to realize food security (Ministry of Climate Change, 2020).

Assessing Pakistan's climate action SAPs highlights that the country has both successes and challenges to report on climate action plans. On the positive side, there has been progress in the use of renewable energy sources: the construction of colossal solar and wind power plants over the last years; these projects have not only helped in limitation of emissions but also in generating provision of energy as well as employment. The application of the measures to improve efficiency in the use of energy has also produced encouraging performance, especially with regard to the industrial sector's energy appetite. However, there are distinct barriers that have made the implementation of these climate action plans difficult. Some of the barriers include inadequate financial capital and human capital in the form of professional project engineers for renewable energy and energy efficiency initiatives (World Bank, 2020). Moreover, lack of institutional and policy coordination provokes the delays in the projects implementations and thus, inefficiency in climate change policies. Nevertheless, Pakistan's participation in the Paris Agreement and continuous endeavor towards integrating climate indexes and improving climate change coping mechanisms provide positive signals in this regard (UNFCCC, 2021).

**Pakistan's Role in Global Climate Change Negotiations:**

Pakistan has been signatory to most international conventions on climate change because it understands the need to work collectively to fight climate change. The country has ratified the Paris Agreement which calls for stabilization of the global temperature to as much below 2 degrees Celsius as possible. Pakistan's INDCs under the Paris agreement include the commitment on reducing greenhouse gases through shift on renewable energy, energy efficiency and climate resilient agriculture (Government of Pakistan, 2016). Pakistan has also integrated its national policies with SDP or the Sustainable Development Goals which includes the 13th goal that urges a

quick and effective response to climate change and its effects. These commitments to the international frameworks mean that Pakistan wants to join the global fight against climate change while requesting the assistance to build its capacity for climate change impacts.

Another one of the major demands that Pakistan has been pursuing in climate forums is Climate Finance and Technology transfer from the developed countries. Due to its scarcity of finances and technology, Pakistan looks up to the concept of CBDR that acknowledges that the developed countries which are historically accountable for higher emissions must come forward and support developing countries financially and technologically (Shum, 2019). It's for these reasons that Pakistan claims that developed nations must provide the necessary finance for developing nations to implement low-carbon development trajectories and manage the impacts of climate change. In all these platforms such as the United Nations Framework Convention on Climate Change (UNFCCC), Pakistan has been demanding for enhanced, predictable and accessible funds required for climate action particularly in vulnerable countries through instruments like the Green Climate Fund among others as the future of the country's climate finance is uncertain (Khan, 2021). Also, Pakistan emphasizes technology transfer, in which effective technologies, knowledge, and best practices in the climate from developed countries to the developing ones to enhance the climate change solutions adoption rates.

The prospects and difficulties in the climate negotiations for Pakistan are complex. There is also the problem of asymmetrical power and resources dissemination between the developed and the developing nations of the world. Most of the time; Pakistan experiences shortcoming in achieving the adequate climate finance and technology transfer pledges as these resources depend on the political and economic ratios of the donor countries (Rauf, 2020). Additionally, bureaucratic and technical requirements regarding the utilization of international climate funds are other barriers. That said, there are enormous possibilities for Pakistan to use its strategic place in the international climate diplomacy. Thus, it can be noted that by engaging in global climate forums and building partnerships with other developing nations, Pakistan can build a solid bargaining power and impact the climate policies globally. Also, more significantly, Pakistan has been quite active in climate diplomacy that can get foreign investment and collaboration for sustainable and disaster-resilient development.

Hence, efficient multilateral diplomacy is central for Pakistan's advancement as it negotiates its climate change politics in global forums while also coming up with viable solutions. In calling for more equitable share of climate finance and technology transfer, Pakistan wants the developing nations to get adequate funding for the development of proper climate change strategies. The country's involvement in the international treaties and conferences proves the intent of finding the common approaches and emphasizes the global linkage of the climate issues. In the future, Pakistan needs to build stronger national policies which should correspond to international obligations and show the country's preparedness to manage climate finance efficiently. Moreover, better regional cooperation and information exchange

of experiences with other countries of the surrounding region can strengthen Pakistan's stance in international climate forum. In conclusion, Pakistan's comprehensive and timely positioning in the international climate diplomacy could make considerable contribution towards the advancement of both the national and global climate actions.

**Conclusion:**

Pakistan's contribution to climate change, particularly through its energy, agriculture, and forestry sectors, underscores the nation's complex environmental challenges. The country's reliance on vulnerable climatic systems, such as Himalayan glaciers and the Indus River basin, exposes its inherent weaknesses. These dependencies heighten the risk of severe consequences, including water scarcity, regional climate shifts, and rising sea levels, which threaten Pakistan's socio-economic stability. These impacts exacerbate issues such as food insecurity, health crises, and population displacement. Therefore, understanding these contributions and vulnerabilities is essential for developing targeted adaptation and mitigation strategies to address this critical challenge.

Pakistan's performance both domestically and internationally toward climate change mitigations presents a mixed picture. At the home front also, Pakistan has improved its capacity on renewable energy generation and management, energy conservation measures, and disaster risk reduction. Nonetheless, some of the difficulties like lack of funds, lack of technology, and corrupt institutions have benefited in hampering these kinds of schemes. Internationally, Pakistan has been an active player of climate talks and supported the demand for climate financing and technology transfers. Although such efforts have produced some of the mentioned positive results, coming up with negotiating power as well as the issue of gaining access to the international funds remain as major challenges. However, the promotion of such legal measures to reduce emission and the leadership role of Pakistan in implementing climate change agreement show a positive sign towards amped up climatic change actions.

As to future implications, Pakistan must strive to enhance its climate policies as an essential means of combating climate change. This entails increasing the capacity of renewable energy systems as well as increasing energy efficiency and climate change mitigation practices in agriculture. The government should also focus on matters concerning climate change such as construction of climate resilient structures and the provision of disaster risk reduction measures that will protect the vulnerable groups of people. Globally, Pakistan must encouraged the donor community to provide more climate finance and support the transfer of technology, and regional cooperation to tackle climate issues. Besides, it will be crucial to mainstream climate change factors within the country's development strategies and frameworks for planning and policy. In turn, the identification of the strategies and plans based on the approaches and suggestions presented herewith will help Pakistan to contribute to the overall efforts made to mitigate climate change across the world and create a more prosperous future.

The relevance of this study is consist with the fact that it overviews Pakistan's climate change interactions and offers a productive perspective on Pakistan's action, exposure and capacity in combatting and responding to climate change. Thus, the results signal the importance of delivering more prescriptive interventions and those policies for combating the complex problems of climate change. Policymakers and Environmental Planners and International Climate Change bodies will benefit from this research by gaining recommendations for increasing resilience to Climate Change and for promoting the achievement of sustainable development. To expand on this, future research can focus on identifying better solutions and technologies that can help Pakistan effectively address climate issues in order to support the nation's efforts in achieving its climate objectives and in turn have a positive impact on climate change across the world.

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