



Pakistan Research Horizon

**A Biannual Journal of Government Postgraduate
College Mansehra, KP, Pakistan**

Volume 1, Issue 2, Pages 44-56

Legislative and Policy Responses to the Climate Change Crisis in Pakistan: A Critical Analysis

Irfan Raja¹, Kamran²

Article Information Received: November 01, 2022 Revised: January 01, 2023 Accepted: January 01, 2023 Available Online: January 15, 2023	Abstract <i>Climate Change is the reality and accepted human crisis of today's world. It has implications for human life worldwide, but developing countries are more vulnerable to its impacts. This is mainly because of their poor resources and socio-economic infrastructure. In Pakistan, the climate change implications have been visible for the past few decades. Almost all key human survival sectors are vulnerable, such as water, agriculture, food, energy, health, and security. Climate change also triggered natural disasters like floods, extreme weather, famine, and heavy rains. The country is trying to cope with the situation through climate-related legislation and policy measures. The objective of this research is to explore Pakistan's legislative and policy response to climate change. The paper analyses the country's existing institutional and legal response to climate change using existing literature on the subject. It is an exploratory research. To deal with the objectives qualitative methodology has been employed, while data is collected from both primary and secondary sources.</i>
Keywords Climate Change Crises Policy Responses Legislative responses Pakistan	
Publisher ©This article is published by Government Postgraduate College Mansehra. This is an open-access article under the Creative Common Attribution Non-Commercial 4.0	

Corresponding author: Raja Irfan: irfanraja.apex@gmail.com

¹ Subject Specialist, Government Higher Secondary School, Dhodial (Elementary & Secondary Department KPK)

² Lecturer, Department of Pakistan Studies, Abbottabad University of Science and Technology, Abbottabad

1.1 Introduction

Pakistan is among the top 10 nations in the world affected by climate change. The population depends on rivers, being mainly an agricultural country where 80 percent of water comes from the glaciers, which are now melting at an alarming pace. If nothing is done, humans fear facing a huge catastrophe.”

According to German Watch’s long-term Climate risk index (2017), Pakistan is number eight on the list of the ten most affected countries from 1998 to 2017. The report indicated the country’s death toll was 296.40, with total losses in millions of 3 826.03 USD. The report stated the highly exposed position of Pakistan to climate change. This indication from such a reputable and recognized international institution is alarming for the country. The country’s vulnerability is doubtless. There are several chronic implications of climate change in the country. It has the power to seriously damage the life fabric of the country through its effects on key socio-economic sectors.

Climate change has the potential to seriously harm Pakistan with its tremendous social, environmental and economic impacts (Khan et al, 2016). The potential implications of climate change include a reduction in water resources, a decrease in agricultural outputs, an extension in shore erosion and sea water, increase in the occurrence of intense climatic incidents. Climate change is also one of the core causes behind the regular occurrence of natural calamities such as cyclones, droughts, floods and heat strokes that have taken the lives of thousands of citizens. The calamities have also destroyed livelihoods and seriously harmed the country’s infrastructure (Chaudhry, 2017). Climate Change is threatening and endangering the country’s water, food, health and energy security. Its security implications on the listed securities can lead to several crises like the country’s water, food and energy crises. All the nations of the world, generally and the developed world especially initiated efforts to address the threats of climate change ((Kiran & Qurat-ul-Ain, 2017).

The International communities have established an International mechanism through legal and financial instruments and institutions to assist the developing world. The International legal tools on climate change like UN Framework Convention on Climate Change, UN Convention to Combat Desertification and Paris agreement are facilitating the countries in addressing climate change concerns (Bernstein, 2002). The Instruments also have some commitments for the countries to fulfill. Pakistan also has some International legally and morally binding obligations. Hence, to meet the two requirements, firstly, to lessen the vulnerability and to deal with the implications of climate change and secondly, to accomplish the country’s International commitments, the government needs a solid and efficient legislative and institutional response to deal with the severe impacts of climate change.

This is an unavoidable prerequisite to protect its vast population from the negative impacts of climate change. This paper attempts to explore the climate change implications on Pakistan and its institutional and legislative response to deal with the challenge. It is an exploratory study analyzing the issue’s existing primary and secondary literature.

1.2 Overview of Climate Change

Climate Change is considered the most threatening environmental and socio-political issue on the planet, affecting all seven mass tracts of land. The term Climate Change has variations in its definitions, but all the conceptual definitions have some common ingredients.

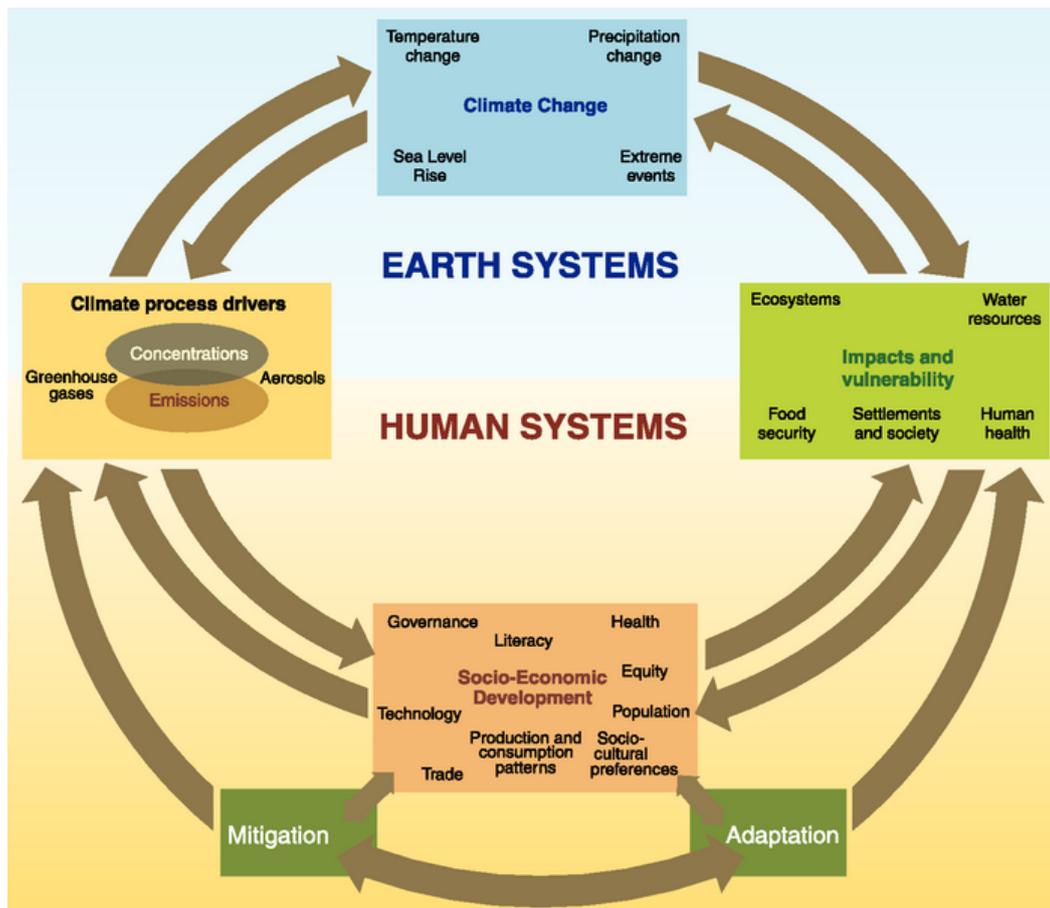


Figure 1 : Climate Change 2007: Synthesis Report

The IPCC is the leading Interstate scientific organization that deals with Climate Change. According to IPCC, Climate change refers to negative changes that are taking place in climate and atmosphere and that persist over a long tenure. The changes are caused by natural inner processes or human activities (IPCC, 2012). The United Nations Convention on Climate change is the leading International legal instrument on climate change. It defines Climate Change as "A change of climate which is accredited directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time duration (UNFCCC, 1992). Similarly, NASA is the world's leading agency dealing with climate change and space sciences. It defines Climate Change as long-standing variations in the standard weather patterns resulting mainly from human actions (NASA, 2019).

After taking a brief review of some renowned definitions of climate change, one can extract some common ingredients of the term Climate Change as follows:

1. It is an alteration in the regular pattern of the atmosphere.
2. It is the negative change that is taking place in the climate.
3. The changes persist over a long period.
4. Mainly, there are two causes of Climate Change, natural chemical processes and human activities.
5. Climate Change has severe negative implications for human life.

Let's briefly analyze the main causes of climate change though it is a debatable topic among the scientific community and scholars. The changes in the average climate arise mainly from two broader areas of causes. These areas are a natural process in the climate system and human activities. The first causes include internal inconsistency from intercommunication and interactions among different components of the complex climate system. For Instance, the transfer of heat between sea and atmosphere, the natural process of external forcing that leads to the earth's warmth or coolness, including solar variations; the second main cause is human activities that lead to emissions of greenhouse gases that lead to global warming that cause changes in the climate (Lysne, 2018).

Anthropogenic (AWG) is the most accepted theory regarding why and how climate change is happening. According to this theory, fossil fuels emit Greenhouse Gases like carbon dioxide and methane. Due to these gases' emissions, global warming occurs, which leads to climate change (Mikael, 2013). There is a remarkable consensus that global warming is the main factor behind climate change. There are also some agreements among most of the climate change actors on Anthropogenic causes of climate change. Human actions like burning fossil fuels, industrial pollution, excessive use of chemicals, and atomic energy consumption emit greenhouse gases into the atmosphere that lead to global warming. Global warming increases the average temperature of the earth and atmosphere and causes climate change worldwide (Rajeev et al, 1997). So in the above lines, we have briefly discussed the causes of climate change. The leading theory primarily supported by the scientific community and International climate change institutions is the anthropogenic theory. According to this, the human activities that cause the emission of greenhouse gases lead to global warming, which is the leading cause of climate change.

1.3 Key Climate Change Vulnerable Sectors in Pakistan

Climate Change has several severe implications for key socio-economic sectors. Water is one of the most exposed sectors to climate change in Pakistan. Climate change is leading to water security concerns in the country. The country is already facing an extreme shortage of freshwater resources. Pakistan is moving fast towards becoming a water-stressed country; the water accessibility issue can become a national water crisis, and the water availability will be at most 1000 cubic meters by 2035 (Bank, World, 2006). The country is facing excessive population growth, and the enormous population increase also increased the water demand in the country. Still, the need is rising, and water resources are decreasing; this proportion of demand and supply can lead to a severe humanitarian crisis. Individual base water availability, which was 5600 cm in 1951, has been reduced to 1200 cubic meters (PCOP, 2007). The above discussion revealed the vulnerability of the water sector to climate change, and Climate is impacting the country's water resources. If positive steps are not taken, it can be the reason for major human conflict.

Climate Change also has various adverse effects on the agriculture sector. Land desertification and degradation are major climate-induced agricultural problems. The country is already experiencing a shortage of suitable farming land compared to other agricultural countries. The situation is further aggravated due to the loss of large areas of productive land due to land desertification and degradation. Especially arid and semi-arid zones of the country are most exposed to the problem. From Pakistan's total land area, around 6.24 crore hectares are vulnerable to desertification ((Hussain & Irfan, 2012).

Similarly, climate-induced shortage of irrigation water affects agriculture, crop yield, and land output. The increase in crop diseases and pests is also linked to climate change (Gornall et al, 2010). Climate Change's implications on agriculture directly lead to decreased agricultural production that seriously disturbs the country's food system. The country's food requirements are mainly dependent on agriculture.

The current situation is endangering the food security of the country. Wheat and Rice are the most important food supplies of the country, but due to climate change and other causes, wheat production is declining, and Pakistan brings it in from other countries. As IPCC anticipated in its 2001 report, food security will be at the top of the agenda in Pakistan and other Asian countries shortly. This will happen because of two reasons abrupt growth in population and climate change implications (IPCC, 2001). So, the above lines provide us with a view of the climate change implications on the agriculture and food sector. From a food security point of view, the situation looks pretty grave.

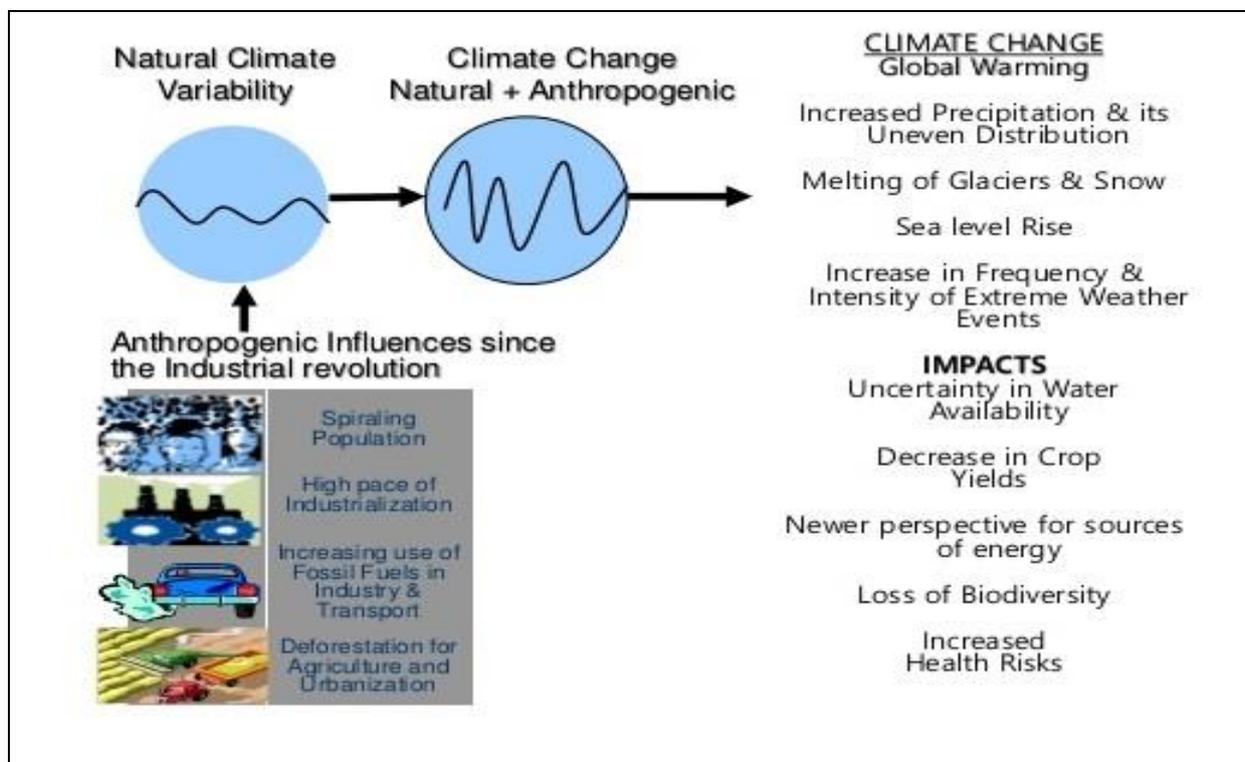


Figure 2: Climate Change Implications Climate on Different Sectors (Lashari, 2016)

Health is another vulnerable sector affected by climate change in the country. Climate change triggered health calamities, which are increasing day by day. Many diseases like dengue, malaria, cholera, and respiratory and infectious diseases are climate sensitive. Climate change is not only causing the spread of diseases but also causing new diseases with new names (Mustafa et al, 2012). One of the prime examples is dengue fever which is recurrently experienced by the country's masses. Along with other causes, climate change is one of the leading causes of frequent outbursts of the dengue epidemic in Pakistan in 1994. It has been happening regularly in the post-monsoon period, and people are losing their lives due to dengue every year with more fatalness (Jahan, 2011). Currently, the country is facing a huge-scale epidemic of dengue fever. Cases of calamity have been seen in the entire country. During the current outbreak, the most affected regions include Karachi, the country's business hub, Peshawar and Lahore. In Sindh alone, 247 more dengue cases have been detected, of which 225 are from Karachi. The same is the case with other parts of the country (ISFID, 2019). Hence, Climate change has implications for human health and its related aspects.

Power and its demands are openly associated with climate change, and both have shared impacts. The energy sector is highly vulnerable to climate change; the energy system is receptive to the country's negative changes brought by climate change. High temperatures and extreme weather are growing and demanding more energy, so the energy sector is already in crisis (Mahmood et al., 2016). Being an energy deficit nation, the energy crisis of meeting supply and demand has swamped the country for over a decade. Population expansion and climate change factors like intense heat and water availability are the fundamental causes behind this critical situation (LEAD, 2016)

Electricity and Natural Gas are the two main sources of energy in the country for domestic and commercial use. Still, industries are being shut down from the shortage of energy crisis. In summer, the electricity load shedding and in winter, the gas load shedding disturbs the domestic and industrial users. Especially the country's financial hub, Karachi remains energy affected city. The city's inhabitants are crying over the energy crisis, and the domestic users suffer a lot.

The multiple implications of climate change in several key sectors can threaten the country's national security. Climate can lead to internal and external security threats in Pakistan. The reasons for these threats are non-availability and non-access to human survival resources. The severe increased struggle to access limited food, water, energy and health resources can create internal and external conflicts. The water unavailability and restrictions can trigger inter-provincial and inter-regional disputes; there are already water disputes among all the provinces. Similarly, the water disputes with India can be more severe and lead to further border tension (Khan et al., 2016).

The scarcity of energy, food, and water and the frequency of natural disasters and internal and external administration can promote political instability and tension, leading to violence and conflict among people and the government if the current state of water scarcity and mismanagement remains intact. In that case, there is a strong possibility that the fuming protests and individual acts of violence may turn into mass conflict (Mustafa et al, 2013).

The above predictions have a strong logic behind them. The above-indicated concerns can be a potential source of severe threats to Pakistan's national security. So in the above lines, we have discussed some of the critical implications of climate change on the important sectors. The consequences of these sectors are making Pakistan one of the most vulnerable countries to climate change. The repercussions can create severe concerns for the country's water, food, energy and national security. Therefore solid and effective response is required to deal with the climate challenge.

1.4 Climate Change Legislation and Policies in Pakistan

Pakistan's vulnerability to climate change is so obvious that even a layman can describe some of the effects of climate change in his local terms. The vulnerability demands a well-organized response to combat the threats of climate change. Any country's legislation on climate change can be considered the first and most crucial step from two aspects. Firstly, it clears and shapes a country's position on the global forum and international commitments. Secondly, it enables the government to launch an active response to tackle the climatic challenge. In this sense, the legislative bodies have prime responsibilities in developing and enacting climate laws and overseeing the implementation of the rules to save their nations from the fatal outputs of climate change (Townshend & Matthews, 2013). In Pakistan, Climate Change legislation has been getting the attention of the government and legislature for the last few decades due to the country's commitment and participation in International climate change forums. Though the term climate change popularity is credited to the first half of the 21st century, climate-related legislation under the title environment started in 1983, when Pakistan's Environmental Protection Ordinance was enacted.

The Environmental Protection Ordinance 1983 ended without implementation in 1997; then-military ruler Zia ul-Haq promulgated it, but the ordinance mostly remained on paper and away from implementation as the government was more interested in other issues (Alam, 2018). In 1997 a new act with the title Pakistan Environmental Protection Act was legislated. The National Assembly passed it on September 3, 1997, and Senate on November 7, 1997. After receiving the assent of the president of Pakistan, it was enforced in the country. This act mainly makes provision for managing the affairs disturbing the environment. Secondly, it deals with environmental impact assessment and handling complex matters. It also discusses certain environmental crimes and prescribes penalties for them (ILO, 2010).

The main objective of the act was the security, preservation, rehabilitation and healthy development of the environment. Furthermore, the act aimed to control pollution and encourage sustainable multidimensional development. Under this act, three central bodies have also been established: the Environmental Protection Council of Pakistan, the Environmental Protection Agency of Pakistan and provincial Environmental Protection Agencies. The bodies had their administrative structures and functions. Similarly, several anti-environmental activities of the companies and individuals were declared punishable offenses (GOP, 2019).

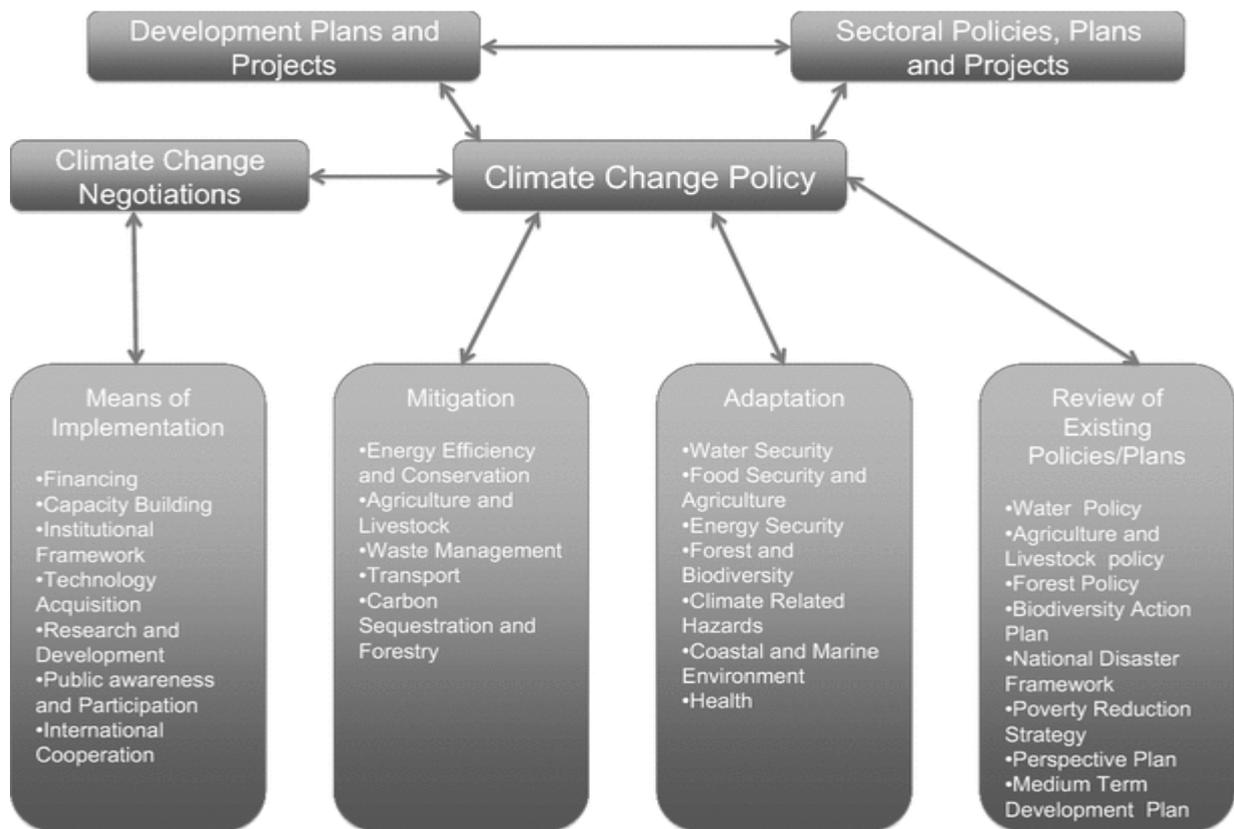


Figure 3 Climate Change Addressing Mechanism in Pakistan

Further progress on climate-related legislation came in 2005; due to the efforts of the Prime Ministers Committee on Climate Change, Pakistan National Environmental Policy 2005 was formulated. The said policy provided a comprehensive strategy that addresses the concerns of all the relevant sectors, such as water supply and management, agriculture, food, energy and biodiversity (Ministry of Water Resources, 2005). Due to the severe threat of climate change implications and the fulfillment of International commitments, the government of Pakistan formed a National task force on climate change in 2008. The main objective of this force was to formulate a dynamic climate change national policy; the task force presented several reports and worked for almost two years; the final report was submitted in 2010 (PCOP, 2010).

The footstone laid by TFCC in the shape of recommendations in their reports, especially the final report was written in 2010. Later, a panel for drafting and finalizing the policy document was formed. Dr. Qamar Uz Zaman Choudry led this team, and the members were Dr. Seeme Malik and Mr. Muhammad Sohail. Steering committee experts under the United Nations Development Programme also contributed to policy formation by providing technical and funding support (MOCC, 2012). Pakistan's National climate change policy was approved in principle by Pakistan's cabinet in March 2012; it was officially launched a year later, on February 26, 2013, in an official ceremony arranged by the UNDP and the federal Ministry of Climate Change (Khan R. S., 2013). The National climate change policy has the following significant objectives:

1. To promote the conservation of natural resources and long-term Sustainability
2. To enhance the awareness, skill and institutional capacity of relevant stakeholders

3. To foster the development of appropriate economic incentives to encourage public and private sector investment in adaptation measures
4. To pursue sustained economic growth by appropriately addressing the challenges of climate change
5. To integrate climate change policy with inter-related national policies
6. To focus on pro-poor, gender-sensitive adaptation while promoting mitigation to the extent possible cost-effectively
7. To ensure the country's water, food, and energy security to face challenges posed by climate change
8. To minimize the risks arising from the expected increase in frequency and intensity of extreme weather events such as floods, droughts and tropical storms
9. To strengthen inter-ministerial decision-making and coordination mechanisms on climate change
10. To facilitate effective use of opportunities, particularly financial, available nationally and internationally (MOCC, 2012).

For the successful implementation of the policy, a Framework for implementing the National Climate Change Policy was developed in 2013. Furthermore, the government has formed a National Climate Change Policy Implementation Committee to ensure the effective implementation of National Climate Change Policy & Action Plans and to oversee progress in this regard; tasks of the committee included regular monitoring and upgrading of the National Climate Change Policy after every five years. Federal Minister for Climate Change was designated as the committee chairperson (MOCC, 2012).



Figure 4: Dr Maleeha Lodhi is Submitting Paris Agreement Instrument of Ratification in UNO

As shown in the above image, Pakistan ratified the Paris Agreement on climate change on November 16, 2016; Pakistan's permanent representative to the United Nations Dr Maleeha Lodhi submitted a letter of ratification at an official gathering at UN Headquarters. This agreement required the countries who ratified it to comply with the recommendations

given in the contract. This agreement, alongside other recommendations, also encouraged the parties to have appropriate legislation to address the climate change challenge.

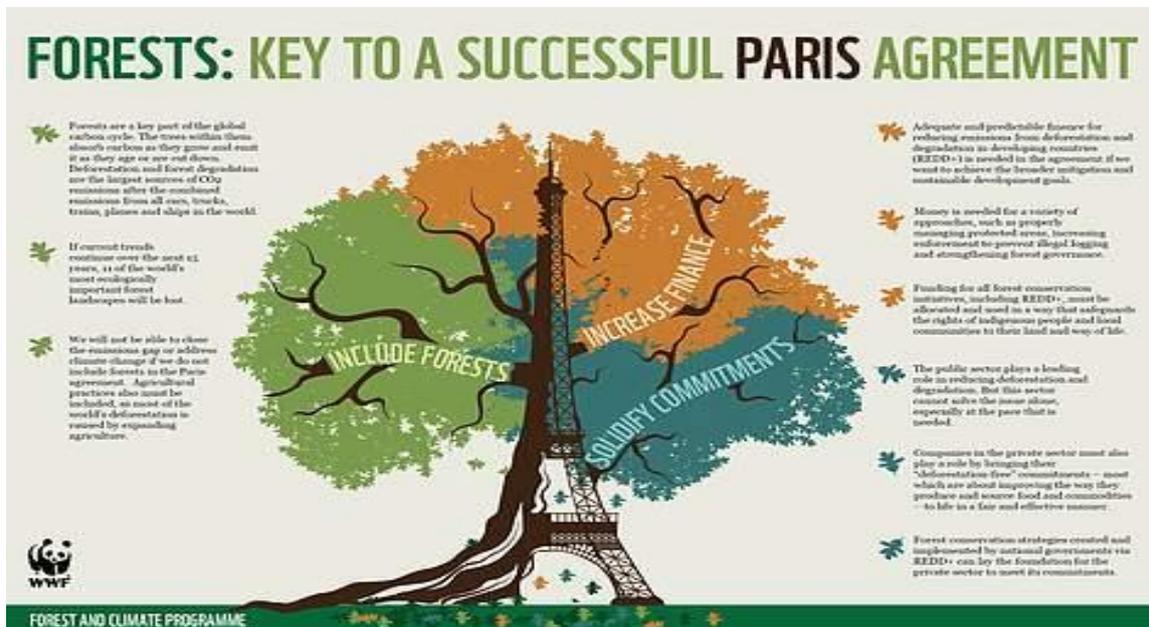


Figure 5: (WWF, 2015)

There is a close relationship between forests and climate change. Firstly trees are important because they are considered storage dams of carbon; they absorb carbon from the atmosphere and store it in wood and inside the soil. Without forests, the dangerous carbon would stick in the environment in the form of carbon dioxide, a critical GHG that triggers climate change. Secondly, plants and trees are also oxygen factories; they produce oxygen in tons which is highly important for cooling the environment. The lack of forests has direct implications for climate change; cleaning forest areas and not planting new trees as a replacement can further damage the environment (Soares et al, 2019). As the forests have a core relationship with climate change and several other benefits, the government of Pakistan developed several policies on forest preservation and plantation. These policies include the national forest policy 1955, 1962, 1975, 1980, 1991 and 2010, but there need to be more policies and their implementation. These policies always remained away from performance; due to this, Pakistan's forest cover area is decreasing abruptly instead of increasing. Hence, forest policies need to be implemented in true spirit to reduce the implications of climate change.

The government of Pakistan, to comply with International commitments and to have a legal instrument on climate change, legislated the Pakistan climate change act in 2017. This act accepted the gravity of the situation for Pakistan. The main feature of this act is the establishment of three legal bodies to carry out coordination, monitoring, reporting and resource allocation work related to Pakistan's climate response. These bodies include the climate change council, climate change authority and climate change fund (GOP, 2019). This act also empowered these bodies to establish reporting mechanisms in response to international commitments. But the critical question lies in the implementation of this act because if we analyze the implementation of other legal instruments, the scene is dark.

1.5 Barriers to Implementation of Climate Change Policies and Acts

Over the year, Pakistan has formulated several climate-related policies and acts; however, due to the non-execution of these policies and the poor implementation of climate-related actions still, we are lingering in the darkness. There are various reasons behind this state of affairs. There needs to be more political will and commitment to the determined implementation of these policies and proper implementation of acts. Poor institutional capacity is also a leading cause of Pakistan's non-execution of climate-related policies and actions. In climate change response, various institutions are involved at the federal and provincial levels, but the capacity and strength of these institutions could be better to cope with the situation. The institution's lack of capacity and strength was highlighted in an official document of NCCP, but the capacity-building measures remained confined to high-level luxury sessions.

Lack of technical expertise and politicization of existing expertise is another challenge that impedes the execution of climate-related policies and acts. Climate Change and its allied sectors are specialized and sophisticated, requiring academic proficiencies, experiences, and expertise in dealing with climate issues. Still, no room is given to climate change skills and expertise in academic disciplines. The available experts are not given chances; instead, on key climate-related posts and portfolios, people are appointed on political considerations. Climate Change is a multidimensional, multisectoral and multi-responsibility-sharing issue. That required well-coordinated efforts from all the sides involved in this issue. There are three main aspects of coordination on the climate issue, but coordination and joint ventures must be coordinated among different sectors and departments. Another barrier to implementing policies and other climate change initiatives is the wide gap in climate literacy among key actors and the common masses.

1.6 Conclusion

Climate change has severe implications for all the human survival sectors in Pakistan. The country's vulnerability lies in its dependence on climate-sensitive sectors like agriculture and other natural resources directly linked with climate change. Lack of political commitment and resources and poor human and physical capital also increase its vulnerability. Climate legislation and policy formation are considered primary steps to address the implications of climate change. The government of Pakistan has sensed the gravity of the situation and, over the year, has formed climate-related legal instruments and policies. Key climate-related legal instruments include Pakistan's Environmental Protection Ordinance of 1983, Pakistan Environmental Protection Act of 1997, Pakistan National Environmental Policy of 2005, National climate change policy, and Pakistan climate change act of 2017. These legal instruments are available, but Pakistan is still hunting in the dark. Several hindrances exist in the smooth and proper spirit implementation of these policies and acts. These hindrances include a lack of political will and commitment, a lack of institutional capacity and strength, a lack of technical expertise and politicization of existing expertise, and a lack of climate literacy and awareness among stock holders and common masses. To address the climate change concerns in the country, there is only one choice: implementing these instruments; otherwise, the situation can lead to severe implications.

References

- Alam, A. R. (2018). *Situational analysis national environmental laws and policies*,. Brussels: European Union. https://www.academia.edu/37461560/Situational_Analysis_of_National_Environmental_Laws_and_Policies_in_Pakistan
- Bernstein, S. (2002). International institutions and the framing of domestic policies: The Kyoto Protocol and Canada's response to climate change. *Policy Sciences*, 35(2), 203-236. <https://link.springer.com/article/10.1023/A:1016158505323>
- Chaudhry, Q. U. (2017). *Climate change profile of Pakistan*. Mandaluyong, Philippines: Asian Development Bank. <https://www.adb.org/publications/climate-change-profile-pakistan>
- German Watch (2019). *Global Climate Risk Index 2019*. Retrieved July 12, 2021, from Global Climate: <https://germanwatch.org>
- GOP. (2013). *Framework for implementation of climate change policy 2014-2030*. Islamabad: Climate Change Division Pakistan. <http://www.gcisc.org.pk/Framework%20for%20Implementation%20of%20CC%20Policy.pdf>
- GOP. (2019, September 14). *Pakistan Climate Change Act, 2017*. Retrieved July 21, 2021, from <http://www.na.gov.pk>
- Gornall, J., Betts, R., Burke, E., & Clark, R. (2010). Implications of climate change for agricultural productivity in the early twenty-first century. *Biological Sciences*, 2973-2989. <https://doi.org/10.1098/rstb.2010.0158>
- Government of Pakistan. (1997). *Pakistan Environmental Protection, Act No. XXXIV of 1997*. Retrieved July 13, 2021, from www.environment.gov.pk
- Höök, M. (2013). Depletion of fossil fuels and anthropogenic climate change – a review. *Energy Policy*, 52, 797-809. <https://doi.org/10.1016/j.enpol.2012.10.046>
- Hussain, Z., & Irfan, M. (2012). Sustainable land management to combat desertification in Pakistan. *Journal of Arid Land Studies*, 22(1), 127-129. http://nodaiweb.university.jp/desert/pdf/JALS-G05_127-129.pdf
- ILO. (2010). *Database of national labour, social security and related human rights legislation*. Retrieved July 19, 2021, from International Labour Organization: http://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=84577
- IPCC. (2001). *Climate change 2001: working group II: Impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/03/WGII_TAR_full_report-2.pdf
- IPCC. (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation*. Cambridge: Cambridge University Press. <https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/>
- ISFID. (2019). *Dengue: Pakistan situation update*. Retrieved July 12, 2021, from <https://www.promedmail.org/post/6754037>
- Jahan, F. (2011). Dengue fever (DF) in Pakistan. *Asia Pacific Family Medicine*, 10(1), 1-4. <https://apfmj.biomedcentral.com/articles/10.1186/1447-056X-10-1>

- Khan, M. A., Ali, J. I., & Ahmad, I. (2016). The challenge of climate change and policy response in Pakistan. *Environmental Earth Sciences*, 75(5). <https://doi.org/10.1007/s12665-015-5127-7>
- Khan, R. S. (2013, February 26). *National climate change policy to the rescue?* Retrieved July 12, 2021, from The Dawn: <https://www.dawn.com/news/788838/national-climate-change-policy-to-the-rescue>
- Kiran, A., & Qurat-ul-Ain. (2017). Climate change implications for Pakistan and way forward. *ISSRA Papers*, IX(II), 49-62. <https://www.prdb.pk/article/climate-change-implications-for-pakistan-and-way-forward-6796>
- LEAD. (2016). *Impacts of climate change on the energy sector of Pakistan*. Retrieved July 23, 2021, from www.lead.org.pk/downloads
- Lysne, S. (2018, February 22). *Whats a big deal about climate change!* Retrieved July 21, 2021, from <https://cwi.edu/blog/whats-big-deal-about-climate-change>
- Ministry of Water Resources. (2005). *National environmental policy 2005*. Retrieved July 13, 2021, from Ministry of Water Resources: <https://mowr.gov.pk/PolicyDetail/MWNIYmMyMmYtMTNhNC00ZTFkLTlmZGIhNTBkZDE5NjA0MWI3>
- MOCC. (2012). *National climate change policy document*. Retrieved July 18, 2021, from www.mocc.gov.pk/policies
- Mustafa, D., Akhter, M., & Nasrallah, N. (2012). *Understanding Pakistan's water-security nexus*. Washington, DC: United States Institute of Peace. <https://www.usip.org/publications/2013/05/understanding-pakistans-water-security-nexus>
- PCOP. (2007). *Commission Pakistan in the 21st Century: Vision 2030*. Islamabad: Government of Pakistan. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC149943/>
- PCOP. (2010). *Last report of task force on climate change*. Islamabad: Government of Pakistan. <http://www.gcisc.org.pk/TFCC%20Final%20Report.pdf>
- Rajeev, G., Gowda, M. V., Fox, J. C., & Magelky, R. D. (1997). Students' understanding of climate change: Insights for scientists and educators. *Bulletin of the American Meteorological Society*, 78(10), 2232-2240. <http://doi.org/10.1175/1520-0477-78.10.2232>
- Soares, J., Santos, C. S., & Carvalho, S. M. (2019). Preserving the nutritional quality of crop plants under a changing climate: Importance and strategies. *1*, 1-26. <https://link.springer.com/article/10.1007/s11104-019-04229-0>
- World Bank. (2006). *World Bank annual report on Pakistan*. Retrieved July 21, 2022, from <https://elibrary.worldbank.org/doi/abs/10.1596/978-0-8213-6759-9>