Journal of Historical Studies
Vol. X. No. I (Jan-Jun 2024) PP 119-141

The Role of Governments in Mitigating Climatic Challenges in Pakistan

Farooq Arshad
Assistant Professor
Department of International Relations
Bahauddin Zakariya University, Multan
frqarshad@gmail.com (Corresponding Author)

Mudasser Mehdi Khan
Lecturer
Department of International Relations
The Islamia University of Bahawalpur, Bahawalpur

Javaid-ur-Rahman
PhD scholar
Centre for Media and Communication Studies,
University of Gujrat

Abstract

Climate change is a global challenge that poses significant threats to ecosystems, economies, and societies worldwide. Pakistan, as a developing country highly vulnerable to the impacts of climate change, has recognized the urgency to mitigate its effects and take action to reduce greenhouse gas emissions (Fahad & Wang, 2019). This research paper examines the initiatives and strategies implemented by the Government of Pakistan to address climate change and achieve sustainable development goals. The study highlights the key policies, programs, and measures undertaken by the government to mitigate climate change, enhance resilience, and promote low-carbon development in the country.

The research paper aims to provide a comprehensive analysis of the climate change mitigation efforts undertaken by the Government of Pakistan. It examines the policies, strategies, and initiatives implemented in key sectors such as energy, agriculture, forestry, and waste management. The paper also assesses the institutional arrangements, stakeholder engagement, and challenges faced in the process of climate

change mitigation. Additionally, it highlights the importance of monitoring, evaluation, and reporting mechanisms to track progress and make informed policy decisions. The findings of this research can contribute to the knowledge base on climate change mitigation in developing countries and serve as a reference for policymakers, researchers, and practitioners in similar contexts.

Introduction and background

Pakistan, like many other regions in the world, has a history of climate change that has had significant impacts on its environment, economy, and population (Mustafa, 2011). Here is a brief overview of the history of climate change in Pakistan.

1. Pre-Industrial Era: Prior to the industrial revolution, Pakistan experienced natural climate variations due to factors such as solar radiation, volcanic activity, and natural atmospheric oscillations (Rasul, Afzal, Zahid, & Bukhari, 2012). These variations resulted in fluctuations in temperature and rainfall patterns, which affected agriculture and ecosystems in the region.
2. Industrialization and Greenhouse Gas Emissions: With the advent of industrialization and increased human activities, greenhouse gas emissions began to rise, contributing to global warming and climate change. Pakistan, as a developing country, has contributed relatively less to global greenhouse gas emissions compared to industrialized nations (Keerio, et al., 2020). However, it is still vulnerable to the impacts of climate change due to its geographical location and socio-economic factors.
3. Glacial Retreat: Pakistan is home to some of the world's largest glaciers, particularly in the Karakoram, Hindu Kush, and Himalayan mountain ranges. Over the past century, these glaciers have been experiencing significant retreat due to rising temperatures (Ren & Bhakta, 2017). This has led to the formation of glacial lakes and an increased risk of glacial lake outburst floods (GLOFs), which pose a threat to downstream communities.
4. Changing Rainfall Patterns: Climate change has affected rainfall patterns in Pakistan, leading to increased variability

and changes in the timing and distribution of precipitation. Some regions have experienced more frequent and intense rainfall events, leading to flooding and related disasters. On the other hand, other areas have faced prolonged periods of drought, affecting agriculture, water availability, and livelihoods.

5. Heatwaves and Extreme Weather Events: Pakistan has witnessed an increase in the frequency and intensity of heatwaves, particularly in urban areas. Heatwaves have claimed numerous lives and put additional stress on infrastructure and public health systems. Additionally, extreme weather events such as cyclones, tropical storms, and heavy rainfall have become more common, causing widespread damage and loss of life (Sivakumar & Stefanski, 2010).
6. Water Scarcity: Climate change has exacerbated water scarcity issues in Pakistan. Changes in precipitation patterns, coupled with glacial retreat, have affected the availability of freshwater resources. The country heavily relies on water from the Indus River system, which is susceptible to changes in glacial melt and precipitation (Ali, Hasson, & Khan, 2009). This has implications for agriculture, energy production, and overall water security.
7. Biodiversity Loss and Ecosystem Degradation: Climate change has impacted Pakistan's biodiversity and ecosystems. Shifts in temperature and rainfall patterns have disrupted habitats, altered migration patterns of wildlife, and increased the risk of species extinction. Ecosystem degradation, including deforestation and habitat destruction, further exacerbates the vulnerability of species and ecosystems to climate change impacts.

Recognizing the challenges posed by climate change, the Pakistani government has taken steps to address these issues. It has implemented policies and initiatives to promote climate resilience, increase renewable energy generation, conserve forests, and improve disaster preparedness. International cooperation and collaboration with global climate initiatives have also been crucial in Pakistan's efforts to mitigate and adapt to climate change.

Major nontraditional security framework

Environmental security theory is a conceptual framework that explores the relationship between environmental factors and security issues. It suggests that environmental degradation and resource scarcity can pose significant threats to human security, national security, and global stability. The Theory recognizes that environmental issues such as climate change, deforestation, water scarcity, and pollution can have wide-ranging impacts on societies, economies, and political systems. These environmental challenges can lead to conflicts over access to resources, migration and displacement of populations, and social unrest. Key principles of Environmental Security Theory:

1. Resource Scarcity and Conflict: Environmental degradation and resource scarcity can trigger conflicts between communities, nations, and regions. Competition over limited resources, such as water, land, or energy, can exacerbate existing tensions and contribute to violent conflicts.
2. Climate Change as a Security Threat: Climate change is considered a major security threat due to its potential to disrupt ecosystems, agricultural productivity, and access to essential resources. Rising sea levels, extreme weather events, and changing rainfall patterns can lead to displacement, food shortages, and conflicts over habitable land.
3. Environmental Refugees and Migration: Environmental factors can drive population displacement and migration. When people are forced to leave their homes due to environmental disasters, resource scarcity, or deteriorating living conditions, it can create social, economic, and political challenges in both the host and origin regions.
4. Human Security Perspective: Environmental security theory emphasizes the importance of human security, which encompasses the well-being and protection of individuals and communities. It recognizes that environmental issues can directly impact people's health, livelihoods, and overall quality of life.

5. International Cooperation: Addressing environmental security challenges requires international cooperation and collaboration. Recognizing that environmental problems transcend national boundaries, the theory emphasizes the need for multilateral approaches, diplomatic negotiations, and global governance mechanisms to manage environmental risks effectively.

Environmental security theory has been influential in shaping policies and strategies related to environmental management, climate change adaptation, and conflict prevention. It highlights the interconnectedness between environmental sustainability and security, urging governments, organizations, and individuals to consider the long-term consequences of environmental degradation on human well-being and stability.

Human Security Theory

Human security theory and climate change are closely interconnected. Human security refers to the protection of individuals and communities from various threats that can undermine their well-being and survival. These threats can include armed conflicts, political instability, economic inequality, and environmental hazards, among others. Human Climate change is a significant global challenge that poses a direct threat to human security. Climate change impact various dimension of human security, including:

1. Environmental Security: Climate change leads to increased frequency and intensity of natural disasters such as hurricanes, floods, and droughts. These events can cause displacement, loss of homes, destruction of infrastructure, and loss of livelihoods, affecting people's physical safety and well-being.
2. Food Security: Climate change affects agricultural productivity, leading to reduced crop yields, altered growing seasons, and increased pest infestations. These changes can undermine food production and availability, potentially leading to food shortages, malnutrition, and food-related conflicts.
3. Water Security: Climate change alters precipitation patterns, resulting in water scarcity in some regions and

increased flooding in others. These changes can disrupt access to clean water for drinking, sanitation, and agricultural purposes, contributing to health problems and conflicts over water resources.

4. Health Security: Climate change influences the spread of diseases, as rising temperatures and changing rainfall patterns affect the habitats of disease vectors such as mosquitoes. This can lead to increased transmission of vector-borne diseases like malaria, dengue fever, and Zika virus, posing risks to public health and well-being.
5. Economic Security: Climate change can impact economies through the loss of agricultural productivity, damage to infrastructure, and disruptions in supply chains. These factors can lead to economic instability, job losses, and increased poverty, exacerbating existing inequalities and potentially fueling social unrest.

Addressing the challenges of climate change requires adopting a human security approach that recognizes the interconnectedness of environmental, social, and economic dimensions of security. This approach emphasizes the need to protect vulnerable communities, build resilience, and ensure equitable access to resources and opportunities. It also highlights the importance of global cooperation and multilateral efforts to mitigate climate change and adapt to its impacts.

In summary, human security theory provides a framework for understanding and addressing the multiple threats posed by climate change to individuals, communities, and societies. By integrating climate change considerations into human security approaches, policymakers and practitioners can work towards building sustainable and resilient societies that protect the well-being and survival of all people.

Resilience Security Theory

Resilience theory: when applied to climate change, refers to the capacity of social, ecological, and economic systems to withstand disturbances caused by climate change and to recover or adapt to changing conditions. It focuses on building resilience within these systems to reduce vulnerability and

enhance their ability to cope with the impacts of climate change.

Key Concepts of Resilience Theory

1. Adaptive Capacity: Adaptive capacity refers to the ability of a system to adjust its structures and processes in response to changing conditions. In the context of climate change, adaptive capacity involves the ability of societies and ecosystems to adapt to new climatic realities.
2. Thresholds and Tipping Points: Resilience theory recognizes that systems can have critical thresholds or tipping points beyond which they may undergo rapid and irreversible changes. These changes can lead to significant disruptions and losses of ecosystem services or societal functions.
3. Panarchy: Panarchy is a concept within resilience theory that describes the nested levels of social and ecological systems. It recognizes that smaller-scale systems operate within larger-scale systems, and their dynamics are interconnected. Understanding these interactions is crucial for managing resilience and adapting to climate change.
4. Social-Ecological System: Resilience theory emphasizes the integrated nature of social and ecological systems. It recognizes that human societies and ecosystems are interdependent, and changes in one can have cascading effects on the other. Therefore, resilience strategies should consider both social and ecological dimensions.

Applying Resilience Theory to Climate Change:

Resilience theory suggests that managing and adapting to climate change requires a focus on building the resilience of social-ecological system. This includes:

1. Diverse and Flexible System: Promoting diversity in social, ecological, and economic systems can enhance their resilience. This involves supporting diverse livelihoods, ecosystem types, and adaptive strategies,

which can increase system stability and response options.

2. Learning and innovation: Emphasizing learning and innovation is crucial for building resilience. This includes promoting knowledge exchange, fostering collaboration between different actors, and integrating traditional knowledge and scientific expertise to support adaptive decision-making.
3. Adaptive Governance: Resilience theory highlights the importance of adaptive governance structures that can respond to changing conditions. This involves creating mechanisms for stakeholder participation, promoting adaptive policies and regulations, and enhancing the capacity for monitoring, evaluation, and learning.
4. Reducing Vulnerability: Resilience theory recognizes the importance of addressing underlying vulnerabilities that can exacerbate the impacts of climate change. This includes reducing social inequalities, improving access to resources and services, and enhancing preparedness for extreme events.

Overall, resilience theory provides a framework for understanding and managing the complex challenges posed by climate change. By focusing on building resilience within social-ecological systems, it offers insights into strategies that can help societies and ecosystems adapt to the changing climate and reduce vulnerability to its impacts.

History of climate change policies

Pakistan has formulated several national and international policies to address climate change. Here is an overview of the country's history of climate change policies:

National Policies and Initiatives

1. National Climate Change Policy (2012): This policy gives a comprehensive framework for addressing climate change challenges in Pakistan (Mumtaz, 2018). It focuses on adaptation, mitigation, capacity building, and research and development. The policy aims to promote sustainable

development, enhance resilience, and mainstream climate change considerations into various sectors.

2. Pakistan Vision 2025: This comprehensive development framework includes climate change as one of the priority areas. It emphasizes sustainable development, energy efficiency, and conservation, and highlights the importance of renewable energy and climate change adaptation.
3. Pakistan Climate Change Act (2017): This Act provides a legal basis for addressing climate change and implementing the National Climate Change Policy (Ahmed, et al., 2020). It establishes the Climate Change Council and the Climate Change Authority to oversee policy implementation, coordination, and monitoring.
4. National Disaster Management Plan (2013-2022): This plan focuses on disaster risk reduction and management, including measures to address climate change-related risks. It aims to enhance resilience, improve early warning systems, and strengthen disaster response and recovery mechanisms.
5. Ten Billion Tree Tsunami Program: Launched in 2018, this program aims to plant ten billion trees across the country to increase forest cover, combat deforestation, and mitigate the impacts of climate change. It also promotes biodiversity conservation and ecosystem restoration.

International Policies and Commitments

1. UNFCCC (United Nations Framework Convention on Climate Change): It is an international treaty aimed at addressing climate change and Pakistan is also its signatory. As a party to the convention, Pakistan participates in annual climate change conferences (Conference of the Parties or COP) and submits national communications on climate change actions and progress.
2. Paris Agreement: Pakistan ratified the Paris Agreement in 2016, which is a global effort to combat climate change (Ari & Sari, 2017). Under this agreement, Pakistan committed to mobilize climate finance, enhance climate change adaptation and reducing its emission of greenhouse gas.

3. Green Climate Fund (GCF): Pakistan is eligible to access funds from the GCF, which supports developing countries in their climate change adaptation and mitigation efforts. The country has received financial support from the GCF for various climate-related projects (Antimiani, Costantini, Markandya, Paglialunga, & Sforna, 2017).
4. Climate Change Performance Index (CCPI): Pakistan's climate change policies and performance are evaluated annually in the CCPI, which assesses countries' efforts in tackling climate change. The index considers emissions levels, renewable energy deployment, energy efficiency, and climate policy.
5. South Asian Association for Regional Cooperation (SAARC): Pakistan actively participates in regional cooperation initiatives through SAARC to address climate change challenges (Majaw, 2012). SAARC promotes knowledge sharing, capacity building, and collaborative action among member countries.

It's important to note that climate change policies are continuously evolving, and the government of Pakistan is committed to taking further actions to address climate change risks and promote sustainable development.

We can evaluate how different governments in past tackled the issue of climate change in Pakistan

PPP and climate change policies

PPP (Pakistan Peoples Party) being one of the largest political party of Pakistan has played a role in addressing climate change in the country. Here are some key points regarding the PPP's stance and initiatives on climate change.

1. Policy Advocacy: The PPP has emphasized the importance of climate change and has advocated for policies to address its impacts. The party recognizes climate change as a significant threat to Pakistan's environment, economy, and social well-being. It has called for the development and implementation of comprehensive climate change policies and strategies.

2. Climate Change Act: The PPP-led government supported the Pakistan Climate Change Act in 2017. The act provides a legal framework for addressing climate change and implementing climate policies in the country. It establishes the Climate Change Council and the Climate Change Authority to oversee policy implementation and coordination.
3. Paris Agreement Ratification: The PPP-led government, during its tenure, supported the Paris Agreement on climate change in 2016. By ratifying the agreement, Pakistan committed to reducing greenhouse gas emissions, enhancing climate change adaptation, and mobilizing climate finance.
4. Renewable Energy Promotion: The PPP has expressed support for renewable energy sources and the promotion of clean energy technologies (Jamal, 2018). The party recognizes the importance of transitioning to renewable energy to mitigate greenhouse gas emissions and reduce dependence on fossil fuels. In the past, the PPP-led governments have initiated renewable energy projects, such as wind and solar energy installations, to promote sustainable energy practices.
5. Afforestation and Conservation: The PPP has emphasized the importance of afforestation and conservation efforts to combat climate change. The party recognizes the role of forests in mitigating climate change by absorbing carbon dioxide and preserving biodiversity. PPP-led governments have launched initiatives, such as the Ten Billion Tree Tsunami Program, to increase forest cover and combat deforestation.
6. Climate Resilience and Adaptation: The PPP has highlighted the need to enhance climate resilience and promote adaptation measures to address the impacts of climate change. The party has emphasized the importance of building resilient infrastructure, improving disaster management systems, and enhancing capacity in vulnerable communities to cope with climate-related risks.

PML and climate change policies

PML-N (Pakistan Muslim League-Nawaz), one of Pakistan's major political party, has also addressed climate change and taken initiatives to tackle its impacts (Senz & Reinhardt, 2010). Here are some key points regarding the PML-N's stance and actions on climate change:

1. Policy Focus: The PML-N has acknowledged climate change as a significant issue and has recognized the need for policies to address its challenges. The party has emphasized the importance of developing comprehensive strategies and policies to mitigate greenhouse gas emissions, promote renewable energy, and enhance climate change adaptation.
2. Renewable Energy Projects: The PML-N-led governments have initiated several renewable energy projects in Pakistan. Notable initiatives include the establishment of large-scale solar and wind power projects, aiming to increase the share of renewable energy in the country's energy mix. These projects contribute to reducing greenhouse gas emissions and promoting sustainable energy practices.
3. Energy Efficiency Measures: The PML-N has emphasized the importance of energy efficiency as a means to mitigate climate change and reduce the country's carbon footprint. The party has focused on improving energy efficiency standards, promoting energy conservation practices, and implementing energy-efficient infrastructure projects.
4. International Commitments: During its tenure, the PML-N-led government ratified the Paris Agreement on climate change in 2016. By doing so, Pakistan committed to reducing greenhouse gas emissions, enhancing climate change adaptation, and accessing international climate finance. The PML-N has emphasized the importance of fulfilling international climate commitments and participating actively in global climate change forums.
5. Afforestation and Conservation: The PML-N has recognized the significance of afforestation and conservation efforts in combating climate change. The party has supported initiatives to increase forest cover, combat

deforestation, and preserve biodiversity. It has emphasized the importance of sustainable forest management practices and the role of forests in sequestering carbon dioxide.

6. Disaster Management and Resilience: The PML-N has highlighted the importance of disaster management and resilience-building measures to address climate change-related risks. The party has called for the improvement of early warning systems, infrastructure resilience, and community preparedness to cope with extreme weather events and natural disasters.

PTI and climate change policies

PTI (Pakistan Tehreek e Insaf) being one of the main stream political party of Pakistan, has emphasized the importance of addressing climate change and has taken various initiatives to tackle its impacts (Syed, Awan, Mushtaq, & Kiran, 2022). Here are some key points regarding the PTI's stance and actions on climate change:

1. Climate Change as a Priority: The PTI has recognized climate change as a critical issue facing Pakistan and has prioritized it on its political agenda. The party acknowledges the need for concerted efforts to mitigate greenhouse gas emissions, promote renewable energy, and enhance climate change adaptation.
2. Clean and Green Pakistan: The PTI's flagship initiative, "Clean and Green Pakistan," aims to tackle environmental challenges, including climate change. The campaign focuses on tree plantation drives, solid waste management, and cleanliness programs, with the goal of creating a cleaner and more sustainable environment.
3. Renewable Energy Promotion: The PTI has emphasized the importance of renewable energy as a means to mitigate climate change and promote sustainable development. The party has supported the expansion of renewable energy sources, including solar and wind power, and has encouraged investments in clean energy projects.
4. Forest Restoration and Conservation: The PTI has highlighted the significance of forests in combating climate change and preserving biodiversity. The party has initiated

tree plantation campaigns, such as the Billion Tree Tsunami and the Ten Billion Tree Tsunami Program, to increase forest cover, combat deforestation, and sequester carbon dioxide.

5. Climate Resilience and Adaptation: The PTI recognizes the importance of building climate resilience and adapting to the impacts of climate change. The party has called for the development and implementation of measures to enhance disaster management, strengthen early warning systems, and promote sustainable practices in vulnerable sectors.
6. International Commitments: The PTI-led government supported the Paris Agreement on climate change in 2016, demonstrating its commitment to global climate action. Pakistan's engagement in international forums and cooperation on climate change have been emphasized by the PTI to access climate finance, share knowledge, and collaborate with other countries.

Pakistan's Future challenges and implications of climate change

In Pakistani context, future challenges and implications of climate change policies can have significant impacts on various aspects of the country. Here are some key areas to consider:

1. Water Scarcity: Pakistan heavily relies on the Indus River system for its water supply. Climate change can disrupt this system, leading to increased water scarcity. Rising temperatures, changing precipitation patterns, and glacial melting can result in reduced water availability for agriculture, industry, and domestic use. This could lead to conflicts over water resources, food insecurity, and displacement of populations (Farooqi, Khan, & Mir, 2005).
2. Agriculture and Food Security: Pakistan's economy heavily depends on agriculture, and climate change poses a significant threat to the sector. Changes in rainfall patterns, increased frequency of extreme weather events (such as droughts and floods), and rising temperatures can impact crop yields and livestock productivity. This could lead to food shortages, loss of livelihoods, and increased poverty (Chandio, et al., 2022).

3. Events of extreme weather: the intensity and frequency of extreme weather events in Pakistan is expected to change through climate change, including heatwaves, cyclones, and heavy rainfall (Hussain, et al., 2019). These events can result in loss of lives, infrastructure damage, and disruptions to essential services such as transportation, electricity, and healthcare.
4. Health Impacts: Climate change can have adverse health effects in Pakistan. Increased temperatures can contribute to heat-related illnesses, while changes in rainfall patterns can lead to the spread of waterborne diseases. Additionally, natural disasters can result in injuries, the spread of infectious diseases, and mental health challenges for affected populations.
5. Energy Sector: Pakistan has been heavily reliant on fossil fuels for its energy production, contributing to greenhouse gas emissions. Implementing climate change policies will require a shift towards renewable energy sources such as solar, wind, and hydropower. This transition may involve challenges in terms of infrastructure development, financing, and ensuring a reliable energy supply during the transition period.

Role of government in mitigating climatic challenges
Suggestions and recommendation

The role of governments in mitigating climatic challenges in Pakistan is crucial as climate change poses significant threats to the country's environment, economy, and overall well-being of its citizens. Here are some key areas where the government plays a vital role.

1. Policy Development and Implementation: Governments are responsible for formulating and implementing policies and regulations to address climate change. This includes setting emissions reduction targets, promoting renewable energy sources, implementing energy efficiency measures, and encouraging sustainable practices across sectors (Lo, 2014). Governments can create favorable policy environments that incentivize low-carbon technologies and practices, as well as enforce regulations to reduce greenhouse gas emissions.

2. International Cooperation and Agreements: Governments participate in international climate change agreements and negotiations to collaborate with other nations in addressing the global challenge. They can contribute to international climate funds and engage in technology transfer initiatives to support developing countries in their climate change mitigation efforts. Governments also work with international organizations to share knowledge, best practices, and scientific research related to climate change.
3. Investment and Financing: Governments can allocate funding and create financial mechanisms to support climate change mitigation initiatives. This includes funding research and development of clean technologies, providing subsidies or incentives for renewable energy projects, and establishing green investment funds. Governments can also leverage public-private partnerships to attract investment in low-carbon infrastructure and innovation.
4. Infrastructure and Urban Planning: Governments play a critical role in infrastructure and urban planning, which can have a significant impact on climate change mitigation. They can promote sustainable urban development practices, such as green building codes, efficient public transportation systems, and waste management strategies. Governments can also invest in climate-resilient infrastructure, including flood management systems, coastal protection, and renewable energy infrastructure.
5. Education and Awareness: Governments can raise public awareness about climate change and its impacts. They can develop educational campaigns, integrate climate change education into school curricula, and promote sustainable behavior change among citizens (Drummond, Hall, Sauer, & Palmer, 2018). Governments can also support research and knowledge dissemination on climate change mitigation strategies, fostering innovation and informed decision-making. Public Awareness and Education: Governments have a crucial role in raising public awareness about climate change and its impacts. They can promote educational campaigns, provide information on sustainable practices, and encourage behavioral changes that reduce carbon emissions. The government of Pakistan has been

focusing on awareness campaigns to educate the public about climate change and the importance of sustainable practices.

6. Monitoring and Reporting: Governments are responsible for monitoring and reporting on greenhouse gas emissions, climate change impacts, and progress towards mitigation targets. They can establish national systems for data collection, verification, and reporting to track emissions and evaluate the effectiveness of climate change policies and initiatives. Transparent reporting enables accountability and informs policy adjustments as needed.
7. Climate Change Adaptation: Governments need to prioritize climate change adaptation strategies to help communities and ecosystems cope with the impacts of climate change. This includes measures such as building resilient infrastructure, promoting sustainable agriculture practices, and implementing early warning systems for natural disasters. The government of Pakistan has been working on various adaptation initiatives, including the National Disaster Management Plan, to reduce vulnerability to climate-related risks.
8. Forest Conservation and Reforestation: Forests absorb carbon dioxide from the atmosphere and play a vital role in mitigating climate change. Governments can implement policies and programs to protect existing forests, promote reforestation efforts, and encourage sustainable forest management practices. In Pakistan, the government has launched initiatives like the Ten Billion Tree Tsunami Program to increase forest cover and combat deforestation.

It's important to note that addressing climate change requires collective efforts from governments, businesses, civil society organizations, and individuals. Governments need to collaborate with various stakeholders, including the private sector and local communities, to develop and implement effective climate change mitigation strategies.

Conclusion

Climate Change is a significant global challenge that requires immediate and effective policy responses. Pakistan, as a

developing country highly vulnerable to the impacts of climate change, needs comprehensive and well-crafted policies to mitigate and adapt to its effects. In conclusion, the following key points summarize the necessary climate change policies for Pakistan:

1. Mitigation Strategies:

    a) Transition to Renewable Energy: Pakistan should prioritize the development and deployment of renewable energy sources such as solar, wind, and hydroelectric power. This will reduce dependence on fossil fuels, decrease greenhouse gas emissions, and improve energy security.

    b) Energy Efficiency Measures: Implementing energy efficiency programs and encouraging the use of energy-efficient technologies in industries, transportation, and residential sectors can significantly reduce carbon emissions and energy consumption.

    c) Afforestation and Reforestation: Investing in large-scale afforestation and reforestation projects will enhance carbon sinks, conserve biodiversity, prevent soil erosion, and improve water retention, contributing to climate change mitigation.

    d) Sustainable Agriculture Practices: Promote sustainable agricultural techniques such as precision farming, organic farming, and agroforestry to reduce greenhouse gas emissions, conserve soil health, and improve resilience to climate change impacts.

    e) Industrial Sector Reforms: Encourage industries to adopt cleaner production methods, improve waste management practices, and enforce stricter environmental regulations to reduce

emissions and promote sustainable industrial growth.

2. Adaptation Measures:

    a) Climate-Resilient Infrastructure: Develop climate-resilient infrastructure, including roads, bridges, buildings, and water management systems, to withstand extreme weather events and ensure the uninterrupted provision of essential services.

    b) Water Resource Management: Implement effective water resource management strategies, including rainwater harvesting, efficient irrigation techniques, and improved water storage infrastructure, to cope with changing precipitation patterns and reduce water scarcity risks.

    c) Disaster Preparedness and Early Warning Systems: Strengthen disaster management institutions, improve early warning systems, and enhance community resilience to reduce the impacts of climate-related disasters such as floods, droughts, and heatwaves.

    d) Health and Education: Integrate climate change considerations into public health and education sectors, including awareness campaigns, training programs, and health infrastructure improvements, to address climate-related health risks and promote climate literacy.

    e) Research and Development: Encourage research and development activities to enhance understanding of climate change impacts specific to Pakistan, develop innovative technologies, and support evidence-based decision-making.

3. International Cooperation and Funding:

a) Collaboration with International Organizations: Engage with international organizations, such as the United Nations Framework Convention on Climate Change (UNFCCC) and Green Climate Fund (GCF), to access funding, technical expertise, and knowledge sharing opportunities for climate change initiatives.

b) Climate Diplomacy: Strengthen diplomatic efforts to advocate for global climate action, forge partnerships, and participate actively in international climate negotiations to ensure the interests and concerns of Pakistan are adequately represented.

c) Climate Finance: Mobilize domestic and international climate finance to support climate change mitigation and adaptation projects, particularly targeting vulnerable communities, and ensure transparent and effective utilization of funds.

In conclusion, Pakistan needs a comprehensive approach to address climate change, combining mitigation strategies to reduce greenhouse gas emissions with adaptation measures to build resilience. Effective implementation of these policies, supported by international cooperation and adequate funding, will enable Pakistan to mitigate the adverse impacts of climate change, protect vulnerable communities, and contribute to global efforts in combating this global challenge.

References

4. Ahmed, W., Tan, Q., Shaikh, G. M., Waqas, H., Kanasro, N. A., Ali, S., & Solangi, Y. A. (2020). Assessing and Prioritizing the Climate Chane Policy Objectives for Sustainable Development in Pakistan. *Symmetry, 12*(08), 1203-1-33. doi:10.3390/sym12081203

5. Ali, G., Hasson, S. u., & Khan, A. M. (2009). *Climate Change: Implication and Adaptation of Water Resources in Pakistan.* Islamabad: Global Change Impact Studies Center Islamabad. Retrieved from https://www.researchgate.net/publication/274026294_Climate_Change_Implications_and_Adaptation_of_Water_Resources_in_Pakistan

6. Antimiani, A., Costantini, V., Markandya, A., Paglialunga, E., & Sforna, G. (2017). The Green Climate Fund as an effective conpensatory mechanism in global climate negotiations. *Environmental Science & Policy, 77*(C), 49-68.

7. Ari, I., & Sari, R. (2017). Differentiation of Developed and Developing Countries for the Paris Agreement. *Energy Strategy Reviews, 18*, 175-182. doi:https://doi.org/10.1016/j.esr.2017.09.016.

8. Chandio, A. A., Jiang, Y., Amin, A., Ahmad, M., Akram, W., & Ahmad, F. (2022). Climate Change and Food secuirty of South Asia: fresh evidence from a policy perspective using novel empirical analysis. *Journal of Environmental Planning and Management*, 169-190.

9. Drummond, A., Hall, L. C., Sauer, J. D., & Palmer, M. A. (2018). Is Public Awareness and Perceived Threat of Climate Change Associated with Governmental Mitigation Targets? *Climatic Change, 149*(2), 159-171. doi:https://doi.org/10.1007/s10584-018-2230-2

10. Fahad, S., & Wang, J. (2019). Climate Change, vulnerability, and its impacts in rural Pakistan: a review.

Environmental Science and Pollution Research, 27, 1334-1338.

11. Farooqi, A. B., Khan, A. H., & Mir, H. (2005). Climate Chnage perspective in Pakistan. *Pakistan Journal of Meteorology, 2*(3), 11-21.
12. Hussain, M., Butt, A. R., Uzma, F., Ahmed, R., Irshad, S., Rehman, A., & Yousaf, B. (2019). A Comprehensive Review of Climate Change Impacts, Adaptation, and Mitigation on Environmental and Natural Calamities in Pakistan," 192, no. 1 (December 16, 2019): 48, https://doi.org/10.100. *Environmental Monitoring and Assessment, 192*(1), 48. doi:10.1007/s10661-019-7956-4.
13. Jamal, S. (2018). Examining the Pakistan Climate Change Act 2017 in the Context of the Contemporary International Legal Regime. *LUMS LJ*, 10-116.
14. Keerio, H. A., Panhwar, S., Shah, S. A., Naji, A. M., Ali, A., & Aftab, A. (2020). Investigation of Climate Change Variability Under Climate Change Conditions Over the Semi-Arid Region. *Journal of echanics of Continua and Mathematical Sciences, 15*(12), 46-54.
15. Lo, K. (2014). A Critical Review of China's Rapidly Developing Renewable Energy and Energy Efficiency Policies. *Renewable and Sustainable Energy Reviews, 29*, 508-16.
16. Majaw, B. (2012). Climate Change and South Asian Association for Regional Cooperation: A Regional Response. *International Journal of Social Sciences and Humanity Studies, 4*(2), 71-80.
17. Mumtaz, M. (2018). The National Climate Change Policy of Pakistan: An Evaluation of Its Impact on Institutional Change," Earth Systems and Environment. *Earth System and Environment, 2*(3), 525-535.
18. Mustafa, Z. (2011). *CLIMATE CHANGE AND ITS IMPACT WITH SPECIAL FOCUS IN PAKISTAN," vol. 33, 2011, 290.* Symposium on "Changing

Environmental Pattern and its impact with Special Focus on Pakistan".

19. Rasul, G., Afzal, M., Zahid, M., & Bukhari, S. A. (2012). *Climate Change in Pakistan Focused on Sindh Province.* Islamabad: Pakistan Meteorological Department.
20. Ren, G.-Y., & Bhakta, S. A. (2017). Climate Chnage in teh Hindu Kush Himalaya. *Advances in Climate Change Research*, 1-4.
21. Senz, A., & Reinhardt, D. (2010). Green Governance - One Solution for two problems? Climate change and economic shocks: risk perceptions and coping straegies in China, India and Bangladesh. *Working Papers on East Asian Studies, 86*, 1-88.
22. Sivakumar, M. V., & Stefanski, R. (2010). Climate Change in South Asia. *Climate Change and Food Security in South Asia*, 13-30.
23. Syed, F. Z., Awan, M. W., Mushtaq, A. Q., & Kiran, I. (2022). Fighting Climate Change: A Critical Analysis of Clean Green Pakistan Initiaive of Pakistan Tehreek-e-Insaf (PTI). *Journal of the Research Society of Pakistan-JRSP, 59*(1), 230-240.