Original Article (JSPGA) Publishing Date: 30th December 2021

Journal of Strategic Policy and Global Affairs
Vol: 02, Issue: 01(2021) DOI: https://doi.org/10.58669/jspga.v02.i01.05

Climate Change Sustainable Development Goals: A Case Study of Pakistan

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Abstract: Development that satisfies current demands without reducing the ability of future descendants to satisfy their own needs is referred to as sustainable development. Pakistan is among the nation's most susceptible to climate change. Geographical, societal, and climatic diversity are the fundamental causes of this susceptibility. Developing climate change vulnerability and adaptability has become essential for Pakistan. However, eco-friendly technologies are becoming a top priority in frameworks for creating and implementing sustainable development policies. To connect Pakistan's adaptability requirements and possibilities with the targets and goals of its sustainable development, the crucial first step is to determine and evaluate Pakistan's climate change adaptation issues. The emphasis has been on merging the objectives with the current development model to move it on to a more sustainable road and the total aspects of industrial, societal, and ecological.

Keywords: Climate Change, Sustainable Development, Geographical Climate Change, Pakistan, Ecological

Introduction

Pakistan is the sixth most populous country in the universe, with a massive number of natural assets and a range of biological zones, ranging from the Karakoram in the north to the coastal area in the south (UNEP, 2013). In the northwest are the Himalayan and Hindu Kush peaks, and in the east are the Indus and its tributary flood plains. These ecosystems have all been endowed with assets that have helped the nation's economy thrive. Most of the hilly territory comprises grasslands, which have helped sustain the region's thriving pastoral economy.

A strong fishing business has been supported by Sindh's productive agricultural coastal areas, which are home to 800 various kinds and numerous shrimp. Besides being a primary component of forest resources, the marine, riverbanks, and highland woods have also preserved agriculture production, shielded waterways, and supplied critical environmental processes. Moreover, the 200,000 square miles of Indus River wetlands (Britannica, 2001) and the cultivated dunes have served as the nation's fertile croplands, making them the nation's heartland.

In recent years, Pakistan has seen devastating storms, rains, and storms that have caused millions of deaths and displacements, devastated industries, and devastated infrastructure (Mumtaz, 2018). A sobering caution that Pakistan is among the nations particularly susceptible to the impacts of climate change is the possibility that these and other environmental catastrophes could become more frequent and severe in the upcoming decades due to climate change.

Due to global warming, there will likely be a massive spectrum of effects on Pakistan, including decreased agricultural production, excessive water supply fluctuation, higher coastline damage and ocean intrusion, and greater incidence of severe weather conditions. Integrating climate change into national policy and planning is necessary to address these threats and make climate-smart investments in enterprises, infrastructure, and human capital.

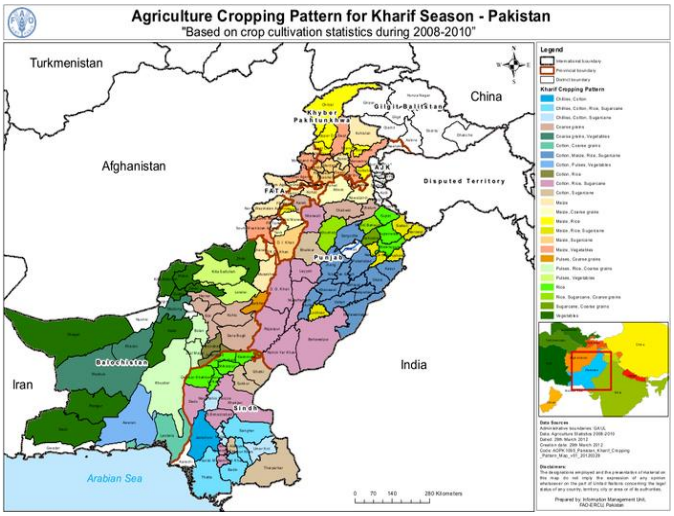
A significant climate change risk could be permitted for Pakistan. The yearly average temperature in Pakistan has risen by about 0.5°C over the 50 years. In the preceding 30 years, the annual days with a high temperature have risen by about five times (Zaman, 2017). Although there has been a minor rise over the past 50 years, average rainfall has traditionally shown significant fluctuation. About 10 cm have been added to the sea level along the coast of Karachi over the past several decades.

According to a core carbon emission scenario, Pakistan's average yearly temperature is projected to rise by 3°C to 5°C by the end of the century. In contrast, greater world concentrations might result in a rise of 4°C to 6°C. Although a long-term pattern in mean annual precipitation is not anticipated, it is set to witness seeking to enhance variation. By the turn of the century, there will be an additional 60 centimeters of sea level change, mainly affecting below coastal regions south of Karachi, near Keti Bander, and the Indus River delta.

Pakistan will face increasing flood events fluctuation due to higher rainfall variation and ice mountains melting

during upcoming climate change situations. As evaporation inflation increases, there may be a huge requirement for agricultural production. Given the water supply, cultivation may move north as forecast declines in wheat, and basmati rice harvests are foreseen. It can become harder to find fresh water, for water demand is challenging. The need for more climate control when it's warmer will probably lead to a rise in power consumption.

This paper will explore the scenario of climate change in Pakistan and the Sustainable Development Goals that are adopted in this regard. In the first section, the research briefly discusses the overview of Pakistan's climate change. The second section of the paper highlights the causes and outcomes of change in the climate. In the third section, the paper will explain the implementation of sustainable development goals. The fourth section will analyze the outlook of climate change in Pakistan. Policy recommendations will be given in the last section.



Cause and Outcome of Climate Change in Pakistan

Green House Emission

In the late 1960s, researchers knew that climate change in Pakistan was the result of high levels of carbon dioxide (CO2) and other greenhouse gas emissions (GHG), including nitrous oxides (N2O) and methane (CH4). However, it has only been recently that the connection between greenhouse gases and global warming has been brought to the forefront of experts, legislators, and citizens thanks to the widely recognized "greenhouse effect." The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR5) proves that humankind's acts have enhanced the greenhouse effect even though it is a natural phenomenon and rather vital for Earth's existence. Despite an increasing number of climate change adaptation measures, CO2 levels in the atmosphere reached 164,130 PPM in 2015 and climbed to 187,310 PPM in 2018, an increase in the rate, respectively.

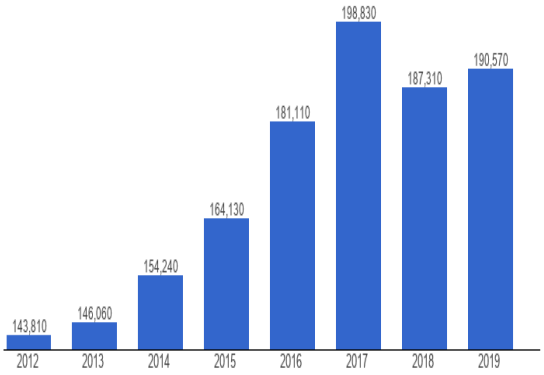


Figure No.1 Analysis of Carbon Dioxide Emission Rate in Pakistan

Global Warming

The increased greenhouse effect, which has disrupted the Earth's climate stability, has ended in a warmer world. Since 1880, the world average temperature has increased by around 0.80 degrees Celsius (IPCC AR5, SPM-5). While there is a precise long-term global warming period, temperatures do not rise annually, and some years exhibit higher temperature differences than everyone else. These temperature changes throughout the year are triggered by natural phenomena such as El Ninos, La Ninas, and big volcanic explosions.

Yet, not all parts of the earth are heating uniformly. Warming is more apparent above land than across the ocean and towards the latitudes, with the Arctic heating 2.8 times quicker than the rest of the Northern Hemisphere (Box et al., 2019; Shahid & Adnan, 2021). In reality, more than a third of the worldwide entity already lives in areas that have witnessed more than 1.50 degrees Celsius of increasing temperatures in at minimum one season.

Due to continued global warming, the Greenland and Antarctic ice plains have already been shedding volume. Over the 1979-2012 period, the Arctic sea ice coverage decreased by around 10%, and the standard winter ice depth decreased by about 1.8 m (IPCC AR5, WG1, SPM-9; Box et al. 2019). While losing Arctic ice is a consequence of global warming, it is also a source of more significant warming since uncovered seas absorb high sun radiation than ice, a process known as decreasing albedo.

Global warming also causes glaciers to dissolve and decrease. Glaciers are receding five times quicker now than they had been in the 1960s. The glaciers melt quicker in central Europe, the Caucasus region, western Canada, the lower 48 regions of the United States, New Zealand, and around the tropics. Annually, these glaciers lose more than 1% of their mass (Zemp et al. 2019). However, Greenland's outer glaciers and ice caps reached an incurable critical threshold in about 1997. They will proceed to dissolve (Nol et al. 2017), and the interior glaciers and ice caps are still growing.

In addition, sea levels also increase as a result of temperature rises. According to Mengel et al. (2016), dissolving glaciers and ice caps and the expansion of water under heat are the two causes of sea level rise. According to Nol et al. (2017), the loss of the Greenland ice caps and its outlying glaciers and ice caps accounts for roughly 43% of the current rise in sea level. 16–21 cm of sea level rise occurred between 1900 and 2016 (Sweet et al. 2017). More precise data from space satellite surveys show an increasing rise of 7.5 cm between 1993 and 2017 (WCRP 2018), indicating a tendency of around 30 cm per century.

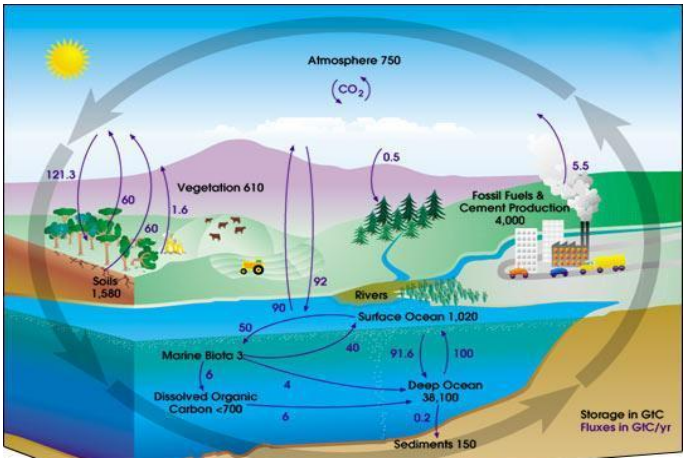


Figure No.2 The Global Warming Cycle

Pakistan Sustainable Development Goals

Climate Change Action Program

The action plan's goal for addressing climate change is to implement the appropriate acceptance and mitigation strategies. There is a requirement in Pakistan to incorporate climate change into national policymaking as well as other policy and planning activities. All significant developments should be screened for potential implications of climate change and chances to generate carbon credits by making this a requirement of the EIA.

There is a need to strengthen all emergency management organizations' sectors must be to deal with floods and other climate-related calamities by taking the necessary precautions. Formulating, styling, developing and reinforcing the proper storm river banks, dykes, and safety berms to safeguard waterways is crucial. Establish a central hub for connecting, exchanging, and managing climate change-related information.

For the National Climate Change Policy's successful operation, in addition to the Framework for Climate Change's interaction with other planning and policy efforts, provincial governments should establish policies on climate change. Rising carbon drain potential can be achieved via replanting and afforestation, for example, as mitigation actions (MOCC, 2017).

Change to renewable energy sources while reducing GHG emissions from businesses, agricultural operations, and the transport industry by control review. Furthermore, to minimize Greenhouse gases, boost power effective transportation solutions such as gasoline automobiles. Utilize "Technology Need Assessment" to determine the best solutions currently on the market as you shift to renewable power to cut carbon emissions.

The recommendations can significantly decrease the dangers related to climate change consequences. It will ensure protection from catastrophes brought on by climate change and safeguard people's lives, possessions, the nation's infrastructural facilities, and industry. In addition, it will support global efforts to halt climate change by ideally rerouting the state's expansion onto a low-carbon course. The table will show the Climate Change Action Plan implementation that will achieve the SDG target and assist other SDG goals.

Short-Term

Plan	Partners	Tentative cost
Integrate climate change and sustainable development into national policies, initiatives, and planning.	Ministry of Climate Change, sectoral ministries such as agriculture, water, and electric power, enterprises, commerce, and trade budget, stats division, and provincial P&DDs	3.0
Increase capability for incorporating climate change issues into planning processes and develop national and regional Climate Change Expert Groups	Federal Flood Commission, NDMA, PDMAs, Ministry of Climate Change, Prov. EPDs, Provincial Climate Change Centers	2.0
Increase and develop adaptation and mitigation capabilities to deal with the impacts of climate change properly.	Federal Flood Commission, NDMA, PDMAs, Ministry of Climate Change, Prov. EPDs and Provincial Climate Change Centers	2.0
Manage floods and other climate-related calamities using proper strategies.	Federal Flood Commission, NDMA, PDMAs, Ministry of Climate Change, Prov. EPDs and Provincial Climate Change Centers	50.0
Use proper measures to deal with floods and other climate-related disasters.	NDMA, PDAs, and DDMAs	10.0
Set up a national unit for data exchange, networking, and frequent updates on climate change.	Ministry of Climate Change, GCISC, Prov. Climate Change Centers	2.0
Create federal and provincial funds to help accelerate matching funding for climate change efforts.	Ministry of Climate Change, M/o Planning, Development & Reforms, M/o Finance, Prov. P&DDs, Climate Change Centers, Finance Deptts.	2.0
In partnership with Pakistan Meteorological Department and district authorities, enhance the existing hydrological network and system for early warning and river flow monitoring.	WAPDA, PMD, Federal Flood Commission, Provincial Irrigation Depts, District, and Government.	1.5

Medium-Term

Reduce the effects of climate change through forest conservation and replanting under the Green Pakistan Programme.	Ministry of Climate Change, Prov. Forests & Wildlife Deptts	50.0
Scaling up Glacial Lake Outburst Flood (GLOF) risk mitigation in Northern Pakistan to minimize community susceptibility to glacier-related catastrophes.	Ministry of Climate Change, NDMA, PDMAs, Prov. EPDs, Climate Change Centers	36.0
Create policies and plans for water, food, and energy security that consider the problems climate change poses.	Ministry of Water and Power, Ministry of National Food Security and Research, Ministry of Climate Change, Prov. P&DDs	50.0
To reduce greenhouse gas emissions, encourage energy-efficient transportation initiatives such as fuel-efficient vehicles, railroad system expansion, and mass transit networks.	Ministry of Communication, Ministry of Climate Change, NEECA, Prov. P&DDs	50.0
Ensure careful monitoring of Greenhouse gases from all areas, including enterprises, agriculture, wildlife, and transportation.	Ministry of Climate Change Federal and Provincial EPA's, GCSIC	5.0

Long-Term

Improve disaster mitigation and preparation capabilities at the federal, provincial, and district levels.	Ministry of Climate Change, NDMA, PDMAs, Prov. P&DDs	5.0
Create National and Provincial Implementing Entities (NIE & PIE) to handle climate change mitigation and adaptation programs at the national and provincial levels, accordingly, in order to make reliable estimates of SCP and its relationship to climate change possibilities.	Ministry of Climate Change, EPDs, Climate Change Centers, Prov. P&DD	10.0
Encourage the development of climate-resilient infrastructures, such as telecommunications, energy, services, and transportation.	Ministry of Communication, MoCC, M/o Water & Power, NEECA, PCRET, AEDB, Prov. EPDs, Provincial Climate Change Centers, P&DDs, Communication & Public Works Dept. LGRDDs; NHA, Electricity Supply Companies	40.0
Build disaster-resilient multifunctional school facilities that can also serve as sanctuaries during natural disasters.	M/o Federal Education & Professional Training, Prov. Education Deptts; NDMA, PDMAs, DDMAs	40.0
Create emergency plans for Glacial Lake Outburst Floods (GLOF) and other glacier-related emergencies.	NDMA, Ministry of Climate Change, PDMAs, DDMAs	1.0
Develop SCP and its relationship to climate change curriculum, with a special focus on Disaster Risk Reduction (DRR), and integrate it into the official learning system across the country.	Ministry of Climate Change, HEC, M/o Federal Education & Professional Training, Prov. Education Dept.	5.0
Using bioengineering methods, redevelop and build cyclone bunkers in fragile coastal regions.	NDMA, PDMAs, Sindh & Balochistan Coastal Dev. Authorities	20.0
Using dam collapse models to analyze storm channeling	Federal Flood Commission, Prov. Irrigation Deptts; NDMA, PDMAs	2.0

Analyze, build, build, and reinforce appropriate flood river banks, dykes, and defensive berms to safeguard wetlands.	Federal Flood Commission, Prov. Irrigation Deptts; NDMA, PDMAs, Ministry of Climate Change, Prov. P&DDs	30.0
The inventory of greenhouse gas emissions will be revised on the fact that it is based.	Ministry of Climate Change, GCISC, SUPARCO, Atomic Energy Commission	2.0

Outlook of Climate Change in Pakistan

The United Nations Framework Convention on Climate Change (UNFCCC) has previously been ratified by Pakistan. Due to these international obligations, the nation has made significant efforts to address climate change. It announced and put into effect the CDM National Operational Strategy (GOP, 2006) as an indication that the nation was ready to enter the future carbon market.

Pakistan's promises to combat climate change are also reflected in its federal policy structures, such as the National Energy Conservation Policy, Framework for Economic Growth, One UN Programme on Environment, National Environmental Policy, and Climate Change Policy of Pakistan. Implementing green and promoting productivity expansion is a commitment made in Pakistan's Framework for Economic Growth, which places specific emphasis on tackling climate change.

In the context of organizational growth, the Cabinet Committee on Climate Change was created in 1995 to serve as a forum for coordinating climate change policies. This was renamed the Prime Ministers Committee on Climate Change in 2004, which also sought to create high-level intergovernmental links and was incredibly successful in kicking off the nation's participation in the world carbon market. The Climate Change Division was recently established, serving as the authorized national centerpiece for the UNFCCC and the Kyoto Protocol.

The nation's legislative reaction to climate change should focus on two critical areas: mitigation and resilience. In concepts of mitigating the impact, the decarbonization circumstances predicted for the nation in the light of one survey (GOP and UNFCCC, 2011) approximate extra capital investment for mitigating the impact varying between $8 and $17 billion by 2050 as increasingly clean and efficient coal and a more significant percentage of renewable energies are used. The report claims that using cleaner technology would make it possible to reduce pollution from the BAU scenario by 40%.

Numerous adaptation strategies are being supported or considered in relation to water supplies, farming and cattle, coastlines and the Indus Deltaic Region, as well as for improving woodlands and other delicate habitats. According to early research (GOP & UNFCCC, 2011), annual alteration costs will be excessive, extending from US$ 7 to US$ 14 billion. Pakistan, a developing country, lacks the funds to cover such high adaptation costs and dire need assistance from wealthy nations, who agreed to provide it as part of the Bali Action Plan.

The implications of climate change demand that policy reforms consider climate change. The difficulty of coordinating climate change response with growth strategy necessitates an emphasis on co-benefits. A plan aimed at reducing greenhouse gas emissions relates to accomplishing specific goals. Policies and activities that can create win-win situations must be discovered and emphasized in this respect because several ecological safety initiatives offer economic advantages.

Policy Suggestions for Climate Change

It is crucial to understand how climate change, industry, economics, etc., relate to one another and more significant global issues to achieve Sustainable Development Goals. Today's world faces major problems related to climate change. It is crucial to connect with the public and make them aware of its dangers to prevent them. People must prioritize climate change sufficiently (Shahid & Adnan, 2021).

Enhancing how to educate the public about the risks associated with doing nothing via media tactics is essential. Citizens, Agriculturer, Fishers, Sensitive Groups, Youth, Disabled People, School-Going Kids, Decision Makers, Influencers, Leaders, Analysts, Civil Servants, and Corporate Sector are among the target groups for this objective.

Another leading cause of climate change is the harmful to discharge. The number of such automobiles must be decreased. Instead of using private transport, one should develop a public transportation-oriented behavior. Electric automobiles should be used as they emit fewer pollutants. One of the leading causes of environmental deterioration is fossil fuel use. There is a need to minimize the utilization of fossil fuels and adopt alternative power sources, including air, bio, hydropower, and geothermal energy.

The best response to climate concerns is renewable power. (Shazad, 2015 ; Shahid & Adnan, 2021). The issue's core is good governance, and any potential solutions can only be implemented if the government frames and successfully

designs decisions can be implemented. Preferences should guide the development of strategies for adaptation and mitigation, which should then be carried out strictly.

Similarly, dam building is necessary to evaluate and solve Pakistan's growing water crisis, as is taking steps to lengthen the useful lives of current storage sites (GOP, 2012). However, The world must modify its way of life since a rapid rise in auto car use, and high-speed economic growth could bring a climatic eruption and other tragedies. To stabilize their industries, governments must embrace renewable energy sources. Pragmatic and cooperative action should be recommended both at the regional and international levels.

Conclusion

As one of the few emerging economies to have developed their own climate change policies, Pakistan is one of the nations that are most susceptible to climate change. A commendable stride toward Pakistan's successful combating of climate change was to consider it in SDG Pakistani government is responsible for implementing climate change policies and other associated laws. However, it is crucial to provide a solid foundation for creating climate change policies and planning processes in the regions.

It is significant to emphasize that Pakistan has limited ability to address climate change. The upcoming proposal includes a number of specific actions for enhancing both organizational and people capabilities. In order to incorporate creative strategies for successful outcomes, the policy is prepared to advance climate research and scientific evidence. Additionally, it places a high emphasis on citizen participation and appropriate stakeholder participation while addressing climate change in the nation.

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How to Citation: Batool, Y. (2021). Climate Change Sustainable Development Goals: A Case Study of Pakistan. *Journal of Strategic Policy and Global Affairs*, *02*(01), 24–31. https://doi.org/10.58669/jspga.v02.i01.05