



Climate Change: A Mega Impediment for Pakistan to Meet THE SGDs (6, 13)

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ARTICLE INFO	ABSTRACT
Received: February 26, 2026 Revised: March 09, 2026 Accepted: March 23, 2026 Available Online: April 08, 2026 Keywords: Climate action, Climate Resilient Policies, Climate Change Corresponding author: Ujala Aziz Email: ujalaaziz87@gmail.com	Climate change has severe effects on various sectors around the world. Although extreme weather events and their effects are particularly apparent in developing countries due to their increased susceptibility to the climate issue. Pakistan stands out as one of the country's most susceptible to climate changes. The unusually high rainfall and melting of the glaciers have made the progress of SDGs, difficult. The water sector and sanitation situation are one of the most vulnerable sectors to climate change. Therefore, the purpose of this study was to examine how Pakistan's climate is changing and to quantify the implications for SDG 6 (water and hygiene) and 13 (climate resilient policies). A mixed techniques approach was used to achieve this goal. A literary examination of reports, institutional publications, and previous research was done for the qualitative component. Interviews and theme analysis of the study were done for the quantitative analysis. The study's conclusions showed that Pakistan's access to drinking water and sanitation (SDG 6) had been adversely impacted by rising water stress brought on by shifting temperature and precipitation patterns. This study is important because it aims to estimate the proportion of climate change that contributes to Pakistan's declining water availability, describes the nation's current risks and potential for mitigation, and offers policy recommendations to support climate-resilient practices to aid in adaptation (SDG 13) to changing climate regimes.

Background of the Study

Climate change is a naturally occurring phenomenon that arises from changes in Earth's temperature and weather patterns brought about by human activities. The main contributor to this climate phenomenon is the use of fossil fuels. According to ¹, the top ten causes of climate change include transportation, agriculture, and power plants, energy production, deforestation, farming, oil and gas drilling, transportation, and fertilizers. Greater population densities will be disproportionately impacted by climate change because natural disasters are more dangerous and destructive when they occur. If extreme weather events become more frequent and violent due to climate change, high-density population locations will be among the most vulnerable².

The conversation that is currently prevailing on sustainable development begins with the words "our common future." In addition, the Brundtland report stressed how important international cooperation is to sustainable development. This discovery sparked further discussions and investigations, raising awareness of the importance of sustainable development. As a result, a set of specific goals known as the Millennium Development Goals (MDGs) were created in order to accomplish

¹ El Bilali, Hamid, Imaël Henri Nestor Bassole, Lawali Dambo, and Sinisa Berjan. "Climate change and food security." Agriculture & Forestry/Poljoprivreda i šumarstv 66, no. 3 (2020).

² Valentová, Anna, and Vanda Bostik. "CLIMATE CHANGE AND HUMAN HEALTH." Military Medical Science Letters/Vojenské Zdravotnické Listy 90, no. 2 (2021).

them between 2000 and 2015. The MDGs were designed to track countries in the southern hemisphere's development, with a primary focus on development resulting from human activity. In spite of the notable advancements made throughout the implementation phase, the Millennium Development Goals (MDGs) have had a noteworthy impact. The 2030 agenda for sustainable development was formally endorsed by the UN General Assembly in 2015 with the goal of creating a comprehensive framework that enhances the welfare of present and future generations. The centerpiece of the agenda is the Sustainable Development Goals, a set of seventeen (17) goals designed to improve the state of the world's inhabitants ³.

The United Nations General Assembly officially adopted the combination of 17 Sustainable Development Goals (SDGs) in September 2015, which were accompanied by a comprehensive set of 169 targets to manage economic, environmental, and social dimensions, such as reducing poverty, creating a healthy planet, and ensuring a prosperous and peaceful future for all. SDG 6 is specifically focused on water and sanitation; however, achieving most of the SDGs will depend on water, which is necessary for both ecological health and human development. Natural ecosystems are essential to the achievement of the SDGs because they store, manage, filter, and clean water. To ascertain whether the availability and use of water are local or global issues, one must have a thorough understanding of the intricacies involved⁴.

Climate change and SDGs are interrelated to each other in many ways; SDG 13, which is concerned with climate actions to enhance national adaptability and resilience (UN, 2021). However, climate change creates many obstacles in the way of SDGs progress in Pakistan⁵. This aim of the study is to examine that in which way climate change threatens the progress of SDGs (6, 13) targets in Pakistan. The study will shed light on the various sectors in Pakistan to know the occurring challenges in their development. Lastly, the study will provide policy recommendations to adapt to the changing climate and its devastating events.

The increasing effects of climate change provide Pakistan with a significant challenge in reaching Sustainable Development Goals 6 (Clean water and sanitation) and 13 (Climate Action). The unfavorable impacts of shifting climatic patterns seriously impede the nation's attempts to guarantee clean water and sanitation access and to address the more general need for climate action⁶. With an emphasis on the harmful effects of Pakistan's climate on SDGs 6 and 13, this study attempts to methodically examine the many issues related to the country's climate. The goal is to offer suggestions and insights for practical mitigation and adaptation measures.

One of the studies is conducted by Shahid and Adnan to see the overall impacts of climate change on Pakistan and its proposed solutions. It highlighted some of the issues Pakistan facing in taking climate action. The study also states that the government authorities have given this subject special attention and view it as a delicate and important matter. Pakistan has made a number of initiatives, including the creation of action plans and a climate strategy. Undoubtedly, the implementation of the National Climate Change Policy (NCCP) represented a noteworthy advancement. More than 120 policy recommendations across several domains are made by NCCP. But the disasters of climate change badly affect the state's efficiency to take a concrete measure in this field. For instance, one of the major parts of Pakistan's economy is dependent on agricultural sector, which is affected the most by climate change. Moreover, the torrential floods every year bring with itself infrastructural and human loss; give a dent to already fragile economy. As a result, Pakistan is lacking in proper long-term policies for SDG 13 (climate actions)⁷.

Earth's natural climate is changing due to climate change, which also produces factors that drive unnatural changes in the climate. Greenhouse gas emissions are causing erratic changes in Earth's climate, upsetting the planet's natural equilibrium. Every element of human existence is impacted by this temperature variation. The first hazard that climate change poses is a

³ Ali, Sajjad, Liu Ying, Adnan Nazir, Muhammad Ishaq, Tariq Shah, Aasir Ilyas, Izhar Ud Din, and Azam Tariq. "The effect of climate change on economic growth: Evidence from Pakistan." *Pacific International Journal* 2, no. 2 (2019): 70-76.

⁴ Mujtaba, Ghulam, Mansoor Ul Hassan Shah, Abdul Hai, Muhammad Daud, and Mazhar Hayat. "A holistic approach to embracing the United Nation's Sustainable Development Goal (SDG-6) towards water security in Pakistan." *Journal of Water Process Engineering* 57 (2024): 104691.

⁵ Yasin, Hafiz Qaisar, Jessica Breadsell, and Muhammad Naveed Tahir. "Climate-water governance: a systematic analysis of the water sector resilience and adaptation to combat climate change in Pakistan." *Water Policy* 23, no. 1 (2021): 1-35.

⁶ Rasheed, H., F. Altaf, K. Anwaar, and M. Ashraf. "Drinking water quality in Pakistan: Current status and challenges. Pakistan Council of research in water resources (PCRWR), Islamabad." All rights reserved by PCRWR. The authors encourage fair use of this material for non-commercial purposes with proper citation 141 (2021).

⁷ Shahid, Fakhara, and Mubeen Adnan. "Climate change: impacts on Pakistan and proposed solutions." *Pakistan Soc. Sci. Rev* 5 (2021): 223-235. Sheer, A., S. Fatima, and A. Sharif. "Impact of Climate Change on Pakistan and Proposed Solutions: Evidence from Literature." *Migration Letters* 20, no. 6 (2023): 97-112.

shortage of freshwater, which will put human survival in jeopardy. Food production will also be impacted by this, as farming would be directly impacted. Pakistan is experiencing just this, and things will only get worse from here on out (BBC, 2020).

According to the World Economic Report, Pakistan has struggled to manage its population, manage resources wisely, develop efficient infrastructure, and rein in inflation. As a result, the country is currently facing a serious water shortage. When individuals cannot access fresh water for drinking, which is a basic human right, it disturbs the peace and progress of the nation. Because there hasn't been enough planning for distribution and consumption, Pakistan is experiencing a water scarcity. The preservation of this natural resource is not guided by any preventative measures. Pakistan is now experiencing a water shortage, and the situation is expected to get worse over the next few years. The per capita water was 1,500m³ in 2009. This level is decreased and has reached 1,017 m³. Pakistan has two larger dams, Mangla and Tarbela, which have high debris and sand, reducing the storage capacity from 145 Million Acre-Feet to 14 Million Acre-Feet, which is reflecting how critical point is at Pakistan now in respect of its water reservoirs (PCRWR, 2019).

In Pakistan, the quality of the accessible drinking water is appalling. Both metropolitan cities and rural communities have contaminated surface and subterranean water sources that are prone to sickness. Overall, Pakistan is classified as a "water stressed" nation and is rapidly approaching the status of a "water scarce" nation in the next few years due to the sharp decline in the amount of water available per person. The changing circumstances also make it more difficult to obtain water for everyday needs and agricultural output, which exacerbates Pakistan's problems with human security ⁸.

The most often used term in Pakistan these days is "water pollution," which has many causes that impact the quality of the water that is readily available. An increase in air temperatures, which has the innate ability to raise the temperature of drinking water, microorganisms, organic compounds, nutrients, and heavy metals, is one of the common causes. In addition to surface debris, irregular water supply, improper water supply discharge, sewage water close to drinking water lines, industrial waste (which is now widespread in nearly all major Pakistani cities), untreated sewage water discharge, and extremely incompetent technical workers and service providers on water disposal projects are other factors that have been found to affect water quality⁹. The concentration of various chemicals in the geological formations in specific areas determines the amount of geological and natural factors that pollute water; on the other hand, anthropogenic pollution is brought on by the extensive use of pesticides and herbicides, coal mining, oil refining, careless garbage disposal, and septic tanks. Due to these developments, only 20% of the population has access to clean drinking water, and the remaining 80% are willing to drink contaminated water. The latest food shortages have made matters worse because large portions of Pakistan remain underwater, contaminating the land and leading to other health problems. Due to the government's incapacity to properly dispose of sewage water and the seepage of tainted food water deep under the Earth, the current condition has also resulted in unpurified subsurface drinking water¹⁰. The structure of paper is comprised of 5 sections that divide the entire study into various steps. Section 1 provides the background of the study. Section 2 Literature review. Section 3 Research Design and Methods the will elaborate the research design, data collection procedures, and data analysis techniques. Section 4 Data Analysis and Results will present the study's findings based on the collected and processed data. This part should be structured under the study questions and objectives. Section 5 will give the summary of the entire study and its further policy recommendations.

Literature Review

One of the most contentious discussions of the modern period is climate change. Due to its detrimental consequences on the entire world, it has united everyone. The climate is becoming more unliveable due to the world's increasing temperature rise. Rising sea levels, altered precipitation patterns, more frequent and severe weather events, and ecological disturbances are only a few of the effects of this increase in global temperature on the environment. Climate change is having a substantial impact on a number of areas, such as agriculture, water resources, public health, and biodiversity¹¹. As a result, sustainable

⁸ Raza, Maimoona, Fida Hussain, Jin-Yong Lee, Muhammad Bilal Shakoor, and Kideok D. Kwon. "Groundwater status in Pakistan: A review of contamination, health risks, and potential needs." *Critical Reviews in Environmental Science and Technology* 47, no. 18 (2017): 1713-1762.

⁹ Qamar, Khulud, Goodluck Nchasi, Hania Tul Mirha, Javeria Arif Siddiqui, Kainat Jahangir, Sean Kaisser Shaeen, Zarmina Islam, and Mohammad Yasir Essar. "Water sanitation problem in Pakistan: A review on disease prevalence, strategies for treatment and prevention." *Annals of Medicine and Surgery* 82 (2022).

¹⁰ Nawaz, Ahsan, Syeed Adnan Raheel Shah, Xing Su, Afzal Ahmed Dar, Zhongfu Qin, and Gadah Albasher. "Analytical strategies to sense water stress level: an analysis of ground water fluctuations sensing SDGs under pandemic scenario." *Chemosphere* 291 (2022): 132924.

¹¹ Pickson, Robert Becker, Peng Gui, Ai Chen, and Elliot Boateng. "Climate change and food security nexus in Asia: A regional comparison." *Ecological Informatics* 76 (2023): 102038.

development is facing enormous problems on a global scale. Pakistan is also one of the most vulnerable countries to climate change. Pakistan has already experienced its detrimental repercussions, just like other regions. As an illustration, consider destructive floods, heat waves, wildfires, and droughts. Furthermore, regions reliant on rivers like the Indus face dangers as a result of altered precipitation patterns and glacial melt, which worsen the situation of water scarcity. Water scarcity and the possibility of glacial lake outburst floods are caused by the increased melting of glaciers in the Himalayan and Karakoram ranges. These incidents had a negative impact on livelihoods, infrastructure, and agriculture ¹².

In comparison to the average global temperature increase, the Intergovernmental Panel on Climatic Change (IPCC) assessments 2018, which are based on future climate projections using a variety of Global Circulation Models (IPCC 2000a, b), indicate somewhat higher temperature increases in the region where Pakistan is located. There is no denying the climate system is warming, and many of the changes that have been documented since the 1950s have been unparalleled across centuries or even millennia¹³. Sea level has increased, the amount of snow and ice has decreased, and the atmosphere and ocean have warmed. There is a good match between the IPCC's predictions and projections for Pakistan, according to research conducted by the Global Change Impact Studies Centre (GCISC) in Pakistan using modelling and historical meteorological data. For the entire country of Pakistan, the predicted temperature increases in the 2020s, 2050s, and 2080s are 1.31, 2.54, and 4.38 C in the A2 scenario. The findings indicate that, toward the end of the time horizon, the temperature increase in Pakistan is greater than the equivalent increase in the global average. Furthermore, Northern Pakistan has had a greater temperature increase than Southern Pakistan ¹⁴.

Methodology

Nature of the study

This research is explanatory in nature and it follows the "Global Environmental Governance model" to look into the trends in the existing data that haven't been investigated before. This study attempts to quantify the contribution of climatic shifts to water security and sanitation situation in Pakistan and provides an assessment of how this affects the climate related policies in Pakistan. This type of research is significant as it helps investigate the patterns of relationship between different variables, giving insights into certain claims that can guide future endeavors.

Data Collection

The information used in this research study was acquired from recruiting participants, preparing interviews, conducting interviews and recording data. Also, statistics and figures have been taken from government publications, books, journals, and media. Furthermore, through national and international environmental research publications that have provided sufficient information regarding the changes in climate and SDGs (6, 13) progress, secondary data has been collected.

Sampling Technique

The sample size for this study was carefully set at 11 participants, a number carefully chosen to balance practical constraints such as time, resources, availability, etc. with the need for a thorough qualitative analysis. Participants from federal government sectors, academicians, researchers and climate activists were involved, whose views, experiences and ideas related to climate change and SDGs were thoroughly explored.

Purposive sampling techniques, also known as judgment or selection sampling, are used to select research participants. This deliberative approach involves the careful selection of individuals who have the appropriate knowledge, expertise, and experience necessary to achieve the research objectives, and each participant is selected based on pre-determined criteria for the progress of SDGs and climate-related decision making.

The participant selection process was carefully defined to identify individuals who met the specific requirements set by the research objectives. Participants must hold positions in federal sectors or directly involved in climate-related activities and SDGs' progress programs, and have strong knowledge, experience or expertise relevant to the sector level within the organization.

¹² Fatima, B., M. Ashraf, and F. U. Hasan. "Policy brief Sustainable Development Goal 6: setting the course right." Pakistan Council of Research in Water Resources (PCRWR), Islamabad 46 (2023).

¹³ Beck, Silke, and Martin Mahony. "The IPCC and the new map of science and politics." Wiley Interdisciplinary Reviews: Climate Change 9, no. 6 (2018): e547.

¹⁴ Beck, Silke, and Martin Mahony. "The IPCC and the new map of science and politics." Wiley Interdisciplinary Reviews: Climate Change 9, no. 6 (2018): e547.

Research Instrument

The research instrument of this study consisted of a semi-structured interview guide designed to facilitate data collection in line with three main research objectives. The interview guide had a total of nine questions and served as a comprehensive tool to elicit participant information, opinions and knowledge on disaster management and response to climate disasters.

The interview guide was designed to be specific to the three main objectives of the study, with three questions assigned to each objective. This structure ensures that data collection is focused and systematic, allowing an in-depth examination of key themes and issues related to the research objectives.

Each question in the interview guide was carefully designed to address specific aspects of disaster management and climate disaster response guided by broad research goals. Open-ended questions are used to encourage participants to freely express their ideas, knowledge and understanding, facilitating the generation of rich qualitative data.

The questions in the interview guide were clear, concise and unambiguous so that participants could understand the purpose of the study and deliver meaningful response. In addition, the interview guide was pilot tested before implementation to ensure clarity, relevance and appropriateness.

Throughout the interview process, the researcher maintains flexibility to guide the interview as needed based on emerging themes of discussion. Survey questions can be used to delve into specific areas of interest or to clarify participant responses, improving the depth and quality of information gathered.

Strategies applied for the data collection

In this research study, data is gathered from interviews, Google Scholars and other database systems such as Emerald and J-Store. The study examines actual data, and the peer review is focused on climate change and SDGs (6, 13) progress.

Data analysis

The research makes use of a qualitative research approach with thematic analysis. It has looked over the data that was transcribed from eleven in-depth interviews. Research questions about climate change, its perceptions, and SDGs (6, 13) progress have been investigated through in-depth interviews. A semi-structured interview guide has also been employed. When the researcher asked follow-up questions, the structure helped the researcher obtain meaningful information from the respondents. It allows the researcher greater latitude to pose inquiries that might not be covered in the interview guide. The thematic analysis method has been applied to the interpretation of the qualitative data.

Doing Thematic Analysis

Braun and Clarke method of thematic analysis ¹⁵provides basic guide for the analysis of qualitative data. Table (5.4) summarizes the technique suggested by (Braun and Clarke, 2006) where one step leads to another step in the thematic analysis.

Step 1: Familiarization with the data

The first step in doing thematic analysis is to get familiar with the qualitative data. Interviews are recorded through tape-recorder. Then the audio recording of the interviews is transcribed into English. Multiple readings of the transcribed data familiarize the researcher with the patterns of the data collected.

Step 2: Generating Initial Codes

The next step in the thematic analysis of the transcribed qualitative data is to generate codes. Transcribed data was organized in a systematic way. Different colors were used to mark the patterns in the transcribed data. And then those colors were given coded. It helped to reduce the large data into different meaningful chunks. Each code generated was somewhat relating to the research questions of the study.

Step 3: Searching for themes

The next step in the thematic data analysis is to find out themes (or sub themes). Theme is defined as patterns that give something valuable about the data. It is characterized by its significance. The codes provide the base for the selection of the

¹⁵ Braun, Ricardo. "Social participation and climate change." *Environment, Development and Sustainability* 12, no. 5 (2010): 777-806.

themes. Different codes are merged together to formulate a theme that may address particular research question of the study. Codes with similar meanings are classified into one theme which might have sub theme or themes.

Step 4: Reviewing themes

The next step in the thematic analysis is to review the themes. In this step, themes are reviewed and merged into major themes wherever necessary having the similar underlying meanings. All the transcribed data were classified into themes and sub-themes

Stage 5: Defining and naming themes

The next step in thematic analysis is about defining themes. It is the stage where final refinement of the themes / sub-themes is carried out. It is also identified how themes and sub-themes are interrelated to each other. This stage of thematic analysis is guided by the previous stage.

Stage 6: Producing the report (Write up)

This is the final stage in thematic analysis where discussion on each themes and sub-theme is carried out. Basically, it is the crux of the thematic analysis.

Results and Discussions

Qualitative Analysis

For qualitative analysis, expert interviews, the official publications, reports, and previous studies published by the government, semi-government, or international institutions that have expertise in climate change, SDG 6 and SDG 13 were analysed.

Thematic Analysis

As mentioned in the steps of the thematic analysis, discussion of the identified themes is the crux of the thematic analysis, so this section provides the discussion and reflection of the identified themes and sub-themes.

Climate Crisis and the Surge of Extreme Weather Patterns

The South Asian region is experiencing a "new climate normal," according to a recent World Bank report, and a sizable portion of the region is exposed to multiple types of hazards, ranking it among the top regions most vulnerable to climatic shocks. Natural catastrophes such as severe heat waves, cyclones, droughts, and floods are common in South Asia; these extreme weather events have tested the resilience of local residents, corporations, and governments. More than 50% of South Asians, or over 750 million people, who live in eight different nations, have experienced one or more climate-related disasters in the past 20 years. Around 800 million people live in this region, which is already home to some of the poorest and most vulnerable countries in the world. The living conditions of these people are now seriously threatened by the changing climate¹⁶

The average temperature of the South Asian region has risen by 0.9°C over the past century and by 0.6°C between 1950 and 2010, according to the IPCC's "Fifth Assessment Report." By 2050, South Asia's average temperature is expected to have increased by an additional 1.5°C to 4.5°C, over preindustrial levels. Furthermore, during the 1950s, the region's precipitation intensity has increased 32 times, or 4-8%, increasing its susceptibility to climatic disruptions (IPCC, 2014). Pakistan is included in the group of South Asian nations that are most at risk from the growing dangers posed by climate change. Pakistan is presently ranked eighth among the most affected countries and is one of the most vulnerable countries in the world with regard to the effects of climate change over the past 20 years, according to the "Global Climate Risk Index" released by the non-profit organization German watch¹⁷.

Pakistan's most populated metropolis, Karachi, ranks sixth in the world for water insecurity, and the country is among the top 33 states suffering from severe water stress. A survey states that the agricultural industry is most susceptible to extreme

¹⁶ Anant, Arpita. "World Bank Reforms and Climate Change (2021).

¹⁷ Eckstein, David, Vera Künzel, and Laura Schäfer. The global climate risk index 2021. Bonn: Germanwatch, 2021.

water-related disasters and declining water supply. Pakistan suffered serious damage to its farmland, infrastructure, and human resources during the 2010 floods; the agricultural industry alone lost nearly \$5 billion in US dollars¹⁸.

Similarly, Pakistan saw terrible floods and droughts in 2022, which severely damaged the nation's natural resources and financial holdings. Initially, the nation experienced a heat wave with a 1-in-1000-year intensity level and persistent temperatures exceeding 45°C, severely damaging crops and forestland. Later, the nation had the strongest and most concentrated monsoon rains, flooding some 4410 million acres of cropland. According to a recent research on "Post-Disaster Needs Assessment" (PDNA), Pakistan's floods in 2022 are projected to have caused damage worth over 14.9 billion US dollars.

Climate Change and Sustainable Development Goal 6

Situation of SDG6 in Pakistan

The International Institute for Sustainable Development (IISD), in collaboration with the United Nations Development Programme (UNDP), the Centre for Climate Research and Development (CCRD), and the Pakistani Ministry of Climate Change, released a project report in 2017 titled "The Vulnerability of Pakistan's Water Sector to the Impacts of Climate Change." The report's conclusions showed that Pakistan's growing water demand is a result of shifting climate patterns. From 158.06 billion cubic meters annually in 1990 to 166.84 billion cubic meters annually in 2000 and 182.39 billion cubic meters annually in 2014–15, the nation's total field water requirements have been rising. The majority of these numbers indicate a significant increase in the country's irrigation water requirements. In response to the growing demand, the nation's groundwater extraction has increased nationwide, rising from 49.30 billion cubic meters annually in 1990 to 56.90 billion in 2000 and 61.29 billion in 2014–15.

Pakistan's irrigation water supply is entirely dependent on the Indus River System (IRS) and its tributaries, which are replenished by precipitation and snowfall, as stated in a 2019 report by the Pakistan Council of Research in Water Resources (PCRWR). During the monsoon season (July, August, and September), Pakistan receives around 84% of the overall influx, with the remaining 16% coming in during the other three months of the year. The hydrological cycle and the intensity of weather patterns are being impacted by climate change; wet seasons are getting wetter and dry seasons are getting drier, increasing the likelihood of extreme weather events including heat waves, droughts, and floods. Furthermore, the state's water security is seriously at risk due to the existing reservoirs losing capacity at a pace of 0.2 million acre feet annually¹⁹. This is because the state now has insufficient water storage capacity to handle the effects of either extreme.

Situation of sanitation in Pakistan

Higher levels of sanitation are linked to better health outcomes. Nearly 10% of diseases worldwide are related to dirty water and inadequate sanitation; additionally, inadequate sanitation, poor hygiene, and contaminated water are responsible for half of the world's maternal-child underweight problem²⁰. Malnutrition thus results from a combination of factors, including inadequate nutrition and socioeconomic inequality (bad access to water and sanitary conditions). Investing in social amenities such as water and sanitation not only raises people's social standing but also helps to lower poverty. Improving a country's living conditions and social standing can be achieved by providing better water and sanitation. Numerous studies have discovered that better cleanliness and access to water are important factors in malnutrition. Pakistan has integrated sustainable development goals into its national development plan. According to a study by²¹, Pakistan has not made as much progress in water and sanitation as the median of nations whose per capita GDP is less than 3,000 US dollars. To close this gap, Pakistan will require US 55 billion dollars, or 2% of GDP annually, until 2030.

People in Pakistan are compelled to rely on untreated ground water, which is primarily saline and does not satisfy WHO criteria, as their main supply of water due to the country's exponential population growth and scarcity of freshwater sources. Between 1951 and 2009, the amount of water available per person decreased by 3900 cubic meters. By 2025, it's predicted to

¹⁸ Uprety, Yadav, Uttam Babu Shrestha, Maan Bahadur Rokaya, Sujata Shrestha, Ram Prasad Chaudhary, Ajaya Thakali, Geoff Cockfield, and Hugo Asselin. "Perceptions of climate change by highland communities in the Nepal Himalaya." *Climate and Development* 9, no. 7 (2017): 649-661.

¹⁹ Haider, Haroon, Muhammad Zaman, Shiyin Liu, Muhammad Saifullah, Muhammad Usman, Junaid Nawaz Chauhdary, Muhammad Naveed Anjum, and Muhammad Waseem. "Appraisal of climate change and its impact on water resources of Pakistan: A case study of Mangla Watershed." *Atmosphere* 11, no. 10 (2020): 1071.

²⁰ Chomitz, Kenneth M. *Climate Change and the World Bank Group: Phase 1, an Evaluation of World Bank Win-win Energy Policy Reforms*. World Bank Publications, 2009.

²¹ Brollo, Fernanda, Emine Hanedar, and Mr Sébastien Walker. *Pakistan: Spending needs for reaching sustainable development goals (SDGs)*. International Monetary Fund, 2021.

become as scarce as 700 cubic meters per person. Water deficit is predicted to reach 32% in 2025 due to the acute lack of available water storage facilities and the uncertainties surrounding additional initiatives aimed at improving drainage, sanitization, and storage in Pakistan. With the recent flooding, Pakistan is currently dealing with one of the most severe climate changes, which has further complicated water management. Because water sanitation and sewage pipes are located next to one another, leaks in these pipes can contaminate the water and expose consumers to a variety of illnesses. Water must be "free from components which may adversely affect the human health" in order to be considered safe. These elements include organic materials, minerals, and microbes that cause illness. According to Sindh's water quality evaluation using the water quality index (WQI), just 2.13% of the samples were rated as excellent and 55.32% as bad. The majority of people are compelled to use this water since there is no other reliable source of drinking water and there is a bigger demand for clean water than there is supply. Poor water quality is now responsible for 40% of all deaths and 30% of all diseases, having a profound effect on human health ²².

Pakistan's Situation in Water and Sanitation; Comparison within Region

(SAARC)

Saheed and Shahid conducted a study to highlight the situation of water, sanitation and malnutrition in Pakistan. According to the study, there is no substantial correlation between water and sanitation in Pakistan and underweight or stunting, but there is a correlation between water and sanitation and waste. Pakistan is still behind other SAARC nations in the area and has not yet met the benchmarks for SGD goals 3 and 6. For children to grow, nutrition is a critical investment. Programs for improving access to water and sanitation might reduce health costs associated with diseases spread by these channels as well as social discrimination related to these issues. In order to improve the population's level of living, more funding and budgetary attention must be given to water and sanitation projects ²³.

Pakistan's efforts for SDG 6 (clean drinking water and sanitation)

One of the most basic human rights is the availability of clean, safe drinking water, and it is the duty of those in authority to guarantee that this right is respected. The situation of Pakistan is not satisfactory in case of clean water access and sanitation. For instance, just 20% of Pakistan's population has access to clean drinking water, indicating a glaring imbalance in the country's distribution of clean water²⁴. The remaining population is consequently forced to rely on inadequately clean water to meet their daily needs, which surely exposes them to a variety of illnesses and other harmful impacts of tainted water that are made worse by human activity. Pakistan has terrible water and sanitation conditions, which contribute to 97,900 deaths a year, of which 54,000 are children under five. Diseases related to water and sanitation account for 25% of hospital visits in Pakistan. However Pakistan has always been on the forefront of taking preventive measures for clean drinking water and sanitation. Some of the major policies Pakistan has made are following: Policy 1: National Drinking Water Policy 2009 ,Policy 2: National Sanitation Policy 2006, Policy 3: Climate Change Adaptation Strategy for Water Sector.

The Impact of climate change on policies for SDG 6 in Pakistan

Pakistan's policies for clean water and sanitation are severely impacted by climate change in terms of their efficacy and implementation. First, changes in water supply and quality brought on by climate change provide difficulties for the National Drinking Water Policy. Furthermore, water sources can get contaminated by extreme weather events like floods, which lower water quality and raise the risk of waterborne illnesses. In order to provide consistent availability to clean water despite climate variability, the policy must include climate-resilient water supply techniques like rainwater harvesting and groundwater recharging.

Climate change also affects the National Sanitation Policy, especially with regard to threats to public health and the resilience of the sanitation system. Sanitation systems are more susceptible to damage during extreme weather events and require more maintenance as a result of rising temperatures and shifting precipitation patterns. The infrastructure supporting coastal sanitation is seriously threatened by sea level rise, which calls for adaptation measures such shoreline protection and the

²² Qamar, Khulud, Goodluck Nchasi, Hania Tul Mirha, Javeria Arif Siddiqui, Kainat Jahangir, Sean Kaisser Shaeen, Zarmina Islam, and Mohammad Yasir Essar. "Water sanitation problem in Pakistan: A review on disease prevalence, strategies for treatment and prevention." *Annals of Medicine and Surgery* 82 (2022).

²³ Shahid, Fakhara, and Mubeen Adnan. "Climate change: impacts on Pakistan and proposed solutions." *Pakistan Soc. Sci. Rev* 5 (2021): 223-235. Sheer, A., S. Fatima, and A. Sharif. "Impact of Climate Change on Pakistan and Proposed Solutions: Evidence from Literature." *Migration Letters* 20, no. 6 (2023): 97-112.

²⁴ Akber, Md Ali, Md Atikul Islam, Md Munsur Rahman, and Mohammad Rezaur Rahman. "Crop diversification in southwest coastal Bangladesh: insights into farming adaptation." *Agroecology and Sustainable Food Systems* 46, no. 2 (2022): 316-324.

transfer of institutions that are particularly vulnerable. In addition, addressing the climate resilience of water supply and sanitation infrastructure is a key component of the Climate Change Adaptation Strategy for the Water Sector. This approach recognizes that planning for the water sector must take climate adaptation into account and places a strong emphasis on building infrastructure resilience to withstand hazards associated with climate change. It also emphasizes how critical it is to support water-efficient practices and technology in order to lessen the effects of climate change on the provision of water and sanitation services. Pakistan may more effectively protect its infrastructure for clean water and sanitation from the effects of climate change by implementing policies that incorporate climate resilience measures. This would guarantee Pakistan's population will always have access to these vital services.²⁵

The Impact of climate change on sanitation in Pakistan

Pakistan's sanitation system faces serious challenges as a result of climate change, which exacerbates already-existing problems and generates new ones. First of all, rising temperatures and unpredictable rainfall patterns exacerbate water shortages, which affect the supply of potable water for sanitary needs. A quarter of Pakistanis do not have access to clean drinking water, according to the Pakistan Council of Research in Water Resources (PCRWR). Climate change exacerbates this issue by changing precipitation patterns, which causes flooding in certain areas and droughts in others. Water availability fluctuations have a direct impact on sanitation facilities because insufficient water supplies make it difficult to maintain sanitation infrastructure and adhere to good hygiene standards. Pakistan is the seventh-worst country in terms of access to basic sanitation, as its 42 percent of the population remains without access to basic sanitation²⁶. Also, as temperatures rise, waterborne illnesses can spread more easily, placing further pressure on Pakistan's cleanliness efforts.

Climate Change and SDG 13 in Pakistan

Pakistan's susceptibility to climate change is exemplified by the catastrophic floods that occurred in 2010 and 2022, resulting in significant destruction of infrastructure, financial losses, and human distress. Due to its diverse geography, which includes both coastal and glacial regions, the nation is vulnerable to a variety of climate-related effects, such as water scarcity resulting from glacial melt and harsh weather. Furthermore, a major contributing factor to Pakistan's climate problems is global emissions²⁷. The United States, the European Union, and other major emitters contribute disproportionately to greenhouse gas emissions; China alone accounts for 28% of emissions. Pakistan is one of the few countries that contributes very little to the global emission landscape, but suffers considerably from it due to increased climate sensitivity. Achieving SDG 13 and constructing sustainable behaviours need addressing these discrepancies through global cooperation²⁸.

Pakistan must work with other countries in order to combat climate change. The floods in 2010 and 2022 brought attention to the need for international assistance in disaster relief and climate change adaptation. Events such as COP26 and COP27 have shown how critical it is to support countries that are at risk. The emphasis of these conferences was on providing technological and financial help to improve resilience and lessen the effects of climate change. International promises notwithstanding, accountability and efficient execution are still essential. Achieving Sustainable Development Goal 13, or climate action, requires effective disaster response and climate resilience²⁹.

Conclusion And Recommendation

Drawing from our conversations, the conclusion underscores Pakistan's extreme susceptibility to climate change as a result of its geographical and socioeconomic characteristics. The varied terrain of the nation, which includes coastal areas and glaciers, is severely impacted by harsh weather, unheard-of floods, and a lack of water. The advancement of Sustainable Development

²⁵ Khan, Imran, Hongdou Lei, Ashfaq Ahmad Shah, Inayat Khan, and Ihsan Muhammad. "Climate change impact assessment, flood management, and mitigation strategies in Pakistan for sustainable future." *Environmental Science and Pollution Research* 28, no. 23 (2021): 29720-29731.

²⁶ Alied, Marcel, Abdus Salam, Sayed Mansoor Sediqi, Patrick Amanning Kwaah, Linh Tran, and Nguyen Tien Huy. "Disaster after disaster: the outbreak of infectious diseases in Pakistan in the wake of 2022 floods." *Annals of Medicine and Surgery* 86, no. 2 (2024): 891-898.

²⁷ Lee, Dongyoung, Jiyoung Shin, Youngil Song, Hoon Chang, Hanna Cho, Jinhan Park, and Jewoo Hong. "The development process and significance of the 3rd National Climate Change Adaptation Plan (2021–2025) of the Republic of Korea." *Science of the Total Environment* 818 (2022): 151728.

²⁸ Waseem, Hassam Bin, and Irfan Ahmad Rana. "Looking back to move forward: a meta-review of climate change research." *Natural Hazards* (2025): 1-20.

²⁹ Waseem, Hassam Bin, and Irfan Ahmad Rana. "Looking back to move forward: a meta-review of climate change research." *Natural Hazards* (2025): 1-20.

Goals (SDGs) 6 (clean water and sanitation) and 13 (climate action) is impeded by governance problems, such as out-of-date legislation, a lack of cooperation from stakeholders, and institutional fragmentation. These problems are made worse by urbanization, which restricts the availability of resources and raises hygienic concerns. Climate change poses serious risks to economic growth and livelihoods by disrupting infrastructure, agriculture, and water sources. Hence, this study was developed to examine that how climate change can hamper the progress of SDG 6 and SDG 13 in Pakistan. This work is important because it offers hard evidence on how much Pakistan's declining growth in the progress of SDG 6 and SDG 13 is caused by climate change, which will help shape future practices and policies related to climate adaptation.

The first specific objective of this research was to investigate effect of changes in weather patterns on SDGs (6, 13). The second was to determine how and to what extent this relationship influences the progress of SDGs (6, 13) of the country. For this purpose, thematic analysis has done for the analysis. The results showed that changes in weather patterns have triggered an increase in clean water availability and worsening of sanitation problems. The results also revealed that these change in weather patterns lead to increase in severe climate events which hinders the progress of SDGs (6, 13). The third and last objective of the study is to address the grim need to encourage adaptive measures on both policy and operational levels.

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