

Topic:

Causes and Impacts of Climate Change on Pakistan.

Outline

1. Introduction:

- (i) Hook statement.
- (ii) General statement.
- (iii) Thesis Statement.

2. Main Causes of Climate Change.

(A) Human Activities:

- (a) Burning of fossil fuels (coal, gas, oil).
- (b) Deforestation and land use.
- (c) The surge in the use of chemical fertilizers in agriculture.
- (d) Increase in use of chemicals in domestic.

(B) Natural Factors:

- (a) Geographical location : Pakistan's location in the region prone to climate change.
- (b) Himalayan Glaciers : Melting glaciers impacts water resources and sea levels.
- (c) Monsoon Patterns : changes in precipitation and temperature affect agriculture.

(c) Policy and Governance Challenges:

- (a) lack of climate policy framework.
- (b) Inadequate Institutional capacity.
- (c) limited public awareness.
- (d) Insufficient funding.
- (e) Inefficient resource management.

3. Impacts of Climate Change:

(A) Environmental Impacts:

- (a) Temperature increase: Rise in average temperature by 0.5°C to 1.5°C since 1960.
- (b) Changing Precipitation patterns: Increased frequency of droughts and floods.
- (c) Sea level rise: Coastal erosion, flooding and salt water intrusion.
- (d) Glacier melting: Himalayan glaciers losing mass impacting water resources.
- (e) Water scarcity: Affecting agriculture and drinking water.

(B) Agricultural Impacts:

- (a) Crop yield decline: wheat, rice and cotton yields reduced due to temperature and precipitation changes.
- (b) Shifts in growing seasons: Heat stress, diseases and mortality in livestock.
- (c) Food insecurity: Reduced agricultural productivity

exacerbates food shortages.

(C) Social and Economic Impacts:

- (a) Human migration: climate-related displacement and rural-urban migration.
- (b) Health impacts: Increased heat-related illness, water-borne diseases and mental health issues.
- (c) Economic losses: Estimated annual losses of 3-4% of GDP due to climate change.
- (d) Poverty and inequality: Climate change exacerbates existing social and economic disparities.

(D) Impacts on Human settlement and Infrastructure:

- (a) Flooding and landsliding: Damage to infrastructure, homes and livelihoods.
- (b) Water logging and salination: Soil degradation and reduced agricultural productivity.
- (c) Coastal Erosion: Loss of coastal infrastructure, habitats and biodiversity.

2. Conclusion:

The Essay:

Think about how the weather has changed over the years. Has the weather gradually turned warmer? or colder? Perhaps, there are hotter summer temperatures or more snowfall. These are all caused directly by climate change. The planet's average surface temperature has risen by two degrees Fahrenheit since 1900. This change is unrivaled by any others in recorded or estimated history. Climate Change is neither a ^{new} issue nor it is a fully settled one. Developed countries are dealing with it. Whereas, underdeveloped countries are still struggling. Unfortunately, Pakistan is one of them. The main causes behind the climate change are human activities, such as burning fossil fuels, deforestation and land use, the surge in the use of chemicals in domestic and agriculture. Natural factors such as geography, melting of Himalayan glaciers and monsoon patterns. Policy and Governance challenges. These causes impact Pakistan on environmental level, agricultural level, social and economic level and also impacts human settlements and infrastructure. Unless these cause are

addressed properly the impacts of climate change cannot be reduced.

The Framework convention on climate change (UNFCCC) in its Article 1, defines climate change as:

"A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Human activities are the major cause of climate change.

The foremost cause is burning fossil fuel (coal, oil, gas). This has increased the concentration of carbon dioxide in the atmosphere. The reliance on fossil fuels such as coal, oil and natural gas for energy generation, transportation and industrial process releases massive amounts of carbon dioxide, methane and nitrous oxide into the atmosphere. Pakistan's energy sector, which is predominantly fueled by fossil fuels, emits over 40% of the country's total greenhouse gas emissions. Additionally, the transportation sector, dominated by gasoline and diesel powered vehicles contributes another 15%. The burning of fossil fuels not only exacerbates climate change but also deteriorates air quality, posing serious health risks to Pakistan's population. The second

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cause is deforestation and land use. Deforestation is the second leading cause of global warming and produces 24% of global greenhouse gas emissions. Scientists say that deforestation in tropical rainforests adds more carbon dioxide to the atmosphere than the sum total of all the cars and trucks on the world's roads. In Pakistan, 20% of the greenhouse gas emissions is from deforestation and land degradation. Pakistan's forest cover has reduced from 14% in 1990 to a mere 5% today. The clearance of forests for agriculture, urbanization and logging releases carbon stored in trees and decreases the ability of forests to act as carbon sinks. Pakistan's National Forest Policy aims to increase forest cover to 20% by 2023, but implementation remains a challenge. The surge in the use of chemical fertilizers in agriculture is the third contributing factor to climate-change. The high rate of application of nitrogen rich fertilizers has effects on heat storage of cropland (nitrogen oxides have 300 times more heat-trapping capacity per unit of volume than carbon dioxide) and the run-off of excess fertilizers creates dead-zones in our oceans. In addition to these effects, the Indus Basin, Pakistan's breadbasket, is particularly vulnerable

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due to intensive agriculture practices. The increase in the use of chemicals in domestic is the fourth main cause of climate-change due to human activities. Household cleaning products, pesticides, and personal care items contain harmful chemicals that release volatile organic compounds (VOCs) and greenhouse gases, contributing to air pollution and global warming. According to Pakistan Bureau of Statistics (2022) Household Survey 70% of Pakistani use chemical cleaning agents. Hence, human activities such as burning fossil fuels, deforestation and land use, the surge in the use of chemical in fertilizers and in domestic play crucial role in climate change. Natural factor also play a significant role in climate-change in Pakistan. The geographical location of Pakistan is one of the main causes of climate change. Pakistan is located in the region which is prone to climate change. The Indian Ocean Dipole (IOD) and El Niño-Southern Oscillation (ENSO) phenomena impact Pakistan's climate, influencing precipitation patterns and temperature fluctuation. Additionally, the Himalayan ~~mountains~~ glaciers melting impacts water resources and sea levels. According to International Centre for Integrated Mountain

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Development (ICIMOD). (2019). Himalayan mountain range's orography has 30% influence on regional climate. Moreover, monsoon patterns in Pakistan also contribute to climate change. Intensified monsoons result in frequent and intense heatwaves, heavy rainfall and flash flooding. Monsoon patterns also influence temperature fluctuations, impacting agriculture. According to Pakistan meteorological Department (2020) monsoon winds contribute 70% of Pakistan's annual precipitation that has direct effect on Agriculture. While natural factors are beyond human control, understanding their impacts is crucial for developing effective climate adaptation and mitigation strategies. Last but not the least policy and governance challenges also play a significant role in climate change in Pakistan. One of the main causes is lack of climate policy framework. Inadequate legislation: weak laws and regulations fail to address climate change comprehensively. Pakistan ranks 135th globally in climate policy performance. Due to lack of inter-ministerial coordination and insufficient provincial and local government involvement a strong policy framework for climate change can not be established. In

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order to deal with the climate change in Pakistan an effective policy framework is the need of the hour. Inadequate institutional capacity is another cause of climate change in Pakistan which highlights a serious policy and governance challenge to climate change. The ministry of climate change, established in 2017, struggles to coordinate climate-related activities across various ministries and departments. Local governments lack the capacity to implement climate-resilient infrastructure projects, and provincial authorities often overlap or contradict federal policies. Limited public awareness about climate change and its impacts significantly contributes to Pakistan's vulnerability. Almost 70% of Pakistanis lack basic understanding of climate change causes and consequences. The knowledge gap is due to inadequate education, limited media coverage and insufficient outreach programmes. Furthermore, Pakistan's climate institutions suffer from insufficient funding. Insufficient financial resources hinders the implementation of climate-resilient infrastructure projects, renewable energy initiatives and climate

change adaptation programs. The national budget allocated for climate-change initiatives is 0.5%. This funding shortfall forces Pakistan to rely heavily on foreign loans, increasing debt burdens and limiting the country's ability to prioritize climate action. Moreover, Pakistan's inefficient resource management exacerbates climate change impacts. The country's water, energy, and land resources are mismanaged, leading to widespread waste, pollution and environmental degradation. Poor waste management practices, including open dumping and burning, release harmful pollutants. This mismanagement not only harms the environment but also undermines Pakistan's economic and social development, making it increasingly vulnerable to climate-related disaster. Hence policy and governance challenges such as lack of climate framework, inadequate institutional capacity, lack of funding, lack of awareness among people and inefficient resource management play pivotal role in climate change. The impacts of these causes on humans and environment can not be ignored. Effective climate resilient strategies demands effective and timely solution of these

causes.

climate change has drastic impacts on environment, agriculture, social economic, infrastructure and human settlement. To begin with environmental impacts increase in temperature is one of the prominent impacts of climate change. Pakistan's average temperature has risen by $0.5 - 1.5^{\circ}\text{C}$ since 1960, with projections indicating a further $1.8 - 3.8^{\circ}\text{C}$ increase by 2050. This warming trend intensifies, heat waves, drought and water scarcity impacting agriculture, health, and livelihood. In May 2022, a severe heatwave was recorded in Pakistan and India. The temperature reached 51°C . Climate change makes such heatwaves 100 times more likely. The climate change projections of the IPCC Sixth Assessment Report for South Asia as a whole suggest that heatwaves and humid heat stress will be more intense and frequent; and that both annual and summer monsoon rainfall will increase, with more variations by year. Although contributes only 0.88% of the world's greenhouse gas emissions, it is the 5th most vulnerable country to climate change. Increase in temperature has led to the

changing precipitation patterns that is ultimately increasing frequency of floods and droughts in the country. Extreme weather, such as cyclones or intense monsoon are likely to increase in Pakistan because of increased sea and atmospheric temperature. Between 1998 and 2008 Pakistan reported more than 150 extreme weather conditions. In 2022 catastrophic floods hit the country. The main causes were increased precipitation and glaciers melting due to climate change. One third of the country was under the water. According to the climate minister Sherry Rehman "this has exceeded every boundary, every norm we have seen in the past." 33 million people affected. Pakistan is struggling with debilitating droughts exacerbated by rising temperature and changing precipitation patterns. Drought prone regions such as Sindh, Balochistan, and Khyber Pakhtunkhwa, face severe water scarcity, impacting agriculture, livestock and human consumption. Moreover, sea level rise along the Karachi coast is estimated at 1.1 mm per year for the period 1856-2000 according to the National Institute of Oceanography, Pakistan. This change in sea level is thought to,

due to two major processes, the thermal expansion and the melting of glacier mass. The impacts of sea-level rise on coastal areas and its resources may already be evident in the inundation of low-lying areas, degradation of mangrove forests, decreasing drinking water quality and decrease in fish and shrimp productivity in those regions. saltwater intrusion has also decreased the agriculture productivity. Hindu-Kush-Himalayan range is crucial for water, energy and agriculture for about 2 bn people, is particularly affected due to accelerated glacier melting. The potential loss upto 75% of glacier ice by the century's emphasize the need for urgent action. The devastated 2022 floods were in part driven by glaciers melting. Furthermore, water scarcity is a significant impact of increase in temperature due to climate change. water availability per capita is projected to decrease that will affect agriculture and drinking water. The second major impact of climate change is on agriculture. ~~Due to~~ Rise in temperature ~~and~~ precipitation changes has reduced crop yields such as wheat and, rice and cotton. According

to research led by Dr. Adil Najam at the Lahore University of Management Sciences, by 2024 the cost of climate change to agriculture in Pakistan is likely to be upto 7% of productivity. The 2022 Pakistan floods mainly caused by increased precipitation and glacier melting has led to the food shortages. Due to change in temperature and precipitation patterns traditional farming practices have been affected. This is also shifting planting and harvesting dates, with spring arriving 10-20 days earlier and autumn lingering 10-20 days longer. Consequently, crop yields and quality decline, impacting agricultural productivity and livelihoods. Additionally, climate-change is exacerbating livestock stress in Pakistan, threatening the livelihoods of millions of farmers and herders. Heat stress, dehydration and reduced feed quality compromise animal health, leading to decreased productivity, fertility and mortality. The 2019 heatwave alone caused 10,000 livestock deaths in Sindh. Changes in temperature and humidity also increases the spread of diseases such as foot-and-mouth disease

and tick-borne illnesses. Moreover, reduced agricultural productivity exacerbates food shortages. Decreased crop yields, altered growing seasons, and increased frequency of extreme weather events have led to domestic food production deficits. Consequently, Pakistan's food insecurity has worsened, with 22% of the population facing moderate to severe food insecurity and 10% experiencing extreme food insecurity.

social and ^{economic} impacts due to climate change in Pakistan are very obvious. The most significant social impact due to climate change is human migration. Due to extreme weather events such as floods, displacements and rural-urban migrations have increased. Impacts on economy have forced ~~people~~ rural communities to migrate and displaced in large numbers to major cities. Experts expect 20% of the population to move to major cities; current migration patterns included 700,000 people a year moving from rural to urban environments. Climate change also poses significant health risks to Pakistan's population, exacerbating health challenges. Rising temperatures increase heat-related illnesses, respiratory problems, and

vectors borne diseases like malaria, dengue fever, and cholera. Increased frequency of floods and droughts contaminate water sources, spreading water-borne disease. Additionally mental health concerns including anxiety and depression emerge due to displacements, livelihood losses and climate-related trauma. Pakistan's health care system, already strained, struggles to cope with the increasing climate-related health crisis. Climate change has badly impacted the economy of Pakistan. Due to climate ^{change} there is an estimated annual losses of 3-4% of GDP. The Poverty rate of Pakistan has increased. This has led to the social and economic disparities. The poverty rate of Pakistan, when estimated at ... 2 dollars per day purchasing power parity, exceeds 50% of the total population with stark provincial disparities. Pakistan is frequently plagued by heatwaves, droughts, river and flash floods, landslides, and storms, including cyclones. climate-change has drastically impacted the infrastructure and human settlement sub

as flooding and landslides have damaged the infrastructure, homes and livelihoods. Flooding and landslides damage roads and bridges that lead to disruption of transportation networks, affecting economic activity. Damage to irrigation system is impacting agriculture. 2010 floods damaged 10,000 schools, 400 hospitals and 2500 km of roads. Moreover, waterlogging and salination pose significant threats to Pakistan's agriculture sector, exacerbating soil degradation and compromising crop productivity. Salination caused by rising sea levels and intrusion of saltwater into freshwater sources, contaminates irrigation water rendering ~~it~~ 1.2 million hectares of land unsuitable for cultivation. Last but not the least, coastal erosion, exacerbated by climate change, is affecting Pakistan's fragile coastline, threatening biodiversity and habitats. Coastal erosion affects 30% of Pakistan's marine biodiversity, including endangered species like the Indus dolphin, green turtle and hawksbill turtle.

In a nutshell, the main causes of climate change are human activities such as burning of fossil fuels, deforestation and land use, surge in the use of chemicals in agriculture and domestic. Natural factors such as geography, melting of Himalayan glaciers and change in monsoon patterns. Policy and governance challenges. The impacts of these causes on Pakistan's agriculture, environment, society, economy and infrastructure are drastic. Therefore, it is high time to take strict measures to curb these impacts. In order to save the country from the harmful impacts of climate change, the causes of climate change require proper understanding. As it is never too late to pledge for a new change to create a new tomorrow. Because, where there is a will there is always a way, regardless of the obstacles and hindrances we can also definitely achieve our goal.