

# Climate Change And Its Impacts On Pakistan

Ashraf Hussain <sup>1</sup>, Dr. Muhammad Nawaz Chaudhary <sup>2</sup>, Syed Zaheer Haider Jafri <sup>3</sup>,  
Sundas Malik<sup>4</sup>, Nahida Ali <sup>5</sup>, Dr. Durr-e- Shahwar Awan <sup>6</sup>

<sup>1</sup>. Ph.D Scholar, College of Earth & Environmental Science, University of the Punjab ,Lahore ,Pakistan.

<sup>2</sup>. Professor Emeritus, College of Earth & Environmental Science, University of the Punjab, Lahore, Pakistan.

<sup>3</sup>. MS Scholar Department of International Relations, Muslim Youth University ,Islamabad Campus, Pakistan.

<sup>4</sup>. Visiting Lecturer at Institute of Space Technology, Islamabad ,Pakistan(sundasmalik92@gmail.com)

<sup>5</sup>. lecturer Geography, Government college for Women, Skardu,Gilgit –Baltistan, Pakistan.

<sup>6</sup>.Assistant Professor, Department of Forestry and Wildlife Management, The University of Hirpur ,K.P.K, Pakistan.  
Corresponding Author :( sundasmalik92@gmail.com)

## ABSTRACT

In this article, we talked about how the weather is changing in Pakistan and how that is affecting things like floods, droughts, rising sea levels, pollution, and so on. We've also talked about how changes in climate affect things like weather patterns, wildlife, biodiversity, and, most importantly, global warming. In this paper, we talk about how the global environment is changing and how that might affect food and energy production in Pakistan and around the world. We've also talked briefly about the policies and steps the government is taking to help with the changes in the weather.

**Keywords:** climatic changes, natural disasters, global warming, impacts on Pakistan

## INTRODUCTION

Recent studies have shown that climate change is having effects on both people and the natural world. Climate change is causing the temperature to rise, the rain to change, the sun's rays to get stronger, and extreme weather to happen. This is bad for food, human health, agriculture, forests, and land. Researchers have found that about 971 million people live in places where climate change risks are high. Most people who are at high risk live in countries that aren't as well off or are still developing. Pakistan is one of the top ten countries where climate change is having the most of an effect. Climate change has affected almost every part of the world, but South Asia has been hit the hardest. This is because it is the part of the world that is most sensitive to changes in climate and where people know the least about

how to adapt and protect themselves. In the past, Pakistan has been hit by a number of natural disasters that have made it harder for the country to adjust to new situations. These include long-term droughts and floods, the melting of glaciers and the filling of lakes, earthquakes, hurricanes, avalanches, and other types of snow and ice. Even though Pakistan only puts out a small amount of greenhouse gases, there are a few animal species there that are in danger of going extinct. Pakistan's food supply, energy security, and general well-being are all in bad shape because the country is using more fossil fuels and other man-made greenhouse gases (GHGs). This evaluation is a sector-by-sector look at how Pakistan's industries are adapting to climate change, as well as how much they are expected to cost each year, which is between 7 and 14 billion dollars in the United States(Brøns-Petersen &

Gjedsted, 2021). The research showed that the government needs to get involved if the country is to grow in a way that is sustainable. This can be done by making sure that resources and rules put in place in the past are closely watched and used to make cutting-edge climate policy.

### **CLIMATE CHANGE IN PAKISTAN**

Pakistan is the fifth country in the world that is most affected by climate change. Pakistan has many different types of landscapes, such as the coastal areas of Karachi and Gwadar, the Thal and Thar deserts of Punjab and Sindh, and the hilly areas of KPK and Baluchistan. Because of this, different parts of Pakistan face different problems when it comes to climate change.

Pakistan's economy is mostly based on agriculture, and a change in temperature, a shortage of water, or a change in how the monsoons work can make millions of people's lives very hard. Climate change and extreme weather changes are making food safety and security problems in Pakistan even worse than they already are. Pakistan has been hit by about 152 big weather disasters that killed about 9,989 people and cost the country about \$3.8 billion.

#### **Changes in Climate and Natural Disasters:**

When the weather changes, the risk of natural disasters goes up. People who live in places where climate change is likely are more likely to be hurt by natural disasters. Some of the natural dangers that climate change causes are listed below.

- Floods
- Drought
- Waves of heat
- Sea level rise

- Earthquake
- Pollution

#### **Flood:**

In the last few years, there have been more floods in Pakistan. Most of the flooding from monsoon rains happens in Sindh and Punjab. Most of the flooding from hill torrents happens in KPK, Baluchistan, and Gilgit Baltistan, which are all hilly areas. Most floods happen at the end of summer because of the monsoon rains. However, some floods can also happen because of high temperatures that cause glaciers to burst.

Floods hurt the economy, infrastructure, agriculture, and people's lives in many ways. In 2010, Pakistan was hit by a terrible flood. Thousands of people died, and their cattle, homes, and crops were destroyed. In 2015, Pakistan was hit by another flood in the Chenab River, which killed hundreds of people and hurt buildings. In August 2020, just three days of rain caused a lot of damage. Thousands of people died, their homes, cattle, and crops were destroyed, and many more were hurt.

In Pakistan, people who are at high risk of flooding live in poor areas. They are poor and don't know how to read or write, and they don't have access to basic things like roads or hospitals. This makes the situation worse after floods.

Floods in Hunza happen often and are very bad because the monsoon rains are moving and glaciers are melting more because the temperature keeps going up. These floods wear away the soil.

One person who described it said:

"Every year, the river near our house floods because the Batura glacier melts more and it rains a lot. This takes our land away."

(Nargis Iqbal, Female, Passu, Hunza)

Estimate	Population Exposed to Extreme Flood (1971–2004)	Population Exposed to Extreme Flood (2035–2044)	Increase in Affected Population
16.7 Percentile	4,158,091	9,220,336	5,062,245
Median	5,709,314	11,238,400	5,529,086
83.3 Percentile	7,929,955	13,378,717	5,448,762

The number of people who were affected by floods from 1997 to 2004 is shown in the table. And between 2035 and 2044

### **Drought:**

Climate change and overusing water resources have made droughts in Pakistan happen more often, last longer, and be worse. Drought is the most common natural hazard that Pakistan has faced three times in the last ten years. Since 2000, Punjab and Baluchistan have been hit by a number of very bad floods.

In semi-arid countries like Pakistan, food security and safety tend to get worse when there are droughts. Droughts cause people to move without reason, lead to famines, and kill people. In Pakistan, there are places where droughts happen because it rains too little. In other places, heavy rains caused flooding.

People who live in deserts are very likely to have droughts. People in the Thar Desert are suffering from a bad drought that has led to famine. As a result, many people have died and babies are getting sick from lack of food. Drought is also bad for animals in many ways. People who live in the Thar and Cholistan deserts have to deal with the heat and a lack of water because it doesn't rain enough. When droughts last for a long time, people in that area don't have enough water or food, and it hurts agriculture by lowering crop yields and killing cattle and people.

"In the city, we don't even have water to drink. Animals and livestock are dying because they have no water to drink. If you go to the well and look down, you will only see water at a depth of 50 to 55 feet."

(Muhammad Saleem Khoso, Male, Nagarparkar, Thar)

### **Wave of Heat:**

Heat waves are when it stays hot for a long time. Pakistan is one of the places in the world where the temperature is going up a lot every year. The average highest temperature of the year is about 27°C, and the average highest temperature of June is 36°C. High temperatures cause heat waves, which kill a lot of people. In 2015, about 700 people died of heat strokes in Karachi alone, and about 1200 people died because of heat waves in Pakistan as a whole. From 1997 to 2021, Pakistan had more than 136 very hot spells.

Heat waves are bad for farming because they hurt crops, animals, people's health, and forests. It makes more land dry, which is bad for countries like Pakistan whose main source of income is agriculture. In Pakistan, food safety and food security are affected by heat waves. In some places, crops start to go bad, while in others, the time when crops are ready to be picked moved up.

"The planting season has grown by 15–20 days, but the growing season hasn't changed much. In the past 5 or 6 years, the heat has gotten much worse, which has hurt our crops."

(Muhammad Tauseef, Male, Depalpur, Okara)

### **Sea Level Rise:**

Pakistan is one of the places where the weather is changing because the sea level is going up. A research report from Pakistan says that the sea

level is going up by about 1.1 mm per year (Khan et al., 2020). About 10% of Pakistan's people live in coastal areas, so when the sea level rises, it affects them directly. Many coastal villages, like Soomar, are losing land because the sea level is going up. In the 1990s, the government built a wall to protect land from erosion along the coast. Since then, the government of Pakistan hasn't done anything else to protect land from erosion along the coast.

"In the past, Keti Bundar was a long way from the sea, but now it's very close. Our land is sinking because the sea is slowly eating it up."

(Muhammad Siddique Roonjho, Male, Keti Bundar)

When people who live near the coast lose their land because of rising sea levels, they turn to fishing. This puts aquatic life in danger and causes some species of fish to go extinct. Their only source of income is fishing, but too much fishing hurts the fish, and many fish species are close to going extinct, so the government has banned fishing in some parts of the sea. People who live near the coast in Pakistan are poor, can't read or write, and have health and money problems. Because of coastal erosion and a ban on fishing, people were forced to leave coastal areas and move to cities in search of jobs, schools, and good health care.

"Don't ask me about the past, it makes me cry. This place used to have a lot of people. When the sweet water ran out, the fertile land ran out, too. We only see people living Keti Bundar now."

(Muhammad Siddique Roonjho, Male, Keti Bundar)

### **Earthquake:**

Volcanic eruptions are what cause quakes. Most earthquakes happen in Baluchistan, Khyber Pakhtunkhwa, Gilgit Baltistan, and Kashmir, which are all hilly places. Pakistan is located in a

part of the world where earthquakes happen. Pakistan has three to four earthquakes every ten years, which destroy many buildings, infrastructure, human lives, crops, and other things. In 2005, there was an earthquake in Kashmir and KPK, Pakistan. During that earthquake, many people lost their lives, homes, and money. The main things that cause earthquakes are changes in the climate and bad weather (Naseer et al., 2010)

### **Pollution:**

Pollution is the introduction of any harmful substance into the environment that changes the environment in a bad way.

Pollution comes in four main forms.

- Land pollution
- Water pollution
- Air pollution
- Noise pollution

### **Land Pollution:**

When contaminants are put into the land, this is called land pollution. Land pollution is mainly caused by the waste from industries, hospitals and domestic waste. Land pollution hurts both people and animals. It makes people sick and hurts animals. Land pollution mostly affects the big cities, like Karachi, Lahore, Gujranwala, Rawalpindi, Hyderabad, and Multan. Land pollution can be stopped by planting trees and taking other steps to deal with trash.

### **Pollution of Water:**

When waste from factories, hospitals, and sewage water gets into clean water bodies, it makes the water dirty. Water pollution is bad for both the health of people and the health of aquatic life. People who drink polluted water can get diseases like cholera, dysentery, and diarrhea. Waste

water can be kept from polluting water by cleaning it up before it goes into water reservoirs.

### Air Pollution:

Smoke from cars and factories adds to the pollution in the air. Air pollution also includes smog and acid rain. People who breathe in polluted air are more likely to get asthma, lung cancer, eye problems, and other health problems. Filters can be used in factories to cut down on air pollution.

### Noise Pollution:

Noise pollution is caused by loud machines in factories, loud car engines and horns, and loud music. Noise pollution causes a lot of mental health and hearing problems, as well as other health problems. To stop noise pollution, horns should not be allowed near schools and hospitals, where lots of people live. Putting industries far away from places where people live.

Table: An overview of the risk of natural disasters from 1900 to 2020.

Disaster Type	Disaster Subtype	Events Count	Total Deaths	Total Affected	Total Damag ('000 US\$)
Drought	Drought	1	143	2,200,000	247,000
Earthquake	Ground movement	35	144,116	7,435,786	5,376,755
Epidemic	Bacterial disease	3	142	11,103	0
	Parasitic disease	1	0	5,000	0
	Viral disease	2	130	56,338	0
	Others	5	131	371	0
Extreme temperature	Cold wave	3	18	0	0
	Heat wave	15	2,936	80,574	18,000
Flood	Flash flood	24	3,590	22,114,253	10,184,118
	Riverine flood	43	9,229	34,967,357	9,727,030
	Others	39	5,286	23,863,294	2,670,030
Landslide	Avalanche	12	567	4,435	0
	Landslide	9	222	29,707	18,000
	Mudslide	2	16	12	0
Storm	Convective storm	15	402	1,906	0
	Tropical cyclone	7	11,555	2,599,940	1,715,036
	Others	7	184	2,988	0

### THE EFFECT OF CLIMATE CHANGE ON NATURAL RESOURCES

In this topic, let's talk about how the weather affects natural resources and look at both the good and bad things it does. First, we make a list of all the natural resources that are affected by the weather. Here is that list:

- Wildlife
- Temperature
- Carbon cycle
- Agriculture
- Health of people
- Weather pattern

- Sources of fresh water
- Biodiversity
- Climate change
- Sea level rising
- How water flows

So, we talk in detail about all the natural resources and their good and bad effects.

### **Wildlife:**

How climate change affects animals. Climate change causes a number of problems for the wildlife in all of the parks. The number of species that are still around is going down because they can't make enough food and humans are messing with their natural habitats. Wildlife diseases are caused by organisms that take advantage of changes in the weather to help themselves. These agents could be external parasites, internal parasites, or diseases. Wildlife is also affected by many things. Some animals, like the polar bear, the tiger, the green sea turtle, the snow leopard, and the giant panda, are also affected by changes in climate. About 47% of mammal species and 23% of bird species are in danger because of climate change. It is hard to predict how climate change will affect the spread of disease in a certain area because the effects are likely to be very different. This may be true in the marine ecosystem in particular. Since 1980, there have been big drops in the number of coral reefs in the western Atlantic Ocean. It's likely that this started because sea urchins were everywhere, which let algae take over the reefs. Then, the environment got worse, making reefs more likely to get sick. Since the early 1980s, mass coral bleaching has been seen all over the world. This was especially true after the big 1998 El Niño event, which has been linked to higher sea surface temperatures and the fact that corals can live in water that doesn't have enough nutrients to keep them alive.

### **Temperature:**

The climate is getting warmer every day because of climate change. Since 1880, the Earth's temperature has gone up about 0.14°F per decade, and since 1981, it has gone up more than twice as fast, at 0.3°F per decade. NOAA's records of temperature show that 2020 was the second warmest year on record and the tenth warmest year on record. Since 2005, green-house gases have been trapping more heat in the earth's atmosphere, which is making the average temperature rise. In the last 30 years, temperatures have gone up all over the world. As the earth gets warmer, heat waves are becoming more common in some places, like the United States. Heat waves happen when temperatures stay very high for several days and nights in the same place. How much the planet's temperature rises will depend on the decisions we make now and in the coming decades. Even though we don't know exactly how fast or how much the average temperature of the Earth will rise if people keep putting green-house gases into the air at the rate they are now, we know that it will rise. The average temperature around the world will rise by 4 to 12 f. We make a big change, like using more renewable resources instead of fossil fuels, the temperature rise will be about 2 to 5 degrees Fahrenheit less. This means that heat waves are likely to happen more often and last longer. Heat waves can make you sick with things like heat cramps and heat stroke, or even kill you. Warming temperatures can also cause a chain reaction of other changes around the world. This is because rising temperatures also affect wildlife, the ocean, weather patterns, snow and ice, plants, and animals. The more it warms up, the worse it is for people.

### **Carbon cycle:**

Carbon dioxide from climate change is likely to cause the biggest change in the land carbon cycle. If you raise the temperature, the growing season will last longer and the humidity will rise. Both of these things have made some plants grow

more. But plants that grow longer in warmer weather are also stressed by the heat. Scientists have already seen proof that plants in the northern hemisphere slow their growth in the summer because it is hot and there isn't enough water for them to grow. Dry, water-stressed plants are also more likely to catch on fire or be eaten by insects. This is especially true in the far North, where a rise in temperature has the most effect. Carbon from plants and the soil is being released into the air because the forest has already started to burn more. A tropical forest may also be very vulnerable to drying out. When tropical trees have less water, they grow more slowly, take in less carbon, and die, releasing their stored carbon into the air. Rising greenhouse gas levels may also heat the soil, which may speed up the rate at which carbon leaks out in some places. This is a big problem in the far north, where soil that has been frozen for a long time is starting to melt. Permafrost has a lot of carbon from dead plants that has been there for thousands of years. Because cold slows the breakdown of organic matter, when the soil warms and the organic matter breaks down, carbon seeps into the air in the form of methane and carbon dioxide. This is called the carbon cycle. If you burn fossil fuels, change the land, use limestone to make concrete, or send a lot of carbon into the air, you are contributing to climate change. Because of this, the amount of carbon dioxide in the air is rising quickly. It is already higher than it has been at any time in the last 3.6 million years. Most of the carbon dioxide that comes from burning fossil fuels is taken up by the ocean. Ocean acidification is what happens when this extra carbon dioxide lowers the pH of the ocean. The acidity of the ocean makes it hard for sea creatures to build their shells and skeletons.

**Agriculture:**

Climate change will probably have a direct effect on how much food is grown all over the world. If the average temperature of a season goes up,

many crops will grow for less time and produce less in the end. In places where the temperature is already very close to the physiological maximum of crops, warming will have a bigger effect on crop yields right away. The overall productivity of agriculture around the world will go down a lot in this century because of global warming. By 2080, it is expected to go down by between 3% and 16% in developing countries. Many of which are already close to you and have average temperatures that are above. It is expected that crop tolerance levels will drop by an average of 10% to 25%. In the 2080s, agriculture will become less productive. Let's talk about food security and how productive agriculture is. Climate change has an effect on food security in both direct and indirect ways. Changes in the weather, like changes in temperature and humidity that affect crops. Growth will have a big or direct effect on the amount of food made through indirect linkage events like floods and droughts, which are expected to happen more often because of climate change. This will cause a lot of crop loss and leave large patches of land without food. So, global climate change threatens food security. The net effect of global climate change on food security will depend on how vulnerable people are to global climate change and how well they can adapt to and recover from global climate change. At a global level, changing weather patterns will lead to a drop in agricultural production. Food insecurity is caused by higher food prices. Food insecurity could be a sign of how vulnerable someone is to both sudden and slow changes. This effect of global warming has a big effect on agriculture and trade in developing countries, and it also makes it more likely that people will go hungry. Since 1996, when there were less than 800 million hungry people, there are now more than 1 billion. Data and projections from the United Nations show that the world's population will reach 9.1 billion by the year 2050. A lot of the new people will live in countries that already have trouble feeding

their own people. Dealing with the effects of climate change on agriculture and food production will require careful management of resources like soil, water, and biodiversity. To deal with the effects of climate change on agriculture and food production, people will need to act on a global, national, and local level.

### **Health of people:**

Climate change also has effects on the health of people. In 2007, the intergovernmental panel on climate change put out its fourth assessment report. The report confirms that climate change is already happening and also predicts how the climate will change in different parts of the world. There aren't many city-level projections because people are losing faith in the results of climate models because of stricter rules for cities and women's health in Asia. Here are the main points of the report: Climate change will have a big effect on the freshwater resources that were there before. Climate change has led to more intense rain, especially during the summer monsoon, in temperate and tropical Asia. This has increased the risk of weather disasters, especially in coastal cities. Sea level goes up Changes in freshwater resources, food supplies, and the number of extreme weather events like floods and droughts are the things that worry people the most about the effects of climate change on human health. On natural disasters also affect the health of urban populations. Since efforts to cut carbon emissions are not enough to stop further climate change, policy and research agendas are shifting from migration to adaptation and from global to local studies of impacts and responses. Even if the global climate changes, cities and their local climates will still change, especially by making it rain less and get warmer at night. The urban heat island effect is caused by buildings that keep heat in during the day and a drop in plants that cool the air in temperature latitudes. This makes night and daytime temperatures go up by 1 to 5 CS. The main source of urban heat in tropical cities each

month is during the dry season, the temperature on the island can reach 10 Celsius by the end of the night. The size of an urban heat island is usually proportional to the size of the city. It is measured by the difference in temperature between the city and the places around it. Human activities that release greenhouse gases will change the climate of Earth. Part of the recent warming of 0.5 degrees Celsius is due to such human activities. Changes in the climate will have many effects on human health. For example, if the temperature goes up, it could lead to heat stroke or even death. We look at the few signs that recent global warming has already had some effects on health. We looked at the published estimates of how climate change will affect health in the future. Most of the research done so far has been on thermal stress. Extreme weather and infectious diseases, as well as estimates of regional food yield and hunger, are some of the health risks that the emerging border approach takes into account. Due to social demography and economic distribution, evidence of negative effects of climate change will strengthen the case for pre-policies and help patriots figure out how to help plants adapt.

### **Weather Pattern:**

Changing weather patterns are linked to a rise in the average temperature around the world. Scientists have found that climate change caused by humans is likely to make extreme weather like heat waves and big rocks happen more often and with more force. We talked about changes in temperature, storms, floods, and droughts. Long-term changes in climate can affect many parts of society in many ways, both directly and indirectly. For example, a higher average temperature could raise the cost of air conditioning and affect how diseases like Lyme disease spread, but it could also make it easier to grow more crops. Weather that changes in more extreme ways is also a threat to society. Extreme heat events that happen more often and are



stronger, like heat waves, cause more illness and deaths, especially among the population, and damage some crops. Even though more rain is good for agriculture and water supplies, strong storms can damage property, kill people, force people to move, and disrupt essential services. As the earth warms, the average temperature rises over the course of the year. This affects things like transportation, communications, energy, and water supplies. But the rise may be bigger in some seasons than others. Since 1896, the average winter temperature in the 48 contiguous states has gone up by almost 3 degrees Fahrenheit. Temperatures in the spring have gone up by about 2°F, while temperatures in the summer and fall have gone up by 1.4°F. Since 1970, temperature conditions have become more common. For example, in the United States, unusually hot summer days have become more common in the last few decades. Most of the time, summer nights are getting hotter at an even faster rate. This means that nights don't cool off as much, even though the United States has had winter. Unusually cold winter temperatures have to come less common particular very cold nights record setting daily high temperature have become more common than record blows. Heat waves are happening more often in big cities across the United States than they used to. In 1960, there were only two heat waves per year, but now there are six. This means that the average heat wave season is 47 days longer. Individual heat waves are getting longer and hotter, and climate change is thought to make some extreme weather events happen more often, get worse, and hurt more people. For example, rising sea levels and the effects of coastal storms and warming can put more pressure on water supplies during droughts. This is why many cities and business states are taking steps to prepare for more extreme weather.

**Biodiversity:**

Climate change also has an effect on the wildlife. Climate patterns on Earth are a direct result of biodiversity, and we can see how they are related in different parts of the world. Some of the most important things are that the Amazon rainforest and the boreal forest in Russia are responsible for 70% of the world's rain. Canada is the world's largest system for keeping carbon out of the air(Godde et al., 2021). Peatlands are the best way to store carbon below ground on land. They cover 3% of the earth's surface and hold enough carbon to change the climate if it were released. Earth surface social life from seaweed to planktons to fish that act as a natural garden of Marine flora is earth most important carbon storage area because of interrelationship between life plant life and animal. It makes maintain the initial balance in natural ecosystem and the climate every time we harm Earth's biodiversity. We destroy living things that help control the weather and the amount of carbon in the air.

**Cycle of water:**

Climate change makes this cycle worse because as air temperature rises, more water evaporates into the air. Warmer air can hold more water vapors, which can lead to stronger rain storms that cause big problems. Extreme flooding is happening in coastal areas all over the world because of climate change. It is likely that part of the water cycle is speeding up because of this. Increases the rate of evaporation word white more evaporation causing more precipitation rates and the impacts are accepted to increase over this century. Climate rates or not evenly distributed around the world from areas experience heavier than normal precipitation and the other areas may become prone to droughts as the traditional location of the rain belts and as a shift in response to changing climate.

**Climate change:**

Climate change and global warming are a lot of the same thing. It is one of the most important

ways to track changes in the world. Global warming is a rise in the average global temperature, which has big effects on people, animals, and ecosystems all over the world. Because there are more factors and effects than just a rise in surface temperature, the term "climate change" is used to include these other effects. There is a strong agreement among scientists, with 97% of climate scientists who publish regularly agreeing that humans are the main cause of the warming trend seen since the 20th century.

### **EFFECTS OF CLIMATE CHANGE ON THE ECONOMY**

Changes in the climate will have a direct effect on the amount of food that can be grown. By 2040, the average temperature across the country is expected to rise by 0.5 degrees Celsius, and 8–10% of all crops, or 30,000 Pakistani Rupees per acre, will be lost. Climate change could lead to changes in how we make sustainable food and energy. It affects food and energy security in a direct and indirect way by putting food production and quality of use at risk. Climate change and natural disasters also have a slow effect on the amount of food and energy that can be made from natural resources. In the past few years, floods have caused Pakistan to lose a lot of money. This has hurt the country's infrastructure and agriculture. Just in 2010, these losses added up to more than \$9.6 billion. Since 2010, five floods in a row have caused more than \$25 billion in damage to different parts of the economy, such as agriculture, irrigation, public infrastructure, health and education facilities, and more. Cotton is the main cash crop in the country, so businesses that work with it are among the most affected. In addition to changing the weather, growing populations and more people living in cities are also causing security problems. These problems include, but are not limited to, problems with food production, supply, and control of poverty. The United Nations predicts that the world's

population will grow from 7.2 billion people today to 8.1 billion people in 2025. In the same way, climate change is also having a negative effect on the economy of Pakistan. A rise in temperature and heat waves are also bad for food production and the long-term availability of energy. As the weather has gotten warmer, the country's energy use has grown faster than its ability to make things. In the end, prices go up when there is more buying than making. So, all of these things about climate change are connected to social and economic issues. For the economy to keep growing, regional and national policies need to be made with the long term in mind.

### **RESEARCH'S SCOPE AND IMPORTANCE:**

The research we did and put in this paper is an analysis of the current state of climate change around the world and how it affects Pakistan. It will look at the direct and indirect effects that a changing climate has on the security of food and energy and the long-term use of natural resources. This study looks at how climate affects social and economic factors. It also looks at how important agriculture and the economy are to a country's progress. It looks at the relationship between climate change and energy. In addition to a risk assessment of global climate change and possible threats to Pakistan, this paper gives a framework for implementation needed in a scenario for the country to produce food and energy in a sustainable way even as the climate changes.

### **OBJECTIVES**

The main objective of this study is to assist in describing a framework that could be implemented to determine a socio-economic impact of continuous severe changes in weather on food water and energy.

In our study, we will come up with a plan for dealing with the following major problems:

- Lessening the bad effects of climate change on things like food and energy
- Agricultural production and rural development that is sustainable
- Increasing the use of new technology and productivity
- Making the trade markets and inputs for farming stronger.
- Making good use of and saving natural resources
- Building long-term shared strategic planning skills

### **OUTCOMES**

This study will help make a plan for enough food production and supply, efficient water transfer and use, and sustainable energy production in a changing climate. In the long run, it will have a positive effect on socioeconomic development.

### **CHANGE IN THE GLOBAL CLIMATE**

Wheeler says that natural events, human actions, the release of greenhouse gases like carbon dioxide and methane, and changes in how land is used can all cause climate change. Changes in the climate affect the length and severity of weather by making it warmer, changing the way rain falls, and making it rain more often and harder. The fifth report from the Intergovernmental Panel on Climate Change shows that people have a clear effect on how the climate works. In this report, it says:

"Climate change will make risks bigger and create new ones for both animals and people." Risks related to climate change can come from bad weather, such as severe heat waves, too much rain, and flooding that doesn't stop. In a large part of Europe, Asia, and Australia, heat waves are getting worse. In the same way, there are more heavy rainstorms on land than there used to be.

### **THE EFFECTS OF CLIMATE CHANGE ON PAKISTAN'S ECONOMY**

#### **Food:**

Food security is mostly about how crops are grown and how easy it is to get food. Climate change directly affects both of these things. So, climate change is a major factor in how safe food is around the world, in each country, and in each region. Senator Mushahid Ulla Khan, who is the federal minister for climate change, was quoted in the Daily Times as saying that natural weather events would happen more often in the country. 6% of our GDP was lost because of the devastating floods of 2010. Together with the London School of Economics and Political Sciences and the Lahore University of Management and Sciences, the World-Wide Fund for Nature-Pakistan made a report about climate change in Pakistan and how it affects agriculture and food security. This report says that changes in the climate will have a direct effect on the amount of food that can be grown. By 2040, the average temperature across the country is expected to rise by 0.5 degrees Celsius, and 8–10% of all crops, or 30,000 Pakistani Rupees per acre, will be lost. A well-known climate change think tank in Germany said in 2014 that Pakistan was one of the top ten most vulnerable countries in the world. Only in 2010, the flood cost the country 6% of its GDP. A study done by the Global Change Impact Studies Center and the Pakistan Metrological Department about how climate change will affect Pakistan's future showed that there are big changes in temperature and an upward trend in both the lowest and highest extremes over the region. So, in a situation where people are very vulnerable to the effects of climate change on food security and sustainable energy production, a policy document has been used as a guide to show what changes need to be made in areas like agriculture, water, energy, and livestock.

## Energy:

Changes in climate have direct effects on how and where energy is used and made. The main effects of climate change are an increase in the amount of energy used in homes, businesses, and industries for things like cooling spaces when the temperature goes up, cooling industrial processes, refrigeration, pumping water for municipal and agricultural irrigation, and so on. Energy delivery and fuel types are also affected, such as using electricity for air conditioning and natural gas for heating. Martin et al. describe three steps that must be taken for energy security to be possible.

- There is enough energy available to meet the growing demand.
- Accessible energy resources.
- There could be a guaranteed supply of fuel that wouldn't be affected by outside factors.

Wilbanks et al. said that climate change could have the following most significant effects:

- Residential and commercial refrigeration use a lot of electricity.
- Getting more energy to resources that are sensitive to climate change, like pumping water for irrigation in agriculture and cities.
- Changes in how energy is used and what kind of energy is used, like when electricity is used for air conditioning and natural gas is used for heating.
- Changes in how much energy is used in important parts of the economy, like transportation, construction, and agriculture that are sensitive to climate change.

The National economy Environmental development studies say that in 2008, Pakistan used 37.3 million tons of net energy. Gas (43.4%), oil (29%), electricity (91.53%), coal (10.4%), and LPG (1.5%) were all used to meet the energy needs. 51% of the country's

greenhouse gas emissions come from all of these energy sources put together. Compared to the last ten years, the amount of petroleum used has gone up by 0.5% per year. In the last five years, gas consumption has gone up by 9%, coal consumption has gone up by 1.5%, and oil consumption has gone down by 9.5%.

## Damage Caused By Natural Disasters:

Natural disasters are making things scary around the world by upsetting ecosystems and making it harder to get water and use land for farming. Natural disasters lead to less nutrients in the soil, soil erosion, desertification, and the use up of natural resources. Biodiversity is also being hurt by things like urbanization, deforestation, pollution, and the effects of climate change.

## WHAT IS EXPECTED TO HAPPEN IN PAKISTAN DUE TO CLIMATE CHANGES IN THE FUTURE

According to the Global Facility for Disaster Reduction and Recovery, the temperature in the south and along the coast of Pakistan will rise by 1.4 to 3.7 degrees by the year 2060.

The chances of rain change from place to place and season to season. Heavy rain could get worse, which would cause a lot of damage to infrastructure and agriculture in particular.

## MONITORING OF CLIMATE SYSTEM

In order to reach the goal of sustainable food production and feed the world's growing population, the government, research institutes, and international organizations must work together. The most important part of this scenario is making sure there are good connections with the global market and the international trade system so that there is a stable supply of food and energy.

## The Effects of Climate Change on Communities

### **Vulnerability to diseases caused by climate:**

Pakistan is very vulnerable to disasters on a social level. There are high rates of poverty and malnutrition. The Human Development Index ranks Pakistan as the 125th best country out of 169. It is at risk because it is exposed to natural disasters and climate changes that are worse than average. Over a period of ten years, the death rate in Pakistan went up because of earthquakes. But in the last few years, flooding has also had a huge effect. About 2,000 people died in the big flood of 2010, which also destroyed 12 million homes and hurt 2.2 million hectares of crops. UNISDR (2014) says that floods are responsible for about 75% of the average \$1.3 billion in losses caused by natural disasters each year.

### **Health of People:**

Due to changes in temperature and rainfall, both rural and urban people are more likely to get vector-borne diseases, which can also cause heat stress. This is especially bad for the reproductive health of children, the elderly, and people who live or work in buildings with poor ventilation or in areas with a lot of people. There are more vector-borne and water-borne diseases when there are more extreme events, like floods, droughts, high temperatures, longer dry days, and extreme rainfall. Migrants and people who have moved within their own country are very vulnerable. If the climate changes, it could lead to more child marriages, early births, and domestic violence. Because less food is being made, more women and children are going hungry.

### **• Deaths and diseases that don't spread:**

Pakistan has a big problem with illness and death caused by the heat. Older people are in danger. WHO said in 2016 that the number of deaths caused by heat among people 65 and older went from 10 per 100,000 to about 63 per 100,000. Children, people with long-term illnesses, people

who live alone, and people in certain jobs are also more likely to get sick from the heat. In June 2015, a heat wave in Karachi, Pakistan, killed about 1,400 people. In Pakistan, heat waves are getting worse and happening more often. Climate change is also affecting diseases that aren't spread from person to person in Pakistan. Climate change and local air pollution are both caused by energy sources. Locally and around the world, respiratory infections, lung cancer, and other heart diseases may kill more people because of air pollution. Burning solid fuels inside makes the air dirty. 93% of households in Pakistan use these solid fuels to cook, and 91% of households depend on firewood as their main source of heat (Ali et al., 2021). About 326,000 people die every year from indoor air pollution (WFP 2020). Because they spend more time inside, women and children are more likely to get sick or die because of dirty indoor air. About 34,000 children die every year from acute lower respiratory infections caused by air pollution in their homes (WHO 2016).

### **• Diseases Spread by Vectors:**

Vector-borne diseases can have a big effect on health and are very sensitive to changes in things like temperature, precipitation, and humidity. And these conditions have a big effect on the way that vectors like mosquitoes live their lives. Dengue fever is active in Pakistan right now for about one-third of the year. Some sources show that climate change may be causing a slight drop in the number of people who can spread dengue fever (WHO 2016). Other sources say that rising temperatures may make more places suitable for breeding (Asian Development Bank 2017). The 2019 dengue fever outbreak lasted four months, from July to November. According to WHO, 2019, there were 47,120 cases and 75 deaths. In Pakistan, malaria has been linked to flooding for a long time. During the flooding in 2012, two million more people got malaria over the course of four months. Warmer temperatures and more

rain have a positive effect on malaria transmission, which makes it more likely that Pakistan will have a higher malaria burden (Shafi et al., 2020).

• **Water, hygiene, and sanitation:**

Pakistan has made fast progress in improving its water supply. About 91 percent of the people who live in Pakistan have access to clean water. But UNICEF says that 70% of people still drink water that has bacteria in it, which means that water-borne diseases are getting worse and more common. Because of changes in the climate, both the amount and quality of water pose problems for water supply. First of all, there is less water available because of drought and less rain, which makes the water more polluted and forces people to find other sources of water that aren't as good to meet their household needs. Also, the amount of pollution is getting worse because heavy rain and frequent floods are putting more pollution into the groundwater sources. Landslides and damage to water infrastructure are also caused by these floods. High temperatures also speed up the growth of microorganisms. Changes in climate have a big effect on the coastal areas of Pakistan because of the effects of rising sea levels and salt water on agriculture, infrastructure, and water supplies. 70% of households use a toilet that has been improved. Access to sanitation is higher in cities, where 88 percent of people have it, than in rural areas, where only 58 percent do. In 2019, UNICEF said that 25 million people in Pakistan still went to the bathroom in the open. Open defecation is bad for your health and pollutes the environment. When people throw away their waste in unsafe ways, they expose the environment to more pathogens and make water-borne diseases worse. Still, 53,000 children under the age of five die every year from diarrheal diseases caused by a lack of clean water and toilets. Climate change is likely to make people more likely to get diseases spread by water because it pollutes water sources and makes it

harder to get safe, clean water. WHO predicted in 2016 that due to climate change, the number of people who die from diarrhea will rise from 11.7% to about 17% by 2050. In 2010, floods made cholera more likely, and in 2014, 1,218 people got sick with it (Zhang et al., 2021).

• **Malnutrition:**

Malnutrition and under nutrition are also caused by climate change around the world, especially in places where food is already scarce. As predicted by the Intergovernmental Panel on Climate Change (IPCC), climate change will have bad effects on food security, such as children not getting enough food and dying because of it. 56.5% of rural children are anemic, 51.5% of rural children don't get enough vitamin A, 62.7% of rural children don't get enough vitamin D, and 51.2% of women of reproductive age who are anemic. Pakistan also did well in the Global Hunger Index of 2020, which put it at number 88 out of 107 countries. Pakistan is trying to meet its Global Nutrition Targets, but the bad effects of climate change on food security are slowing this down. This is because people have less food to eat when the climate changes. In different parts of Pakistan, both children and adults have different levels of nutrition. Pakistan has both short-term and long-term malnutrition, which is even worse. Rural households are less likely to have enough food, so they have more people who are malnourished. Changes in the weather also hurt Pakistan's staple crops, which leads to long-term malnutrition. When there isn't enough food, people eat less, and women are more likely to be malnourished because they eat less so their children and male family members can eat (von Grember et al., 2020).

• **Being uprooted and moving:**

Flooding and heat stress are making more people move out of and into Pakistan (et al., 2015). One million people in Pakistan have to move away for good because of natural disasters. A lot of people

also move around temporarily. For example, 20 million people had to move because of the flood of 2010. Heat waves and floods make it harder for people from different places to stay healthy. Skin diseases, lung infections, heart diseases, and diarrhea are very common among migrants, internally displaced people, and IDPs, just as they were among Afghan refugees.

- **Health of the mind:**

The mental health of people who move is also affected by climate change (Cvetković & Grbić, 2021). It makes it hard for IDPs to make a living, and this is a source of conflict. IDPs, especially women and children, are more likely to have mental health problems. They are in danger. As in the 2010 flood, where 70% of children were affected and had mental health problems. Children's mental health was also affected by how their parents reacted to the floods and how they were feeling. From a survey that was done in Pakistan in 2015, it was clear that stress and mental health were problems for migrants. Women Afghan refugees were more likely to have mental disorders than men.

- **Health of the sexes, fetuses, mothers, babies, and children**

**Getting services for sexual and reproductive health:**

People can't get to health care services because of climate-related disasters like floods and landslides. Also, women have trouble getting services because of money and culture. Their male family members, especially in rural areas, don't let them, so they don't use these health care services to get medical help.

Health and reproduction:

1 in 12 women die during pregnancy, and 1 in 14 women who are of childbearing age die from parasitic and infectious diseases.

**Health of mothers:**

Diseases spread by insects and water that are caused by changes in temperature and rainfall affect women who are pregnant or nursing. They have trouble with hygiene, health, and sanitation because of changes in the climate.

**Health of Babies and Children:**

The rate of child death is very high because of poverty, illiteracy, a high birth rate, and the lack of power women have. 18 deaths for every 1000 live births (Herani et al., 2008).

**Poor people and unfairness:**

Most people who are poor are hurt by changes in the weather. Poor farmers, businesses, and communities can't afford air conditioners, local water storage, modern technologies, and irrigation infrastructure. Changes in the climate also make people less productive. In 2013, it was thought that only 17.5% of people in Pakistan who live below the poverty line do so in cities. People in Pakistan have a lower standard of living because of the effects of climate change on small farm owners, farmers without land, and agricultural workers.

**People who are most at risk:**

- **Women and children:**

Women and children are more likely to be hurt by climate change than men and older people. The main causes are lack of food security, lack of job security, poverty, droughts, and floods. During droughts, floods, and heat stress, pregnant and nursing women are the most likely to be malnourished. During droughts, men are usually served first, followed by children and women. This is how rural and city women really live.

- **People who can't walk or talk:**

Polio is very common in Pakistan, so there are a lot of people who can't work. People with disabilities are two to four times more likely to die in a disaster than people without disabilities.

They face different problems with their ways of making a living and getting around, as well as the risk of climate change. Because of this, they are more likely to get sick because of climate change.

• **Farmers:**

Eighty percent of farmers own small plots of land, and climate change affects how much food they can grow. Rainfall patterns affect their ability to farm and make them hard to plan for. Livestock, which is a big part of how poor farmers make a living, is also affected by a lack of feed, water shortages, and high temperatures. As a result, it takes away the farmers' cash income and food.

• **Urban slum dwellers:**

Over half of the people who live there live in slums and colonies, which are called "katchi abadi" in Pakistan. These are places with bad housing and sanitation. Extreme weather events like dust storms, cyclones, urban floods, the urban heat island effect, and rising sea levels hurt their health and ability to make a living, pushing them further below the poverty line.

• **Migrants:**

Pakistan has a lot of people who moved there from other parts of the country or from other countries. Climate change has a big impact on these refugees and IDPs. Most of them end up living in rural areas. They don't have enough food, shelter, medical care, ways to make a living, or food security.

## **WHY AND HOW THE WEATHER CHANGES IN PAKISTAN**

Pakistan is one of the top ten countries that have been hit hard by climate change in recent years. Rapid industrialization, which has had big effects on geopolitics, has caused these changes.

**Causes:**

The main causes of this effect are back-to-back floods since 2010, droughts in Tharparkar and

Cholistan, and a severe heat wave in Karachi in 2015, windstorms in several areas of Islamabad in 2016, cyclonic activity, land sliding, and many other things.

**Effects:**

Concerns about Pakistan's climate include the fact that monsoons are very unpredictable, that water flows into the Indus River System are threatened, that the agriculture sector is under a lot of stress because of a lack of water, that the forest cover is shrinking, and that the level of salt in the water is going up, which is bad for fish breeding. The Food and Agriculture Organization (FAO) looked at Pakistan's water resources, how the water supply system works, and how changes in the weather affect the water supply system. Its main goal was to figure out how changes in weather affect how much water people use. The need for water goes up as the number of people and cities grows. All of these things are making it harder and harder for the country to get enough water. Changes in the weather have a big effect on Pakistan (S. Y. Wang et al., 2011). It is very important to study the link between the amount of water available, how productive agriculture is, and how the weather changes. Based on a single river system, the Indus Basin system projects how much water crops, livestock, forests, and other things will need in the future. This is to meet Pakistan's growing water demand. From what we've talked about so far, it's clear that different sectors are putting a lot of pressure on water resources, so there is a need to guide the shift from irrigation to water management. This is so that Pakistan can increase its agricultural productivity without using up all of its water resources.

(Source: An FAO report on Pakistan's water supply, how it is used, and problems there)

## **PROBLEMS AND CHALLENGES IN STOPPING CLIMATE CHANGE**



Here are some of the problems and problems that make it hard to stop climate change. All of these problems have big effects on how things are run, especially when it comes to international environmental governance(Jafari, 2013).

- There wasn't enough coordination between sector policies.
- There was a huge time lag between environmental effect and human action.
- Objectives were unclear.
- There wasn't much credit for groups that worked on projects with the Global Environment Facility.
- Also ill-defined policies.
- There was no consideration of fairness or gender in environmental governance at all.

### **PAKISTAN'S PLANS FOR DEALING WITH CLIMATE CHANGE**

Pakistan's government has made plans for different parts of climate change. Pakistan hosted World Environment Day in partnership with UN Environment on 5th June 2021. The main focus was on “Ecosystem Restoration” and to prevent, halt, and reverse the degradation of ecosystem on every continent and in every ocean.

#### **Policy Goals**

Some of the goals of Pakistan's policy on climate change are:

- To make sure the country has enough water, food, and energy to deal with the problems caused by climate change.
- To improve the knowledge, skills, and institutional capacities of the right people and groups.
- To encourage the protection of natural resources and their ability to last for a long time(Shahid, 2021).

- To reduce the risk of sudden natural disasters like floods, earthquakes, droughts, famines, and so on.

- To combine the policy on climate change with other national policies that are related.

### **HOW VULNERABLE PAKISTAN IS TO THREATS FROM CLIMATE CHANGE:**

Some of the biggest problems Pakistan faces because of climate change are:

- Extreme weather like rain that gets stronger and happens more often causes floods and droughts.
- Rising temperatures make it hard to get enough water, especially in dry and semi-dry places. This makes agriculture policy bad.
- When salty water gets into the Indus Delta, it has a big effect on coastal farming, mangroves, and fish breeding grounds(Ullah, 2016).
- Coastal areas will face more danger because the sea level is expected to rise and there will be more cyclones because the sea surface temperature is going up.

The government has taken steps to lessen the effects of the environment and climate.

### **Important Projects in the Forestry Sector:**

Pakistan is mostly a country with not enough trees. The main reason is that some parts of the country have dry or almost dry climates. About 4.51 million hectares are covered by forests in the country. Of those, 3.44 million hectares are owned by the government, and the rest are owned by the people in the communities and used by everyone. Deforestation is mostly caused by people living longer and having more children. Also, poverty and lack of knowledge are causing people to cut down trees and log them for fuel, charcoal, and other uses. Also, things that people do, like setting forest fires, make the climate and atmosphere worse (Ajani & van der Geest,

2021). All these activities are threatening the survival of species, creating damage to the atmosphere. To meet the domestic needs and to maintain the existing forest, the Government take measures for the improvement of forestry sector, the detail of which is as follow.

### **Ten Billion Tree Tsunami Program (TBTP):**

The program was based on Khyber Pakhtunkhwa's Billion Trees Afforestation Project, which was a success (BTAP). Because

this project was so successful, the government decided to plant 10 billion trees across the country. The ECNEC gave it's OK to this project, which will cost a total of Rs. 125.184 billion. The main goal was to plant more trees all over the place. The plan had achieved plantation of about 350 million during July-March FY2021. The main goal of this project is to protect the health of the atmosphere, cut down on pollution and greenhouse effects, reduce the number of dangerous floods, and save the environment so that species can continue to live.

<b>S. No</b>	<b>Provinces</b>	<b>Number of Trees (million)</b>	<b>Area (Hectare)</b>	<b>Budget Utilization (Rs-million)</b>
1.	Khyber Pakhtunkhwa	304.24	340,068	5,509.14
2.	Punjab	61.5	20,806	5,216.04
3.	Sindh	323.84	19,500	1,290.64
4.	Balochistan	5.42	2,435	658.979
5.	Azad Jammu & Kashmir	106.937	40,512	1,536.266
6.	Gilgit Baltistan	10.734	1713	4,59.589
<b>Total</b>		<b>814.671</b>	<b>125,034</b>	<b>14,670.654</b>

Source: Ministry of Climate Change

### Protected Areas Initiative:

In 2020, Pakistan Government launched the "Protected Areas Initiative". Its main purpose was to increase protected areas like parks, wet

land, and wildlife reserves, encourage eco-tourism, job opportunities through the conservation.

**Table 16.2: Protected Areas in Pakistan**

Province	Name	Area (sq. km)
Islamabad Capital Territory	1. Margalla Hills National Park	173.9
Punjab	2. Kheri Murat National Park	56.2
	3. Salt Range National Park	52.6
Gilgit-Baltistan	4. Rakh Choti Dalana	N.A
	5. Deosai National Park	3622.1
	6. Khunjerab National Park	44506.0
Sindh	7. Himalaya National Park	2263.0
	8. Nanga Parbat National Park	1785.6
	9. Takar National Park	435.1
Balochistan	10. Karunjar National Park	N.A
	11. Astola Marine Protected Area	401.5
Azad Jammu & Kashmir	12. Takatu State Forest Area	38.9
	13. Hingol National Park	6290.5
	14. Chiltan-Hazar ganji National Park	278.0
Khyber Pakhtunkhwa	15. Machiara National Park	135.4
	16. Toli Pir National Park	50.4
Khyber Pakhtunkhwa	17. Deva Vatala National Park	14.5
	18. Lulusar-Dudipat Sar National Park	303.6
	19. Saif-ul-Maluk National Park	55.6
	20. Broghil National Park	1347.6
	21. Chitral Gol National Park	78.0
Khyber Pakhtunkhwa	22. Ayubia National Park	33.7
	23. Sheikh Badin National Park	155.4
<b>Total Area</b>		<b>62077.6</b>

Source: Ministry of Climate Change

National Green House Green Inventory:

The government sends in its first update every two years, and this report is an important part of the national GHGs inventory. Because of this, the national GHGs inventory is made with the help of standard methods from the Intergovernmental Panel on Climate Change. It gives information about greenhouse gases (GHGs), such as carbon dioxide and methane, which come from sources like agriculture, forestry, industrial products, and other land use and waste.

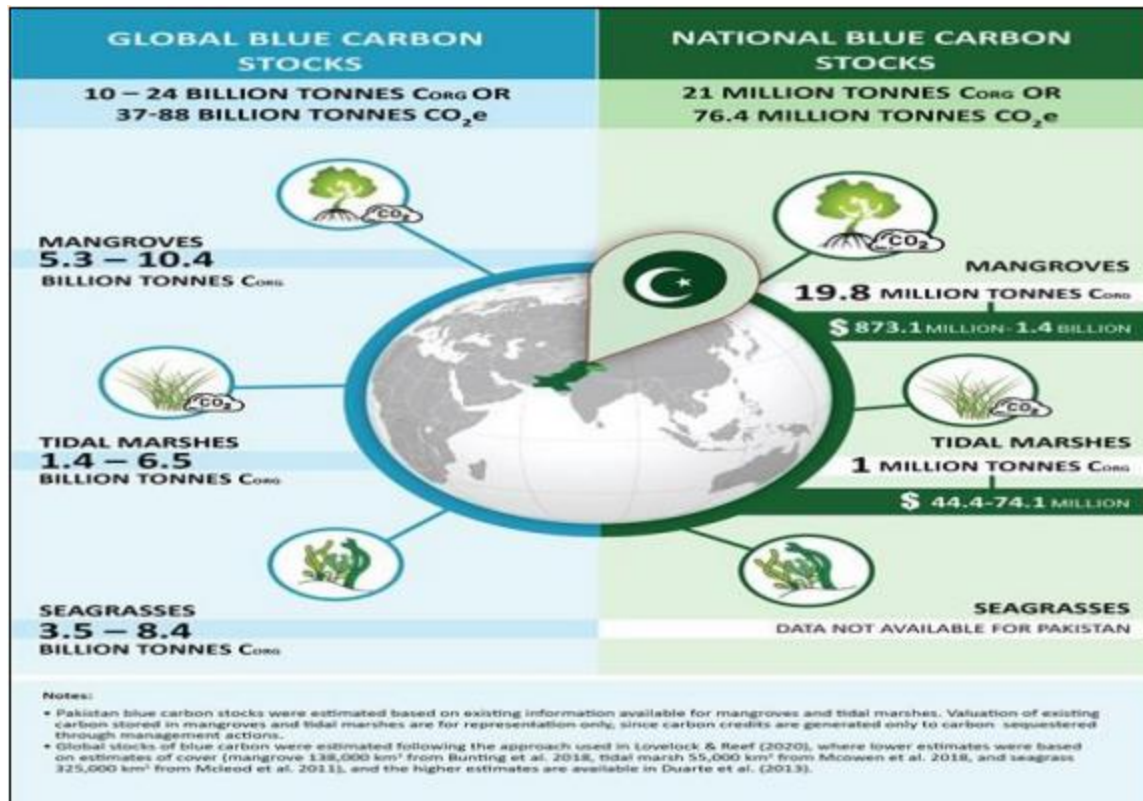
### Carbon Markets:

Pakistan wants to make a carbon market that works well, as promised in the Paris agreement (Q. Wang & Xiao, 2022). The Prime

Minister gave his blessing for the National Committee on the Establishment of Carbon Market to be set up. Its main job is to keep an eye on, report on, and check the infrastructure of the relevant parties.

### Blue Carbon:

Pakistan gets a lot of money from blue carbon, which is good for the ocean and climate. About 21 million tons of carbon stored in mangrove forests and mapped tidal marshes (Ajani & van der Geest, 2021). It is also thought that the Indus Delta Mangroves REDD program from Sindh's government will remove 25 million CO<sub>2</sub> by 2030 and 150 million by 2075. Through this project, about 0.25 to 0.5 percent of Pakistan's annual emissions can be taken out of the air.



Source: Ministry of Climate Change

### Youth and Changes in the Weather:

A population survey says that Pakistan has the fifth most people in the world. About 27% of the people here are between the ages of 15 and 29. Every day, there are more and more young people, and by 2050, that number should be at its highest (Goujon et al., 2020). Because climate change affects people of all ages, the biggest worry is still about young people. A survey was set up to find out more about five areas: climate change knowledge, climate change vulnerability, different adaptation strategies, knowledge of regulations, and climate change advocacy. This result shows that climate change has had a big effect on Pakistan. Most people know little or nothing about the idea of environmental sustainability, while others know a lot about climatic changes. This shows that there is a big difference in how aware Pakistan's young people are of climatic changes. The government has

taken steps to help people who have lost money because of changes in the weather.

### National Program for Adaptation (NAP):

Some people think that the National Adaptation Program (NAP) is one of the most important ways to deal with climate change. Its main goal is to lessen the damage caused by climate change by putting adaptable measures into national policy. The NAP process will try to build a number of nature-based programs, such as the Ten Billion Tree Tsunami Program, the Ecosystem Restoration Fund, and the Recharge Pakistan Initiative.

### Polythene plastic bags should be banned:

In the Islamabad Capital Territory, the Pakistan Environmental Protection Agency made it illegal to use polythene plastic bags. This was done to stop plastic pollution. It made it illegal to make, import, store, or use plastic bags of any kind.

## **NEAR TERM CLIMATE CHANGE IN PAKISTAN**

### **Basic Climatology:**

Basically, climatology is the study of weather and how it changes over time. It helps people learn more about the things in the air that change the weather and temperature over time. Models have trouble predicting how the South Asian Monsoon will change in the future, so it's hard to say what the monthly and annual rainfall will be. All of this points to a slight rise in the amount of rain that falls each month across the country, with some differences from place to place. Punjab is expected to get a little more rain, while Baluchistan may get less rain each month.

### **Climatic Extremes:**

Extreme weather or climate is weather that is unexpected, strange, severe, or out of season. Extreme weather has effects on both people and the ecosystem as a whole. The number of days with more than 20 mm of rain and the amount of rain that falls on very wet days are not expected to change much over the next twenty years. But it is also expected that it will rain more in the eastern parts of Pakistan, such as Punjab and Sindh, even though some parts of Baluchistan and Central Pakistan will get less rain. In Pakistan, the number of changes in temperature will also rise over the next 20 years. In addition to a general rise in temperature, there will be more and more hot days as the 21st century goes on. Also, there will be more and more days that are very hot in the next twenty years.

### **Agricultural Conditions:**

Rising temperatures in the future will hurt dry and semi-dry land because they will have less water, which will also slow down the progress of agriculture in the country. But as the amount of rain a year gets a little bit more, the length of dry spells gets a little bit shorter. When the temperature goes up, more water evaporates,

which dries out the climate as a whole. It is expected that the Mean Drought Index will go down, with a strong trend toward drying along the border with Afghanistan and in Central Punjab (Ahmad Khan et al., 2013).

## **CONCLUSION**

Pakistan has been seen as one of the places where climate change has a big impact. People are having a hard time because of things like floods, drought, cyclones, famine, and many other natural disasters. The government has taken a lot of steps to control the damage caused by these factors by making technological responses better. The TBTP did a lot to bring back Forest and Wildlife resources. Through this program, the government will improve the way it takes care of Protected Areas and also help people by making conservation work into jobs. In the last 5 decades, changes in climate have been a topic of intense interest to scientists, as the impacts of climate change may be witnessed in global warming. Increasing greenhouse gas emissions are resulting in higher temperatures around the world, along with an increase in warm days and nights in Pakistan and other countries, causing violent heat waves that kill many people every year. It is believed that Pakistan's adaptation ability is limited due to its extreme poverty and lack of financial and material resources. In Pakistan, climate change is causing glaciers in the Himalayas to melt faster than ever before in recorded history, unusual rainfall, unpredictable flooding, lack of fresh water, heat waves, earthquakes, and seasonally changing lifestyles.

- In planning, developing, and implementing policies, the government's role must be proactive by removing inefficiencies and unproductive approaches.
- There should be a national sustainable development plan that focuses on eliminating and adapting

- to climate change in an eco-friendly way.
- Citizens should be encouraged to contribute more to climate mitigation and adaptation policies.
  - In natural areas such as forests, oceans, and grasslands, government authorities, organizations, and the general population should work together to develop and implement policies to limit human intervention.
  - Climate research should cover a broader range of sectors since most existing work focuses on specific issues rather than examining sectorial impacts and causes.

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