

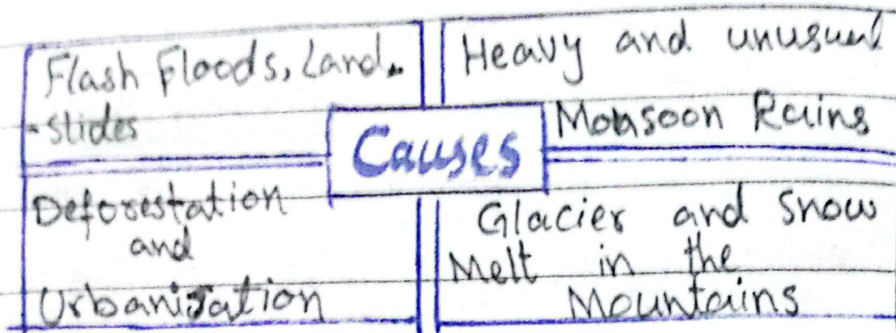
Q = How is climate change increasing the frequency and intensity of floods and heatwaves in Pakistan?

Introduction:

Climate change in Pakistan is a major issue for the country. Pakistan is highly vulnerable to climate change. Like other parts of South Asia, Pakistan's climate has already changed in the last few decades. This has caused many problems for people and the environment. Pakistan is facing more heat, long dry periods (droughts), and dangerous weather events like floods and storms. Another issue is the fast melting of glaciers in the Himalayas, which affects Pakistan's major rivers. From "1999 to 2018", Pakistan was the 5th most affected country in world by extreme weather caused by climate change. So, climate change is not just a future problem, it is already increasing the number and strength of floods and heatwaves in

Disaster
Date _____
Pakistan, directly affecting people's lives,
agriculture, economy, and health.

(2) Climate change causes more Floods in Pakistan:-



(1) Heavy and Unusual Monsoon Rains: usually

Pakistan gets most of rains in the "monsoon season" (summer), in the provinces like Sindh, Punjab, Balochistan, and KPK. But with climate change, the monsoon rains have become much more intense, some times more than usual. For example, in 2022, some areas of Sindh province had 4.5 times more rainfall than normal for that time. In Balochistan, the rainfall was around 500% more in some places.

ii- Glacier and Snow Melting in the Mountains:

Another major cause of ^{more} floods in Pakistan is glacier and snow melting in the mountain. Pakistan has many glaciers in its northern mountains (Himalayas, Karakoram, Hindu Kush). When global temperatures rise, these glaciers melt faster. That adds extra water into rivers (like the Indus and its tributaries), especially during summer. Some glaciers are melting at rates of 10-30 metres per year in Himalayas, 5-10 metres in the Hindu Kush, 2-3 metres in Karakoram. (Al Jazeera).

iii- Flash Floods, Landslides and Runoff:-

Flash floods, landslides, and runoff is one of the biggest causes of flood in Pakistan. Flash flood cause, when sudden and heavy rain or bursting of glaciers, lacks seeds

huge water flows into rivers and streams. This water quickly spreads to villages and farmland causing floods. In 2025, flash floods in Swat and Shangla (KP) killed more than 300 people. Another cause ^{is} of landslides, when rain loosens soil and rocks on mountains, they fall down into rivers or streams. For example, in 2025, landslides in Shangla and Dir worsened flooding in KP. These factors together make floods in Pakistan stronger and more destructive year.

iv. Deforestation and Urbanization:-

Deforestation

and urbanization is another cause of floods in Pakistan. Trees act like a sponge. They absorb rainwater, slow down runoff, and hold soil together. When trees are removed, water directly flows into rivers and low lands causing flash flood and soil erosion. According to NDMA report, 33 million people affected.

3. Climate change causes more Heatwaves in Pakistan:

Climate change is not only causing more floods in Pakistan, but it is also making heatwaves more frequent and dangerous. A heatwave means ^{rising} temperatures for many days, which is ~~cause~~ causes mainly for deadly humans, animals, and crops. Pakistan is one of the hottest country in the world, and cities like Jacobabad, and Dadu often record temperatures above 50°C due to global warming. These heatwaves are now stronger, longer, and happening every year. They affect human health, agriculture, energy, and overall economy.

i. Rising Global Temperatures

Climate change is making the entire planet hotter, and Pakistan is heating up faster than the global average. Warmer

this means more frequent and stronger heatwaves. Every year, summer temperatures are breaking new records especially in sindh and punjab. According to World Bank (2023) reports Pakistan's average temperature is rising 0.5°C per decade, almost double the global ~~at~~ pace.

ii. Urban Heat Island Effect:-

Cities with dense buildings, roads, and little greenery trap heat during the day and release it slowly at night. This makes urban areas much hotter than ~~and~~ rural ones, worsening heatwaves. Poor drainage and electricity shortages make the problem worse in Pakistan. In Karachi and Lahore (May 2024-25), the heatwaves crossed 44°C , with hospitals reporting hundreds of heat-stroke cases.

iii. Deforestation and loss of shade:-

Forest cool the environment naturally and providing shade, absorbing carbon dioxide. But Pakistan has one of the lowest forest covers in the world. When trees are cut down, the ~~land~~ ^{land} heats up quickly, and people have less protection from direct sunlight, leading to more heat stress. Pakistan's forest cover is only 5.2% of land areas (FAO 2025), far below the international standard of 25%.

iv- Shifting Monsoon Patterns:-

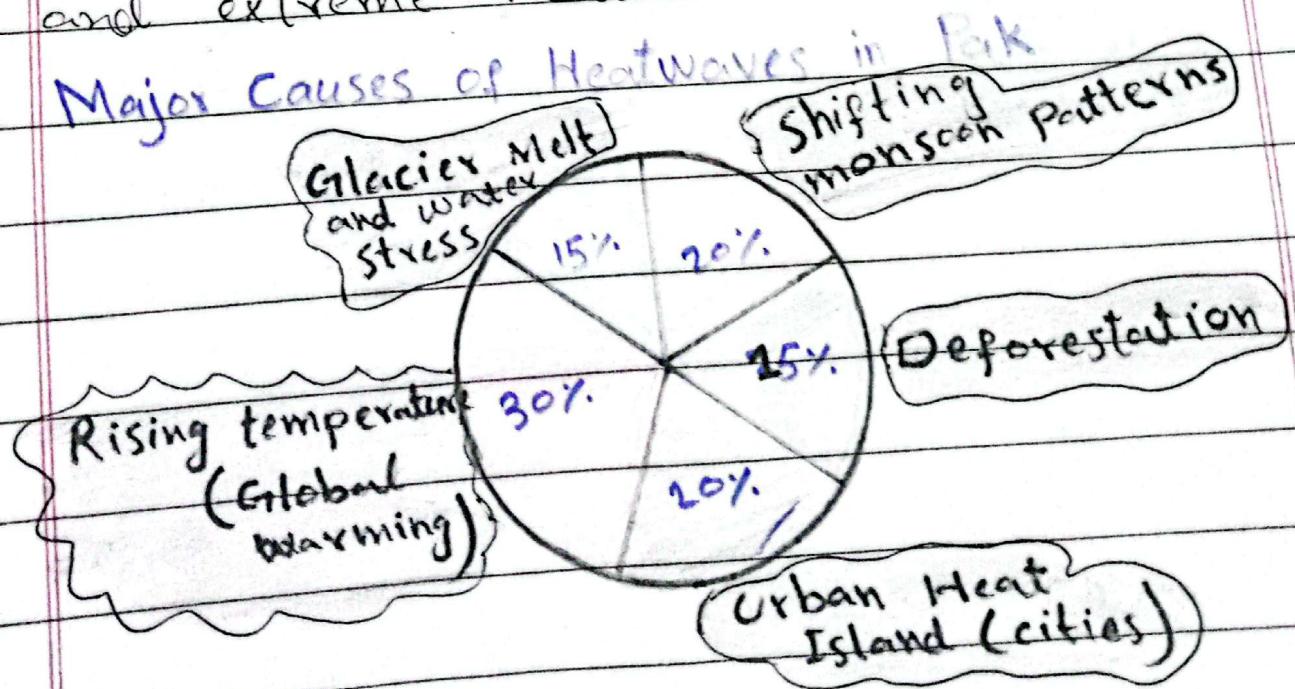
climate

change is disturbing the monsoons cycle. Sometimes rains are delayed, leaving long dry (droughts) and hot spells. This creates ideal conditions for heat waves. Farmers suffer the most because crops need steady rainfall. For example, wheat ~~year~~ yields in Punjab dropped by 10-15% in 2022 due to heat waves.

V- Melting of Glaciers And Water Stress Pakistan

has more than 7,200 glaciers, but they are melting fast due to warming. This brings irregular water flow. Some times too little (droughts), and sometimes too much floods. In dry months, less water means the soil and land heat up, making heatwaves worse. For example, in 2024-25, Summers, GB valleys faced both glacier melting, floods, and extreme heat.

Major Causes of Heatwaves in Pak



4. Compound / Combined Effects:-

Climate change is not only bringing floods and heatwaves separately, but sometimes both have combine and make the situation even worse. When heatwaves are followed by floods, their effects become combine, mean they add more stress on people, crops, water, economy, and health.

i- Stress on Human Health:-

* Heatwaves cause dehydration, strokes, and heart problems.

* Floods spread water-borne diseases like cholera, dengue, malaria.

* When combined it creates double health crisis (after 2022 floods Sindh hospitals also reported heatstroke patients).

ii- Agriculture Loss & Food Security:-

Heatwaves damage

crops (wheat, rice, sugarcane) due to high temperature.

- * Floods wash away standing crops and fertile soil.

- * Together food shortages and higher prices.

- * 2022 floods destroyed 4 million acres of crops.

iii- Water Stress and irrigation Problems:-

- * Floods bring too much water suddenly and damage canals, dams, irrigation.

- * Heatwaves cause drought and water shortages.

- * combined effect imbalance of water.

iv- Impact on Communities and Migration:-

- * Floods displace millions of people from their places.

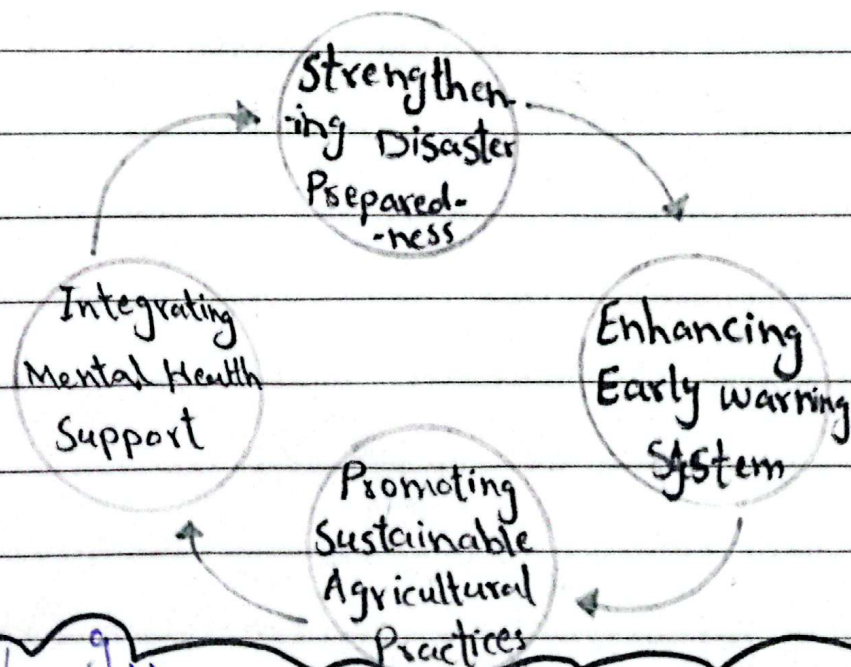
- * Heatwaves make camps and ~~shet~~ shelters unbearable (no electricity, extreme heat).

- * For example, after 2022 floods displaced families in Sindh had to live in tents during 45°C summer heat.

1- Energy and Economy Crisis:-

- * Floods damage electricity grids, gas pipelines, and roads.
- * Heatwaves increase electricity demand.
- * Together give space to power shortages, and loss of GDP.

Way Forward



i- Strengthening Disaster Preparedness

To combat

these challenges, Pakistan needs to invest in climate-resilient infrastructure, early warning systems, and community-based adaptation programs. Enhancing disaster response capabilities and promoting sustainable agricultural practices are also crucial steps toward building resilience. NDMA should train local people for emergency response. If preparation is strong, loss of lives and property will be less.

ii- Early warning system:-

Technology should be used for weather forecasting. If people get warnings about heavy rains or heatwaves early, they can shift to safe places. Mobile alerts, radio, and community centers should be used to spread quick information.

iii- Climate-Friendly Farming:-

Pakistan's agriculture needs to change. Farmers

should grow drought-resistant crops, use water-saving irrigation system, and plant more trees to reduce heatwaves. This will reduce crop loss and protect food security even in tough weather conditions.

iv. Health and Social Support:-

Hospitals

Should prepare special units for heatwaves and flood-related diseases. Mental health services must be included in disaster response. Providing counselling, medicines, and safe shelters will help people recover faster.

v. Community Awareness and Education

People:-

Should be taught about climate change, floods, and heatwaves. Schools, local groups, and media can help communities learn how to stay safe. If everyone knows what to do during disasters, the damage and loss of life will be less.

Rains

Impacts of climate change on Pakistan

i. More and Stronger Floods -

Due to climate change, Pakistan gets heavier and irregular rains. This causes big floods. For example, in 2022 floods, about 33 million people were affected and one-third of the country went under water. Again in 2025, heavy rains in Punjab and KPK displaced more than 2 million people. These floods destroy houses, crops, schools, and roads.

ii. Deadly Heatwaves:-

Hot weather is becoming more dangerous. In 2024, Sindh faced a heatwave where temperature crossed 49°C , causing more than 560 deaths. Heatwaves bring health problems like dehydration, heatstroke, and heart problems. Poor people, and workers more suffer.

i. Loss of Livelihood and Poverty:-

Floods and heatwaves destroy crops, livestock, and businesses. In 2022-25, agriculture loss was over \$30 bn. Farmers loss income, families lose homes, and many people fall into poverty.

ii. Health and Mental Stress:-

These disasters create both physical and mental health problems. Floods spread diseases like malaria, dengue, and diarrhea. Heatwaves cause strokes and breathing issues. For example, studies after 2022 floods showed high levels of mental stress in survivors.

Conclusion

Climate change is making floods and heatwaves worse in Pakistan. It affects lives, homes, and health. With better planning, strong infrastructure, safe farming, and mental health support, Pakistan can reduce these problems.

Q. Discuss the economic and social impact of climate change on Pak's agriculture and rural communities.

(1) Introduction:-

Pakistan mostly depend on farming. About 24 % of the country's economy comes from agriculture, and about 60-63% of people live in rural areas who depend on farm-land, livestock, and small businesses. Climate change is making weather more extreme. Hotter temperatures, changing rains, more floods and droughts are harming crops, animals, and livelihoods.

(2) Impacts on Agriculture:-

There are some important ways climate change which affects agriculture:

i) Changing Rains and monsoon Patterns:-

Rainfall is less predictable. Some years heavy monsoon rains cause floods that wash away fields. Other years there is a long dry spell that reduce water for crops. These patterns can be destroying agriculture sector. For example the 2022 floods damaged millions of hectares and caused large economic losses.

ii- Heat Stress and Rising Temperatures:-

Higher temperatures hurt key crops at sensitive stages like flowers. Studies models show that wheat yields may harm rice and other crops under climate change scenarios. Heat also increases the demand of water and pest attacks.

In 2025 floods, in Punjab's agriculture sector suffered heavy losses. Around 60% of the rice and 25% of the wheat crops were destroyed (Dawn, 2025)

iii- Floods and extreme Rains:-

Frequent and

Severe floods destroy standing crops, livestock and damage roads and storage. The 2022 floods affected tens of millions and caused large damages and economic losses in agriculture and infrastructure. Recent monsoon floods in 2025 again damaged farmland and displaced million of people. These events cut ~~Per~~ production sharply and raise food prices.

iv. Drought and Reduced water availability:-

In many areas face droughts and lower flows of water in rivers. Droughts reduces yields and forces ~~per~~ farmers to use more ground water. During drought farmers more depends on water for yields. But lower flows of water destroy the crops. Pakistan already sank high for water stress. Irrigation becomes costly.

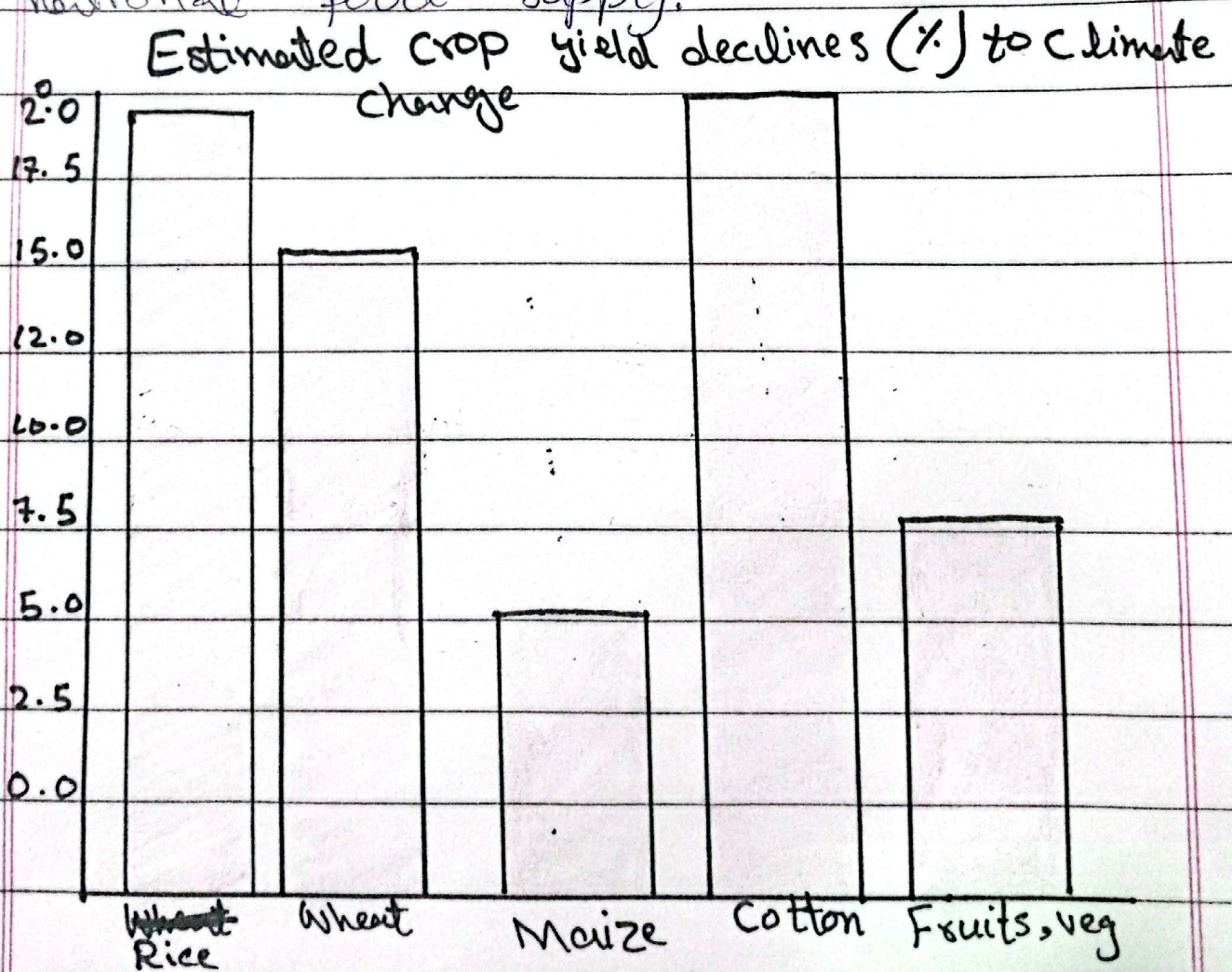
v. Decline in Yields of major Crops:-

Decline major

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Crops due climate change. Research and models show significant fall in yields. Representative estimates are wheat about 15%, rice about 20%, maize about 6%, cotton around 20%, fruits and vegetables around 8-10% in many scenarios. Lower yields reduce farmer income and national food supply.



13) Impacts on Rural Communities:-

i. Loss of Jobs and Income:-

When crops are destroyed and animals die, farm families lose the money they need for food, school, and health. Many rural households have very small savings, so even one bad season pushes them into high debt.

ii. Food Insecurity and Higher Prices:-

Lower local production raises local food prices. Poor families spend a large share of their income on food, so higher prices reduce how much they can eat.

iii. Migration to cities or Abroad:-

When farming stops giving enough money, young people move to cities or look for

work abroad. This breaks family support systems and can leave older people alone on farms.

iv. **Damage to Infrastructure and Services:-**

Floods and storms damage roads, schools and health clinics. This makes accessing markets, medicines and education harder.

v. **Health Risks:-**

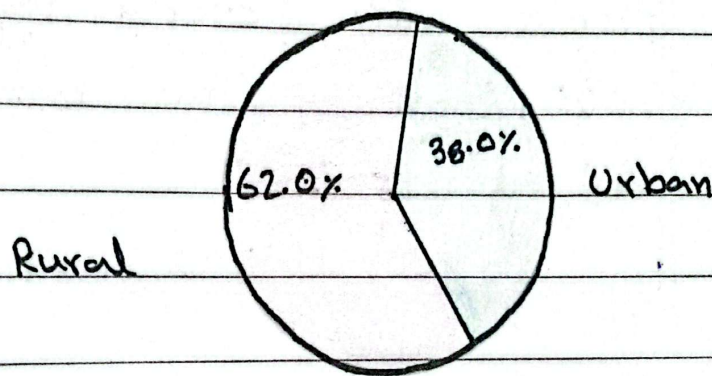
Floods and droughts increase some diseases. Heat waves raise the risk of heatstroke and lower work productivity, while, floods increase waterborn diseases such as malaria, cholera, dengue etc.

vi. **Gender and Social Effects:-**

Women often take on unpaid work, such as gathering water and caring for family. Children

Day _____ Date _____
pulled off from schools to help. Land-
less labourers and tenant farmers
are often most vulnerable because
they have fewer resources.

These social effects combine to
slow down rural development and
increase inequality. Recent floods 2022
and 2025 shows how fast these
effects can become severe.



Conclusion:-

Climate change is already
affecting Pakistan's agriculture and rural
life. The result is lower yields, higher
prices, and increased poverty for rural
families. To reduce damage, Pakistan
needs better early warning and flood

management, water saving irrigation, improve seeds and farming methods, and social protection for poorest households. Investment in these areas can reduce future losses and protect livelihoods.

Without urgent action, climate change could push more than 100 million people into poverty by 2030, most of them farmers and dwellers.

(World Bank Report)