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IMPACT OF CLIMATE CHANGE ON WATER SITUATION IN PAKISTAN: AN ANYLYSIS

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ABSTRACT

This research explores the complex nature of water shortage due to climate change. The world's ecosystems and livelihoods are most affected by climate change, and water is the main channel for these effects. Pakistan, which ranks 14th out of the 17 countries with "extremely high water risk," is already a water-stressed country. Pakistan's patterns of rainfall, snowmelt, river flows, groundwater, and water quality are expected to be impacted by climate change, which manifests itself in the form of rising temperatures and intense and unpredictable weather patterns. This may result in a rise in disputes over water-sharing measures inside and between states. Pakistan is particularly susceptible to the negative effects of climate change. The study examines how Pakistan is affected by climate change with unusual heatwaves and droughts in the summers and unexpected monsoon season rains. Pakistan's economy, which has been severely impacted by both the drought and food shortages, is based primarily on agriculture. The food water is gradually receding, but the contaminated stagnant water is endangering the residents' health in multiple ways. This study contends that Pakistan's most significant national security issue is water security. The availability of water is examined by the growing population, agriculture, and other water-using activities. The effect of excessive glacier melting, the lack of dams to store precipitation, and the lack of innovative techniques to use water for agriculture has been discussed to this research.

Climate Change as an Issue

Climate change means changing weather condition e.g. weather over ten years to million years. Climate has changed with the passage of time since long before human activities transformed and played an important role on weather transformation. At present, change that has brought by the human being is usually used environmental term as ‘climate change’. It is of course a most serious issue and discussed in society at every stage that population of the world is facing this problem in the last nineteenth century. In late 1980 s, it was known as a communal issue. At first it was considered that the circumstances were the reason of human actions and environment has met to an alarming condition and having a serious threat to whole world. Secondly, people having another view that they reject anthropogenic feature of change in climate.

People are with a view to adopt different methods to address this issue. However, public has increased involvement in discourse of climate change and understand the risks and reservations related to this issue, it has been problematic in different manners. Climate has been changing since its evolution and risks and methods emerged with the passage of time to address this issue in a serious manner. Climate change has disastrous effects on environment,

social and political wellbeing of an individual. Due to climate change, increased water shortages and unequal water distribution is the major cause of disharmony and threat over occupation of water resources. Scientists predicted that International climate change will affect the peace as well as natural resources. Similar to this, the environmental changes have inter- relationship with conflict. Water issue is closely linked with climate change (Bonn, 2011).

Impact of Climate Change in Pakistan

Climate Change is causing variation in the natural climate level of Earth and producing elements that force it to change unnaturally. The climate of Earth is changing irregularly because of greenhouse emission, which disrupts the natural system of the environment. This fluctuation in temperature impacts every aspect of human life. The first threat of climate change creates the shortage of freshwater, and as a result the survival on earth is endangered. This also affects food production because cultivation gets affected first hand. This is exactly happening in Pakistan, and the situation is going to be worse in the future (BBC, 2020).

The destruction and damage caused by global warming are evident globally, particularly in South Asia, where the vulnerabilities of the people to climate change are high, and preparation and knowledge of climate change are incredibly low (Mumtaz, 2020). Due to its high levels, Pakistan's low capacity for adaptation restricted financial capital and physical resource shortening and constant intense climatic events such as varying temperatures, ongoing floods, glacial shrinkage, seasonal and lifestyle shifts, earthquakes, and typhoons. Climate change is likely to have an awful global effect on ordinary Pakistani people and their climate change per capita impact, irrespective of whether they are responsible for producing and contributing less to GHG emissions than local animal species such as tigers, buffs, dolphins, and tortoises (Arshad, Krupnik and Aravindakshan, 2017).

Due to the geographic advantage, Pakistan has superiority over the different and diverse climate range on global level. The North and north-western high mountain ranges are freezing in winter while the summer months from April to September are sweltering. In the heat, the vast plains in the Indus Valley are hot and in the winter cold. There is a mild climate on the coastal strip in the south. The precipitation is usually deficient. The annual average rainfall in the plains in the North of the Lower Indus plains varies between 13 cm and 89 cm in the Himalayan region. Rains derive from monsoonal and fall in late summer (Abid and Elahi, 2019). The annual average precipitation is 76 cm. Karachi, the lights city, is Pakistan's trade and financial center. It contributes roughly 25% to Pakistan's GDP and 55% to the federal tax revenue as the Pakistan economy's backbone. It has instead suffered from man-made catastrophes caused by decades of confusion, risky political designs, racial rattling, institutional negligence, and indifference (Buzan, 1983).

Factors Leading to Water Scarcity in Pakistan

Many factors become the reason of water scarcity in Pakistan who shares insufficient resources. Most of the problems appear once it is common observation that one group is benefitting the share on behalf of another group. It becomes scarcer when demand of natural resources is very high by many people but on the other hand resources are scarce. Conflict over water sharing is an example of this reality. Factors that are leading to water scarcity due to water scarcity are discussed below.

Over Population

Population growth is the major problem which becomes the reason to over consumption of natural assets and pressurizes these resources. In this circumstance, this may lead to disharmony and conflict. In many countries, over-population is a very big issue which exhausts these available resources or there is no balance between demand and supply of water then it leads to conflict. Water is consumed in agricultural purposes and insufficient fresh water may cause of political instability. In these cases, it occur tension between citizens for the right to access to safe drinking water. This problem may instigate at local level that escalates to an issue at worldwide level in India-Pakistan case.

Poor Treaties

Major source of conflict are weak and poor treaties. Weak treaties are those who do not address current situation, it may be ambiguous, which do not look forward and have loopholes among one another. Each party seeks its benefits from the treaty and want to gain maximize share in the treaty. When with the passage of time, one party realizes that treaty does not favor it, they respond to revisit the features of it and sometimes they want to withdraw it. Instability in relations and inability to focus future trends is the major cause of weak treaties between India Pakistan relations. When this treaty was signed between India and Pakistan, water needs were not considered seriously in upcoming period.

Water Scarcity

Water is a natural resource, on which survival of the world is based. Water shortage is seen when these water sources are not distributed equally, which results in a lack of water supply for drinking purposes or cultivation. The climate of the earth is increasing, which makes rapid precipitation causing water shortage. This cause is just one example that is contributing to water scarcity; however there are numerous other reasons for playing their part in creating a scarcity of freshwater (Wagan&Khoso, 2013).

Inadequate Water Management Measures

When a natural resource is discovered then people exploit this natural resource until it is depleted. Countries do not understand the circumstances and misuse it. A lot of poor states do not preserve water even though it is a very basic need of human being. These states are incapable to fulfill the demand of their inhabitants due to lack of preservation of water. Sometimes, these water resources dry up or go to declining level. Pakistan's water level is declining due to mishandling and having no reservoirs for saving this natural resource (Ahmad, S. 2009). Also country is unable to satisfy its citizen's demand of water. Inadequate water supply is another cause of water shortage. In this way, countries blamed each other for water shortage that later on becomes the reason of conflicts.

High Temperature

The average annual temperature in the Pakistan Centre for Climate Change Studies has highlighted as Sindh and Balochistan have increased temperatures. Over the past century, Pakistan's average temperature has risen by 0.6°C, complying with the average temperature growth. The average increase in temperature across Pakistan by the end of the century, by about 1° C relative to the global average, as indicated by potential predictions for climate change, based on all four IPCC-AR5 RCP scenarios. This rise in temperatures, in particular, includes the steady regressive effects of most glaciers (except for a small minority in the region of Karaqorum) that account for the bulk of the country's water supplies and shifts in the rainfall pattern, including the rising intensity of severe events (flood, droughts, thermal oceans, and cyclone activity (Mumtaz, 2020). The water cycle in Pakistan is the leading climate change region affected. Climate change is expected to impact agriculture as one of the leading industries negatively. Climate change will threaten the supply of food, limit food access, and impact food quality. Projected spikes in temperatures, climate improvements, changes in extremes, and water supply all contribute to lower farm productivity. Global change and emissions are both the source of seasonal smog.

Climate change has also affected Pakistan economically. According to scientists, in recent years, Pakistan has faced with over 150 freak events triggered by climate change: flash floods, winter smog, summer forest fires, melted glaciers, freaky heat waves, landslides, and displaced residents. Almost 10% of Pakistan's people were displaced during the 2010-11 floods in two provinces, one North of Pakistan and another south. Last year, climate change extreme weather damages were $384 million; in the past 20 years, the national economy has lost nearly $ 2 billion due to climate change ravages. The universe now responds to the threat. Greta Thunberg, an ecology activist from the Swedish teens, rocked top leaders in more than 4,500 places with a call for a global climate change on 20 September 2019, registered demonstrations in around 150 states (Mumtaz, 2020).

Rainfall Patterns

The improvement in total rainfall at a national level increases to just 60 mm over a 109-year period, which results in an average increase of about 0.5 mm/year, which is marginal considering its quantitative effects (Qadeer, 2020) The number of meteorological observatories was smaller in the 19th century, and most evidence from reconstructed proxy data, such as tree rings, coral reefs, sediments. The critical aspect of precipitation is their time and space instability, which involves careful analysis of their problematic behavior. However, in recent decades continuous dry and rainy spells throughout at least several years have also been measured for Pakistan as to the impacts of global warming and climate change, but this weather parameter still has a wide-scale variance (Mumtaz, 2020).

Seasonal Changes/ Monsoon

Monsoon pluviometers are the critical sources of freshwater important in summer in the Subcontinent for agricultural practices and human help. This research is primarily intended for review, using satellite and ground-based measurements, rainfall, and temperature fluctuations in Pakistan over the northern monsoon belt. The rainfall satellite network data was collected by the TRMM and the rainfall and temperature data from 15 land stations in the Pakistan Meteorological Department (PMD). Data was analyzed to detect climatic changes and Spatio-temporal changes in Pakistan's monsoon precipitation. The study indicates that the TRMM and PMD datasets have a strong correlation. In the last two decades, there has been a decline in monsoon rainfall (Abid and Elahi, 2019). In 2010–2017, a more marked drop in monsoon rainfall, i.e., 17.58 mm per year, and a rise in temperature of 0.18°C were observed. A rapid space transition happens with monsoon precipitation (regression =2.5 mm/day), while mild to high monsoon precipitation is seen with an eastbound change. Climate change in the future and its effect on the distribution patterns of precipitation pose a danger to marine habitats around the world. The Climate Change Intergovernmental Panel has said that drought-hit areas may develop both in time and space and the severity of heavy rainfall events is likely to increase as a manifestation of the impacts of climate change on fresh aquatic systems (Akhter, 2015).

The long-term shifts in monsoon pluvial scales across India have important effects for the region's socioeconomic circles. The Indian Subcontinent is adversely affected by increased climatic variations, higher temperatures and drastic decreases in summer precipitation over some regions that could contribute to water stress by 2020. In contrast to other countries under the same monsoon regime, monsoon rainy season period in Pakistan is very short, because Pakistan is located in the western end of the south-west region. Pakistan's position in the Indian summer monsoon zone and demonstrates the active rainfall cycle represented by isohyets over Pakistan. The successful summer season is 1 month and a half compared to 4 months in India for Pakistan. Each year begins from July to September and erratic adjustments to the volume of seasonal average precipitation from year to year are two essential elements of this monsoon scheme. The Summer Monsoon system in South Asia is known as a totally integrated ocean-country-atmosphere system involving run into, but not yet fully investigating all input and mechanics involved (Arshad, Krupnik and Aravindakshan, 2017).

An Increasing issue: Environmental Variation

Effects of environmental variation are, for example, Melting ice sheets, Sea-level rise, Loss of sea-shores, Less usable land, Droughts, Floods, Desertification, diseases and epidemic; including potential socio-political impacts, for example, Livelihood shortage and high poverty rate, less access to fresh drinking water, decline in human wellbeing, shortage of food, Increased movement, Increased social pressure; also some are potential dangers to security and soundness, for example, Risk to worldwide economic improvement, threat of international and national clashes, Strain on humanitarian issue and global organizations, Strains rising from migrants and movement, make strict laws that activate radicals or extremist militants (Prakash, 2012).

Security hazard and danger exists, for example, a powerless or weak state, Atmosphere Threat, Non-Climate Threats, Poverty, Climate Impact, Atmospheric Consequences, Extremism and International Economy Etc. All of these factors are the main reason of environmental variation.

Interrelationship of Water and Climate Change

Environmental change is going on; nobody is discussing that reality despite the fact that the purposes behind change in atmosphere (for example regular or anthropogenic) may be still arguable. Regular risks are increasing as it is seen from floods, starvation, droughts, and number of cyclones. This isn't just causing loss of property, but on the other hand is expanding maladies (in the affected zones) and adding to the fiscal deficit. A dangerous atmospheric deviation has accelerated in the ongoing years; climate incidences are intensifying the situation on land as well as their recurrence as high temperatures. Effect of environmental change is on both freshwater assets and furthermore on seas as far as due to Acidification Sea creature is dying. An adjustment in sea acridity is probably going to decrease the sea's ability to retain CO2 from the air, consequently exacerbating the impacts of environmental change that affect the whole sea naturally (Bengali, 2001). Moreover, a huge change is seen in icy masses and precipitation systems which have just happened. Softening snow and warm extension of seas are causing ocean level ascent. Most of the populations live near the coastline but when sea-level rises it causes the flooding and disintegration. In this situation, access to safe drinking water becomes a major problem living in particular area. In this way, climate change has direct impact on sea level rise and amount of fresh water too.

Even though uncovering coastlines, where most of the populace lives, to more noteworthy disintegration and flooding pressures, rising ocean levels may decline the amount of environmental change and water assets, access to the freshwater of the populace living in a particular area. Freshwater is significant in light of the fact that moves identified with freshwater: an excess of water, less water and nature of water are completely worsened by environmental change (Bates, 2008). It is said that a blend of the worldwide clear picture, and the national level (network level with meetings of nearby individuals in certain networks far and wide) effect of environmental change. As one of the writers (Gupta, 2014) has clarified, "… the issue of environmental change is about the economy; our production and utilization frameworks depends on water. Environmental change is about society, our ways of life, our employments, our nourishment, and our entertainment. Environmental change is about such huge number of issues and can be defined from various perspectives, that we frequently overlook that environmental change is additionally about water, water that makes our planet quite unique; water that makes life possible; water that makes the economy flourish. The connection among climate and water is critical (Zeitoun, 2011)

Changing Patterns of Climate

Because of climate change, the water situation is also changing as the temperature of the earth is increasing and so the water resources are exhausting quickly. Moreover, the Treaty was designed by keeping into consideration the temperature of the period of the previous century. In this way, the Indus Water Treaty is a failure to address water scarcity which is being created because of high temperature. The high temperature is the reason behind this exhaustion is increased precipitation and limited rainfall. The Indus water Treaty fails to provide substitute measures for climate change and it has no provision for Indus basin sustainability. This is why this agreement which was considered providing a highly reliable mechanism is losing its effectiveness (Qamar, Azmat, & Claps, 2019). Many scientists have proved that climate is impacting Indus River Basin. Climate change has affected western Himalayas due to increased rainfalls and changing patterns of precipitation (Krishnan and Sabin, 2019). Rapid Melting of glaciers within Karakoram mountain range and high rainfall has become the major changes in IRB. This extraordinary climate change affects the Indus River. For the next few decades, many scientists have predicted that climate has new trends and changing patterns for subcontinent generally and the Indus River Basin (IRB)

specifically. The complexity of climate phenomena means that these forecasts inevitably come with uncertainties (Westing, 1986)

Conclusion and Recommendations

There is a need for efficient use of water resources. Pakistan can get high value from its water if it is handled systematically. Pakistan has high water than many other countries, it has a long coastline with the Arabian sea extended over 146 km. It is admitted that water is although low per capita water, but the water it has is enough to give it economic and social privileges. There is a need to take urgent action, to control this water scarcity. The country is expected to make significant changes in policies and structure, to overcome shortages, to promise a peaceful and secure life in the country (Altaf, 2019). Need for a national water policy that efficiently handles water pollution, water wastage, and take measures to control this scarcity. Control the excess concentration of arsenic in drinking water, and keep it healthy and fresh. There is a high need to build dams, to store water. As the Kala Bagh dam is the victim of politics, and for these reasons, it has not been built, nor is its structure finalized after passing many years. Multiple small dams to be built to control water scarcity (Randhawa, 2017). There is a need to plant trees and forests to help in stabilizing the environment (Qureshi & Akintuğ, 2014). Pakistan is blessed with glaciers which are highest in number comparing to other countries, these glaciers are melting due to temperature increase, there is need to control greenhouse emission, and secure these glaciers (Nabi, Ali, Khan, & Kumar, 2019).

The temperature of the earth is rising because of human activities which are damaging the balance of the environment. Resultantly the climate of the earth is changing. Similar is for Pakistan where the climate is rapidly changing, causing many other factors. Water sources are the most sensitive factors which easily get affected by climatic change. The glaciers and snow on mountain tops are melting rapidly and the glaciers are also retreating every year. There is an expected dry spell in Pakistan because of this water scarcity. The food supply and life of humans get affected by this climatic change. It becomes necessary for the government to take preventive measures and get control of this threatening situation (Briscoe, J., 2006).

These factors which are discussed above primarily include climate changes, changing of a natural environment, and the water scarcity. On the basis of all the facts mentioned, we conclude that this is need of the hour to revise hydro policies in Pakistan.

Climate change could be controlled while reducing the dependence on fossil fuels. Shifting from fossil fuels to energy resources such as solar energy and hydropower that do not produce CO2 will help to control change in climate. Human activities are directly affected on Greenhouse gasses, planning in population growth should be thought in the long run. Pakistan has much more problematic situation of water access in both urban and rural areas. It necessitates imperative considerations. The advancement and up gradation of irrigation system is needed to enhance water utilization on urgent basis. All the stakeholders must show their consent on the issue of Kalabagh Dam that is in the best interest of Pakistan. Besides this, Bhasha and Muhammand dam should be taken as a serious national issue as water is the main factor of prosperous Pakistan. Politicizing the water issue is the criminal act that is not in favor of national interest. Research culture and technological development must be promoted in the main areas. Water shortage issue in Pakistan requires political will, vision and applicable political policy making approach.

It is time to think about the water crisis and looming threat of war over water in near future. If we do not take serious decisions and address this hot issue at different fronts, a very dreadful and horrible picture of Pakistan transforming fertile into deserted Pakistan. If we are unable to understand the impacts of climate change on water and unable to follow the new techniques to handle the water issue in a good manner then our coming generations will not forgive us for such a criminal negligence on the wastage of natural resources. Pakistan is facing with misconception and distrust since its inception. It is dire need to build understanding on all footings for the welfare of the masses of Pakistan.

REFERENCES

Abid, M., Scheffran, J., Schneider, U.A. and Elahi, E., (2019). Farmer perceptions of climatechange, observed trends and adaptation of agriculture in Pakistan. *Environmental management*, *63*(1), pp.110-123.

Ahmad, S. (2009). Water Resources and Management in Pakistan- Challenges and Future Vision. . Paper Presented in the Course on Integrated Water Resources Management at the National University of Agricultural Sciences.

Akhter, M., (2015). Dams as a climate change adaptation strategy: Geopolitical implications for Pakistan. *Strategic Analysis*, *39*(6), pp.744-748.

Anjal Prakash., Saravanan, V. and Choudrey, J. (2012).Interlacing water and human health. New Delhi: Sage Publications.

Arshad, M., Kächele, H., Krupnik, T.J., Amjath-Babu, T.S., Aravindakshan, S., Abbas, A., Mehmood, Y. and Müller, K., (2017). Climate variability, farmland value, and farmers' perceptions of climate change: implications for adaptation in rural Pakistan. *International Journal of Sustainable Development & World Ecology*, *24*(6), pp.532-544.

Bates, B. C. (2008, January). Climate Change and Water.Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat.

BBC. (2020). What is climate change? A really simple guide. Retrieved from https://www.bbc.com/news/science-environment-24021772

Bengali, K., &Gazdar, H. (2001, April 1). Resolving the Water Crisis, Dawn.

Bonn, (2011). Nexus Conference, 2012. Messages from the Bonn2011 Conference: The Water, Energy and Food Security Nexus – Solutions for a Green Economy. Available on:http://www.water-energy-food.org/en/whats_the_nexus/ messages_policy_recommendations.html.

Buzan, Barry. (1983) People, States and Fear: The National Security Problem in International Relations. Chapel Hill: The University of North Carolina Press.

Gupta, J. ((2014). The History of Global Climate Governance. . Cambridge: Cambridge University Press. .

Intergovernmental Panel on Climate Change, IPCC (ed.) (2001) Climate Change 2001: Impact, Adaptation and Vulnerability. Contribution of Working Group II of the Intergovernmental Panel on Climate Change to the Third Assessment Report of IPCC, London: Cambridge University Press.

Khalid, Iram. (2018). Food Security: Understanding Pakistan's National Security Concerns. Journal of Political Studies, Special Issue, [online] 121:132. Available at: http://pu.edu.pk/images/journal/pols/pdf-files/10_spec_18.pdf

Khan, A. J., Koch, M., &Tahir, A. A. (2020).Impacts of Climate Change on the Water Availability, Seasonality and Extremes in the Upper Indus Basin (UIB).Sustainability , 1283.

Mumtaz, I.K.T., 2020. Impact of Climate Change on Aquatic Situation in India: Implications for Pakistan.

Mustafa, D., Akhter, M., &Nasrallah, N. (2013).Understanding Pakistan's water-security nexus. Washington, DC: United States Institute of Peace.

Nabi, G., Ali, M., Khan, S., & Kumar, S. (2019). The crisis of water shortage and pollution in Pakistan: risk to public health, biodiversity, and ecosystem. Environmental science and pollution research, 26 (11), 10443-10445.

Qadeer, N. (2019, February 16). Pakistan's water crisis. Retrieved from https://tribune.com.pk/story/1911457/6-pakistans-water-crisis-2/

Qamar, M. U., Azmat, M., & Claps, P. (2019). Pitfalls in transboundary Indus Water Treaty: a perspective to prevent unattended threats to the global security. . npj Clean Water , 9 (1), 1-9.

Qureshi, F. U., &Akintuğ, B. (2014).Hydropower potential in Pakistan.11th IntCongrAdvCiv Eng.

Qureshi, W. A. (2017). Water as a Human Right: A Case Study of the Pakistan-India Water Conflict Water Conflict. Penn State Journal of Law & International Affairs .

Randhawa, S. (2017, MARCH 21). 'Pakistan to run out of forests in 50 years at current rate'. Retrieved from Pakistan today:
https://www.pakistantoday.com.pk/2017/03/21/pakistan-to-run-out-of-forests-in-50-years-at-current-rate/

Wagan, F. H., &Khoso, S. (2013). WATER SHORTAGE ITS CAUSES, IMPACTS AND REMEDIAL MEASURES. In 6th International Civil Engineering Congress 28th December Karachi, Pakistan.

Westing, A. H., ed. (1986). Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action. New York, NY: Oxford University Press.

Zeitoun, M., (2011). "The Global Web of National Water Security", Global Policy 2(3): 286-296.