

## Water Crisis in Pakistan: An Analysis of Causes and Solutions

By

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### Abstract:

*Water is the necessity of life. Shortage of water may create a number of problems particularly if this shortage reaches to national level. Agriculture, factories and all other resources of national prosperity are somehow based on water. This paper examines the water crisis in Pakistan. The paper explores the current situation and upcoming situation of the water crisis, the causes of water shortage e.g. Urbanization, climate change, Indian treaty, population, over pumping of ground water. Besides this paper also suggests some possibilities for the solution such as construction of dams and other water reservoirs, public awareness for the importance of water, installation of trees and organizations for beneficial managements.*

**Keywords:** Water Crisis, Pakistan, Causes, Solutions etc.

### Introduction:

“Do not waste water even if you were at a running stream” (Prophet Muhammad peace be upon him).

Water is an essential need of human existence. Every organism contains 50-90% water. The basic need of water for a human is 2 liters per day. 70.8% of earth's surface is covered by water which is not suitable for drinking and irrigation. Increasing level of population and global warming effected the world and raised a dangerous situation for human existence. The climatically changes especially the decreasing level of rains created the shortage of water.

Pakistan is among those countries which are suffering the crisis of water. The crisis of water is a serious and sensitive issue in Pakistan. Pakistan is among top five countries which are establishing and developing the good resources of water. Despite of these establishments 22 million people of Pakistan can't access to drink clean water.

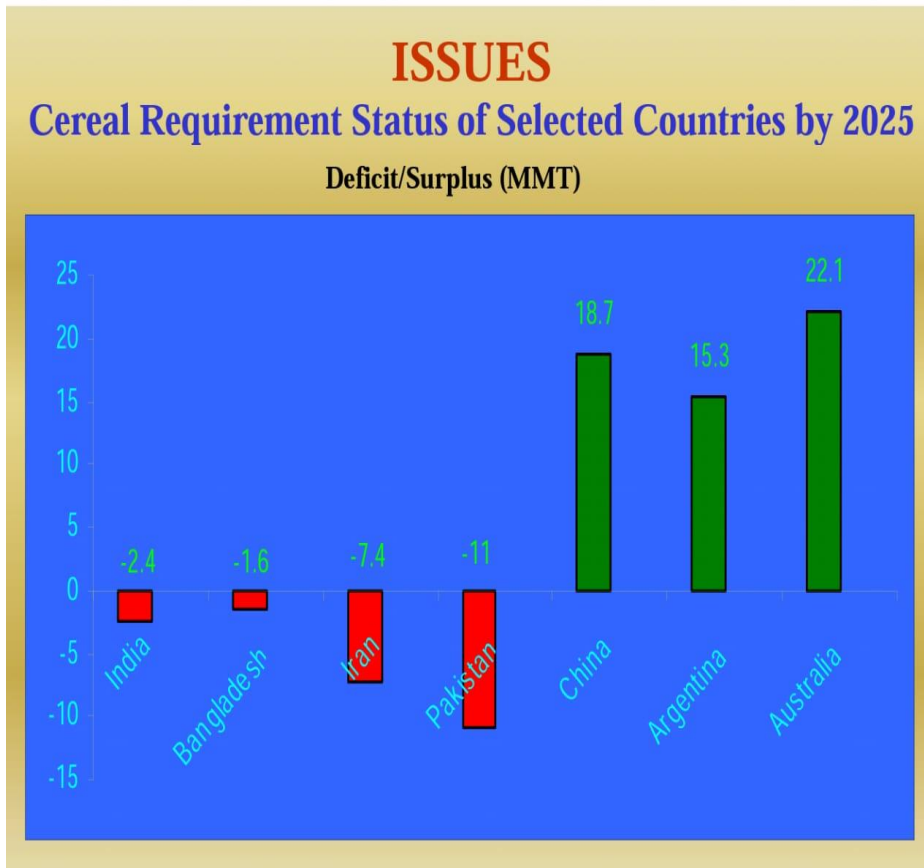
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The major water resource of Pakistan is Indus River which provide 138 million acre feet (MAF) of water every year. According to “UN world water development report” Pakistan is in the category of countries which are highly stressed due to water. According to “Pakistani federal government’s planning and development division” the situation of urbanization and increasing population decreasing the availability of water, from 1,299 m<sup>3</sup> per capita in 1996 to 1,101 m<sup>3</sup> per capita in 2004. This worst situation increasing the need of ground water. Many urban and rural areas using the supply of underground water. This Water is saline containing salt which is dangerous for human health and cause many diseases.

This study aims to highlight water crisis in Pakistan. The current and upcoming situation of water. For this study I have viewed and read previous and currently published researches on water crisis. I have analyzed and briefly discussed the causes behind water crisis and gave some possibilities for the solution of problem.



**Literature Review:**

Many researches has been done on the water problems in Pakistan. The water issues have the center of attraction but still it need more progress. There are a lot of researches and discussions which aimed to aware us about water crisis in Pakistan despite of it Pakistan is going towards the worst situation.

According to John Briscoe & Qamar (2005), among world's most dry countries Pakistan is one of country which have 240mm rainfall per year. They said Pakistan faced many challenges regarding its economy. First challenge was the India treaty (1960) after independence. Second challenge was inappropriate matching of Pakistan's water in western areas from that eastern area which were the irrigated areas. Therefore, Pakistani engineers started to build up Tarbela dam, which is now largest dam of Pakistan. They said currently Pakistan need sustain water and invest water. It need to construct more dams. It has to improve the quality of its projects, water productivity should be increased, poor governance need improvement. They also suggested hopeful facts for Pakistan such as scope of water productivity, beneficial water infrastructures, well establishments of water reservoirs. They said in past Pakistan overcome against water challenges and for future it would progress as well.

According to Ahmed (2006) water crisis in Pakistan increased due to Indus water treaty (1961) and it is further increased due to over using and building of tube wells growth. He emphasized the new technologies and developments like building of large and small canals. Building of new dams and new projects for investments and storage of water.

Rauf (2010) has done a research on "water shortage in Pakistan". In which he discussed the role of Indian treaty on Pakistan which is responsible for water crisis in Pakistan. He said that India built up a chain of dams around western Pakistan which is directly a challenging situation for Pakistan and its economy.

Rauf (2010) has done a research on "Water wars and navigation peace over Indus River Basin" in which he said that water which is basic need of human and countries, now a days menacing because of political issues, increasing urbanization and global warming. Demand of water is increasing and the supply of water is decreasing. He says that international relations are very important among states but water complexities arise the treasure among the riparian states. Disagreement on water between Pakistan and India creates three wars. Indus water treaty and recently building a chain of dams by India into western Pakistan again created conflicts among both countries. He says world Bank said that "if the wars of this century were fought over oil, the wars of the next century will be fought over water". He concludes that that both countries should understand the necessity of water and it is only possible through cooperation.

Bashir (2011) said that we all know the importance of water. We all need to carefully use it and preserve it. Instead of fighting with each other the capacity for storage of water is needed and for that purpose he suggested the building of small and mega reservoirs and dams. He said managements should increase water supply of partner shipping and owner shipping through community participation. He concluded that public awareness is very important.

Enum (2013) analyzed Pakistan's water crisis in her research in which she analyzed water logging and salinity on human health. She discussed that how climate changing causing water problems. She concluded that demands of water are more than that is available. In 1948 the availability of water was 5,600 cubic meters and currently it is only 1,000 cubic meter per capita. Other than that she also highlighted the water resources such as rainfalls, glaciers, the Indus River and dams.

Salim et al. (2013) analyzed in their research that water is necessary for the life on earth. It is basic need for survival as well as essential for economy. They highlighted the causes of water and concluded that industrialization, urbanization, spreading irrigation areas are creating the crisis of water.

Salik et al. (2014) analyzed and discussed kalabagh dam issue and its effects on Sindh and KPK by Global mapper software and through satellite images. They also discussed political issues regarding the construction of Kalabagh dam.

Nawaz (2015) said that water crisis and climate change are effecting the food chain in Pakistan and its production. Unsafe water spreading many diseases and recently drought in Therparker has determined the situation of Pakistan. A better investment of ground and surface water help us to make the situation better.

State bank of Pakistan's annual report (2016-2017), highlighted the availability of water and its demand in Pakistan and challenges of water sustainability. According to this report current situation of water is at a risk level because of urbanization and climate changes. Water supply is not well established. In the future climatically changes may reduce the overall supply of water to the country. Other south Asian countries receive 1000 mm water annually by rain fall while Pakistan only receive less than 500 mm water annually. Limited sources of water storing are turning to worst conditions.

Kwon et al. (2017) analyzed the quality of underground water in Pakistan in their research. They concluded that the industrial wastes and mining has damage the water quality therefore they emphasized to follow the instructions of law and security of trees.

National water policy of Pakistan (2018), made policies for water storage. According to it Pakistan has a wide network of irrigation such as glaciers and water of monsoon rainfalls into Indus river. Arabian sea and Indus river are the backbone of Pakistan's economy and gives a

large resource of water for both domestic and industrial use. According to its report water crisis are increased from last three decades because of climate changes and population. Global warming increasing the sea levels therefor this policy as settle down some principles for the scarcity of water which are summarized as:

- There should be a water treatment for the reuse of water.
- Utilization of water through storages e.g. building dams and barrages.
- Improvement of water resources for different uses.
- Providing awareness of the importance of water to public through media.
- In order to overcome to the stresses there must be abundance of food and water.
- Improvement of water sectors is needed.
- By improving the treatment of trees for the expanding the forests.
- Pre-planned storage management for flood water.
- Harvesting of water through technologies.
- Security for wet lands.
- Security for water sectors for the storage of water and its better use.

Other than these major principles this policy also provided instructions for groundwater. This policy emphasized that every Pakistani has equal right to drink clean water.

### **Discussion:**

Pakistan is facing a critical situation of water crisis. At the time of independence, the availability of water was 5000 cubic meters per capita per annum which is now decreased to 1000 only in 2007. According to pillar (2014) Pakistan's situation will turn into a drought condition by 2025. Pakistan's first "water and Power Development Authority" was created in 1958 to develop and undertake the schemes of irrigation, water supply and drainage, flood control distribution of power and generation transmission, internal navigation and prevention of waterlogging and reclamation of waterlogged and saline land. We can see that every institute are progressing their duties but what are the circumstances which are creating unaffordable situations. Recently The Senate Secretariat forum with all members discussed the critical situation of Pakistan. The meeting was held on 18<sup>th</sup> January 2018, the departments which were the part of meeting were Pakistan's Council of Research in Water Resources, Water and Power Development Authority, Ministry of Planning Development and Reforms, Indus River System Authority, Ministry of Water Resources. Ministry of water resources highlighted the water shortage and brief that Pakistan is falling

dangerously into the category of “water scare countries”. The new schemes for the development of water sources are 31 and ongoing schemes are 50 for which more funds are required.

The crisis of water is not new in Pakistan. This problem has the center of attraction among Medias and talk shows. According to “Pakistan defense forum social and current events” load shading and corruption are the only problems on which public forced to take action and the authorities enact on such problems, the problem and issues of water also need attention. Perhaps we all are familiar with the problem and situation but it still need progress.

“And among His signs is that He shows you the lightning, for fear and for hope, and He sends down water (rain) from the sky, and therewith revives the earth after its death. Verily, in that are indeed signs for people who understand”.

Al Qur’an (Surah Ar-Rum, verse 24).

The shortage of water can slowly create crisis of economy as well, because not only human concern with water. Agriculture also need the supply of water for the production of food. No, doubt every country’s economy depends on its industrialization and agriculture. Pakistan’s total area for agriculture is 196 million acres out of which 77.1 million is appropriate. Seventy-one percent land for agriculture is already cultivated naturally by rai and irrigation. The remaining 29% can be fertile if managements supply water for irrigation (Economic review, 2002). The poor establishments lead to the flood in country and recently the dangerous flood of 2010 has damaged homes, human lives, and crops and spread many diseases. We all are aware about the main sources of water in Pakistan such as Indus River and Arabian Sea Karachi. The water of flood of 2010 flowed into Arabian Sea containing all sort of dirt. Now the fact is that how we can come up over the situation. It is not like that government is only responsible for situation. Every citizen should realize that problem is not concern with government. Every citizen should enhance their efforts and as said by great personality Prophet Mohammad (peace be upon him) “do not waste water even if you were at a running stream”.

#### **Water Quality Status in Pakistan:**

Increasing levels of diseases are caused by pollutant water. Pakistan’s water quality is becoming sour very fast. The sources for such supply water is ground water. Regarding this situation or status of water “The Pakistan Council Research in Water Resources (PCRWR)” has started a National program for observing the level of water and quality of water.

#### **Water Quality Status in Punjab:**

Soomro, Z. A. et al analyzed the water quality in Punjab by collecting water samples from 8 districts of Punjab. They said that many districts of Punjab have unsafe water for drinking. The collected water samples were highly containing microbiological organics such as microbes and Arsenic. Bahawalpur contains the amount of Arsenic 88%, Gujranwala 64%, Kasur 100%, Lahore 100%, Multan 94% and Sheikhpura 73%. Other than that the presence of Nitrates found in the district Rawalpindi (47%) and in Sargodha (54%).

**Water Quality status in Baluchistan**

From Baluchistan they took water samples from 4 cities which are Khuzdar, Ziarat, Quetta and Lorelai. In order to the quality 100% of water is unfit in Ziarat, 68% in Quetta, 91% in both cities Lorelai and Khuzdar. The presence of Nitrates in Quetta is 24%, Lorelai 9%, and Khuzdar 18%, respectively.

**Quality Status in Khyber Pakhtun khuwa Water:**

Under the monitoring in KPK 4 cities were selected for sample which are Abbottabad, Mangora, Mardan and Peshawar, according to the analysis, Iron was founded in water samples. The presence of Iron in Abbottabad was 0%, Mangora 0%, Mardan 67% and in Peshawar 38% was founded.

**Water quality status in Sindh**

The analysis of water samples in Sindh were done from 3 cities. Which are Sukkar, Hyderabad and Karachi. The unfit percentage of water in Sukkar was 67%, Hyderabad 93% and in Karachi it was 86%.

These results of water Monitoring has shown that the quality of water is not well and the presence of high organics metals are causing several diseases. Water supply schemes need improvement. This status need investigation by the authorities.

“There is enough water for everyone and water insufficiency due to mismanagement, corruption, lack of appropriate institutions, bureaucratic insertion and shortage of investment in both human capacity and physical infrastructure”. (The United Nations World Water Development Report 2006). Regarding this report, I think if authorities has power to manage situation. Then it is to be noted that every problem has its roots of beginning, but blaming each other is not a solution for problem. We need to look for possibilities for the solution of problem. According to “Ministry of Planning and Development (2005)” Pakistan has three main resources of storage which are nineteen barrages, eighty small dams, twelve link canals and forty-five command canals.

**Climate:**

Moving further I will discuss the causes and reason behind the water crisis. The first reason behind water problem is climate. Pakistan is among the countries which are affected by global warming. Due to global warming climate changings are occurring which is negatively

affecting the country and its resources. Pakistan's 13,680 sq.km is covered by glaciers. Pakistan's glaciers are expected to melt by 2035. Heavy rainfalls of monsoon threatening the glaciers of Himalayan, Karakorum and Hindukush. These glaciers flows into Indus River. By Indus River the associated rivers and seas are increasing by level, for this purpose deposition of dams creating intense flood in nearby regions. These flooded saline sea water affecting the agriculture and fisheries.

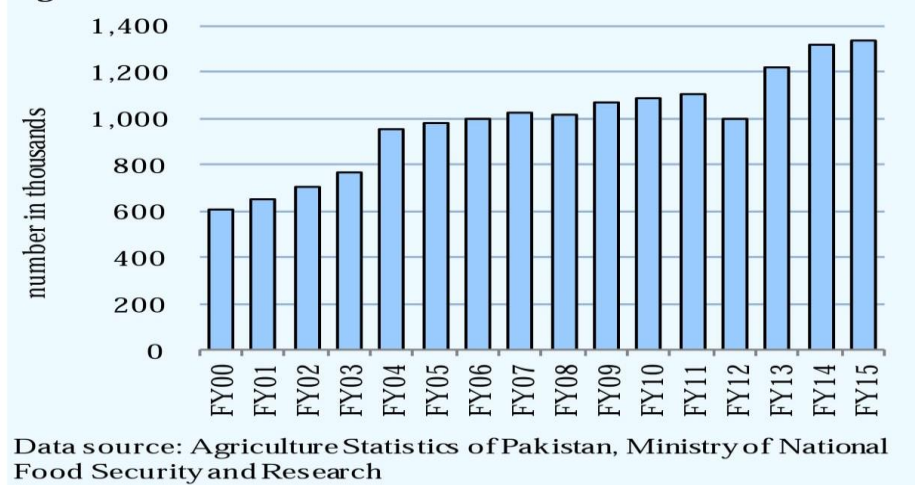
### **Ground Water:**

The second reason behind water problem is ground water and it's over pumping. The 2.5% of earth's surface water is fresh out of which groundwater contains 30% of fresh water. (USGS, 2016). The demand of ground water in Pakistan is increasing because of the agriculture and industrial use. Pakistan has the average of rainfall 200mm per year. Ground water is limited. Pakistan has only 40% of water for domestic use and 60% of water is wasting due to poor and less establishments and managements therefore the use of underground water is increasing in rural areas. Now this process of using underground water is severely increased and the level of underground water is decreased. The over pumping of ground water is creating a situation of crisis of water. Ground water contain organic metals which are affecting the human life and creating many diseases.

### **Indian Treaty (1960) and the Indus River System:**

The third reason behind water crisis is "Indian treaty (1960) and the Indus river system". Indus River is the largest river in Pakistan which is supporting 90% agriculture of Pakistan. India built up a chain of dams near western Pakistan in 1960 where nearby dams are Ravi and Sutlej. The construction of other dams by India created a short or less flow of water into Pakistan.

**Figure 7.5: Number of Tube wells**



### **Population:**



The fourth and last reason is population. The population of Pakistan according to 1951 census was 75 million (east and west/modern Bangladesh) which is now increased. According to 2017 census it is 191.71 million. The increasing population and demands need more availability of more water. Increased population increased the use of water which has created the shortage of water.

### **Possibilities for the Solution of Problem:**

#### **Public Awareness:**

National water policy suggested that for the storage, conservation and for to avoid wasting water, public awareness is very necessary.

Organization of different programs will aware public from the current situation so that they will know the importance of water and will avoid to waste it. Media can aware people to conserve water as it is the basic need for survival. Researches should be conducted by national universities on the importance of water such as the importance of water economically, socially and financially.

#### **Organizations**

Pakistan's national water policy organized certain management for current and upcoming situation which are as following.

- Flood management
- Urban storm management
- Drought management
- Water logging and quality management
- Information management
- Demand management

If above all organized managements will work as they are concerned with, the crisis situation will be better. These all managements not only need organization. The government should enact according the purpose of managements so that this situation will improve.

#### **Ground Water:**

Over pumping of ground water should be avoided. Authorities should alarm the public to avoid overuse of ground water because it contains organic metals which are harmful. Tube wells should be build up according to the permission of authorities and organizations.

#### **Plantation of Trees:**

Water is a basic need of human life. The sustainability of water can be improved or increased by forestation. As long as we will have trees we will get rains because during the process of photosynthesis water release from the plants of tree. These water in atmosphere help to the formation of clouds. This rainforest cycle of water provides the rain. So, raising temperature due to global warming would be control with the help of installation of trees. Prime minister of Pakistan Imran Khan started to launch 10 billion trees in Pakistan on 2<sup>nd</sup> September 2018.

Plantation of trees would be a great source against climate change and global warming. Malik Amin Aslam (advisor of climate change) requested to all Pakistanis to be a part of PMs Plant for Pakistan mission. If we hold this mission now and in future, it would be a great source Turing the situation toward a positive direction. A green environment will help to reduce population and it will produce or cause rains.

**Constructions of Dams:**

A dam is an artificial barrier in which the water of rains, ponds and streams are collected for storage. It aims to supply water and generate electricity. According to the “International commission on large Dams” there are 150 dams and reservoirs in Pakistan containing the height of 15m (49FF). Tarbela dam is the largest dam in Pakistan. It is largest dam in Pakistan by structural volume and is located in Khyber Pakhtun Khuwa Pakistan. Its construction was begun to store, irrigation, flood control of water and to generate hydroelectric power. Other than that Pakistan’s top 10 dams are Mangla dam, Mirani dam, Hub dam, Sabakzai dam, Gomal zam dam, Duber khwar dam, Warsak dam and khanpoor dam.

Building of large and small dams and reservoirs will help authorities to treat crisis issues in a possible way. It is truly a positive step that country has started developing some canals which are under in work such as greater Thal canal in Punjab, Raineer canal in Sindh. Kachi canal in Baluchistan and Chasma Right bank canal in Khyber Pakhtun Khuwa.

Construction of Diamir Bhasha dam will play a vital role for Pakistan. Chief Justice of Pakistan Mir Saqib Nisar and Water and power Development Authority (WAPDA) started the progress on its construction and call Pakistanis for donation. It is located near Indus River. Its height will be 272m and will have the 8.1 MAF (million acre feet) capacity for the storage of water.

Furthermore, Mohmand Dam which is located near FATA. It will have the 1.2 MAF capacity for the water storage.



### Conclusion:

Water is an essential need of human existence. The basic need of water for a human is 2 liters per day. Pakistan is among these countries which are suffering the shortage of water. The demand of water is more than that is available. The main reasons behind the crisis are increasing population Urbanization, climate changings, global warming and over pumping of ground water. The impact of the water shortage effecting the human health. Pakistan's economy and agriculture are also effected due to water crisis. By the point of view which are discussed above, Pakistan will dry by 2025 and its glaciers will melt by 2035. BY holding these alarming situation we have to sort out some solutions. First of all, the construction of reservoirs such as construction of dams, barrages, canal. The government of Pakistan is progressing and the construction of such reservoirs is on way forward. Secondly trees play an important role for a good environment. Tree cycle create moist in air which form clouds, results the rain water. Ground water which is available 30% as fresh water has become Saline due to over pumping. Saline water is highly harmful for health. Therefore, over pumping should be avoided and for that purpose public awareness is very necessary. In the last of paper, I implement that regarding the establishments, organization and management's rules for water crisis should be enacted by government and authorities.

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