CLEAN DRINKING WATER AND FUTURE PROSPECTIVE

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ABSTRACT: Water is one of the most important and vital substance on earth. Without water, there would be no life on this planet (earth). Around 20% of the human population planet has access to quality drinking water. Pakistan is listed 6th highly populated country on the earth having about 207.81 million individuals. Punjab is the most populated province of Pakistan with 110 million people. Contamination of drinking water is the most burning issue of the country. Industrialization, increase in population, intermixing of sewer in pipelines of drinking water and improper utilization of water compromise the quality and decrease the quantity of water. The physical, chemical and biological parameters of water have great detrimental effects on health. Water borne diseases in Pakistan are typhoid, diarrhea, cholera etc. The impact of poor sanitation and hygiene also have adverse effect on tourism, thereby affecting the economy of the country. Government Departments and Agencies are actively working through different interventions like chlorination to ensure facility of clean and quality drinking water to people. Chlorination is a process which is adopted to inactivate pathogens in water. Pakistan Council of Research in Water Resources (PCRWR) and Punjab Food Authority (PFA) conduct sampling and testing of the bottled water companies on periodical basis. Government of Punjab has established Aab-e-Pak Authority under Punjab Aab-e-Pak Act, 2019 for the provision of clean, safe and quality drinking water. Punjab Water Act, 2019, a comprehensive law on the subject has been passed but not implemented. Pakistan is also facing water insufficiency, water quality deterioration and demolition of freshwater resources. The world best practices regarding clean drinking water have also been analyzed. Keeping this in view, the short term, medium term and long term plans have been devised for the provision of clean and quality drinking water and improved sanitation facilities to the masses.

Key words: Clean drinking water, sanitation, health, diseases.

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INTRODUCTION

Water is a pivotal element on Earth which has vital importance to sustain life. It is second to oxygen for being essential for life. To work, function properly and grow, every living organisms need water (Kundzewicz, 2008; Abbas *et al.,* 2021). Humans can survive for days or weeks without food but not more than three to four days without water. If water supply is not enough, human body will grind to a halt and collapse. About 71% of the planet surface is covered with water of which oceans accounts almost 96.5% of all earth's water. Merely 3% of planet water is fresh water, out of which 1.2% drinkable water; the remaining water is locked up in ice caps, glaciers and permafrost, or buried deep in the ground (Gattuso *et al.,* 2019; Dinka, 2018).

Human population is continually rising and is about to touch a figure of 9000 million people on the planet by 2040 (Abbas, 2020; Abbas, 2020a). The increased human population requires high demand of global freshwater (Postel 1999; Hinrichsen *et al.* 1998; Rosegrant *et al.* 2002; UNEP 2003a; Shiklomanov and Rodda 2003; Gleick 2004). However, according to UNICEF-WHO, 2015 report about 2.6 billion people have access to quality drinking water sources from the three decades. However, villages lag behind city areas in both quality and coverage (Bain *et al.* 2014a; 2014b). Regardless of a remarkable increase in worldwide access to quality drinking water, about 1.8 billion people still have to drink feces contaminated water (Davis, 2013; Bain *et al.,* 2014; Bain *et al.* 2014a; UNFP, 2015; UNESCO, 2015). One of the standard established by

World Health Organization (WHO) set guidelines for the upper and lower limits of some inorganic compounds in drinking water. However, consumption of poor quality and contaminated water in developing countries has resulted in significant number of illnesses and deaths of people. The International Water Associations and the WHO are promoting the use of Water Safety Plans (WSPs), a risk management approach to provide quality drinking water. On each 22nd March the World Water Day is celebrated to draw the attention of the people to water related issues.

This universe is very vast and our planet is a very small part of it just like a sand particle from overall volume of desert. This universe is creation of the ALLAH ALMIGHTY and every individual has equal right to use its resources but unfortunately most of the earth resources are in excessive access of the powerful and rich people and they are using it mercilessly. People who have more purchasing power are destroying the earth rapidly i.e using more fuel, more air conditions producing more chlorofluorocarbons, halos and hydrochlorofluorocarbons, greenhouse gases, wasting the resources, converting the agricultural land to housing societies etc. Due to greenhouse gases, glaciers are melting rapidly that is an alarming sign. All people should convey the message that in future human on earth will have to face dangers of severe shortage of water if certain measures were not adopted. Most of the glaciers in Pakistan will be diminished in next few decades and there will be no water from glaciers after 2060 in Pakistan (UNDP) which may lead to severe feed security concerns.

Pakistan ranked at 142nd among 189 countries according to Human Poverty Index and ranked at 144th among 189 countries in UN's Human Development Index. (HDI 2020, UNDP, 2020 Rankings). UNDP multidimensional HDI is based on indices of education, nutrition, child mortality and access to safe water. Safe drinking water is important to control many diseases such as diarrhea, cholera and typhoid. About 80% of all diseases through the globe are related to poor quality water. It is well known that the provision/distribution of fresh and quality water in most areas is less a problem of physical water scarcity than more a problem of economical water scarcity throughout the world. Poor governance and mismanagement lay at the heart of the world's water crisis (Rogers and Hall, 2003). Managing existing drinking water resources is a key to ensure water security at local, national and international levels (UNDP 2013). Rogers and Hall (2003) stated that the effectiveness of water governance in many places of the world has been undermined by poor management, corruption, lack of appropriate institutions, bureaucratic inertia, insufficient capacity and shortage of investment. Figure 1 shows the water stress by countries throughout the globe accordingly. According to Post-2015 Millennium Development Goals (MDGs), unequal access possibilities to drinking water remain a problem. The water withdrawal and consumption in Pakistan is described in Table 1.

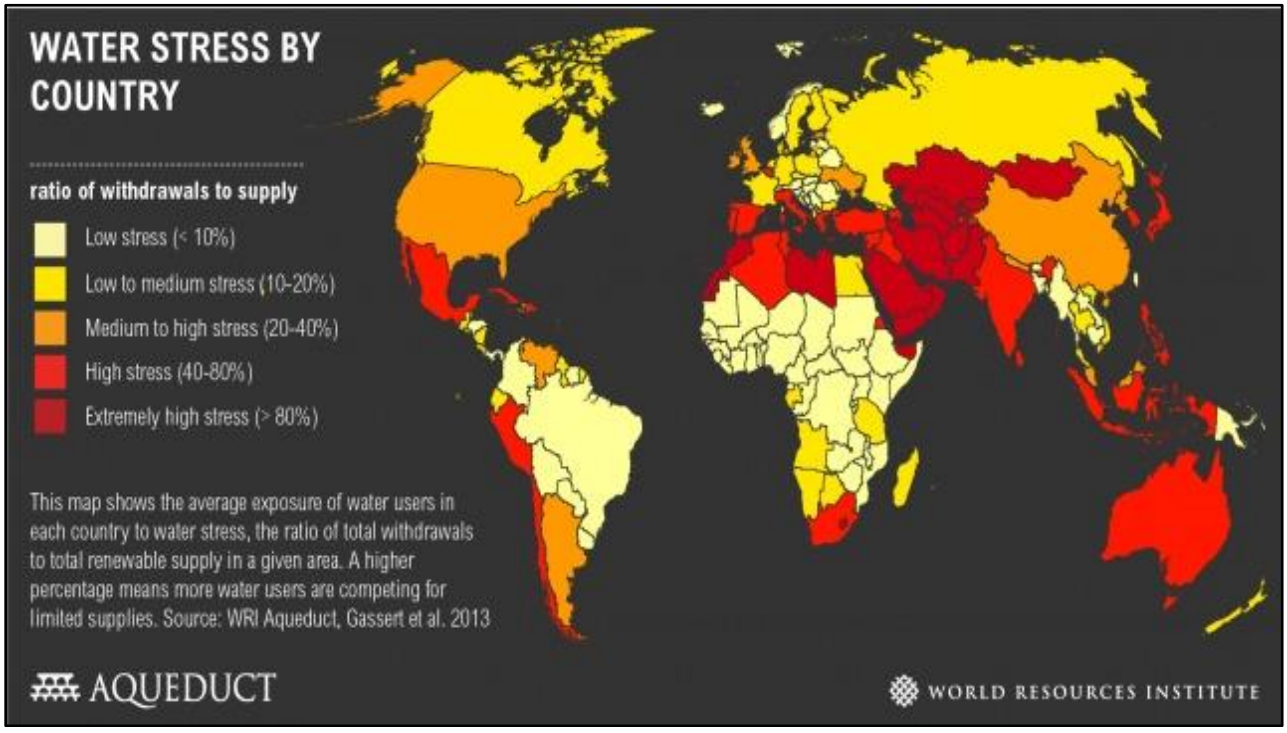

Figure 1: Water stress by countries throughout the globe.

Pakistan Council of Research in Water Resources (PCRWR) has reported that 44% of the total population in the country have no access to safe quality drinking water, although, in villages areas 90 percent of the population lacks such access. About 20% of the whole population of Pakistan has access to safe drinking water.

Table1: Water withdrawal and consumption in Pakistan.

	Water with drawl (BCM)		Water consumption (BCM)
Canals	122	Irrigation	80
Ground water	62	Livestock	1
Total	184	Municipal	1
Double counting	48	Industrial	<1
Net withdrawal	136	Total	82

Amir and Habib, 2015; FAO, 2011
BCM= billion cubic meters

The rest 80% population have to use poor quality drinking water due to unavailability healthy drinking water sources. The Government of Pakistan has developed Clean and Green Pakistan Index (CGPI), which is used as an index at city/tehsil and neighborhood level aims to rank cities/tehsils and neighborhoods regarding to their cleanliness and greenery. The CGPI is the central pillar of CGPM officially promoted by the Prime Minister (PM) of Pakistan on November 25, 2019. The provision of quality drinking water was placed as top indicator in the CGPI including water supply coverage, functional water supply and free from contamination at house hold per consumer level. The Per capita availability of water in Punjab is shown (Figure 2)

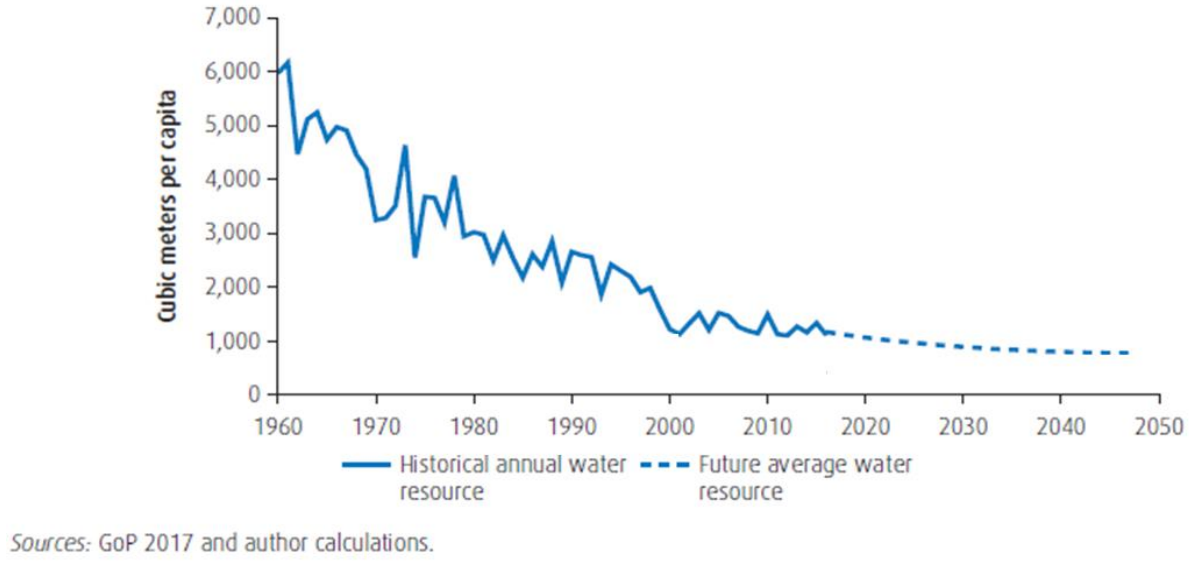

Figure 2: The per capita water availability in Punjab

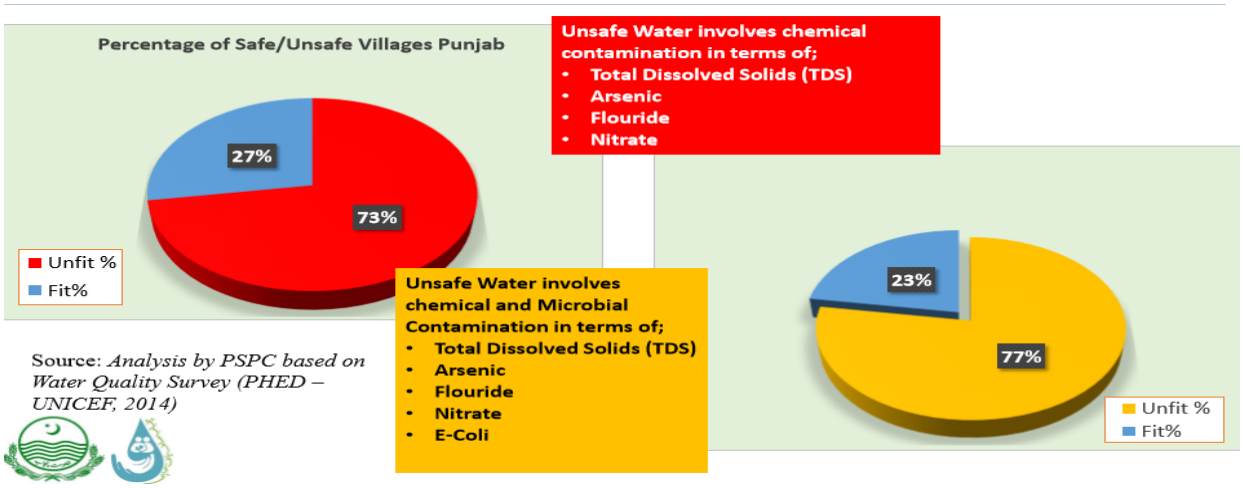

Figure 3: The status of water quality in Punjab

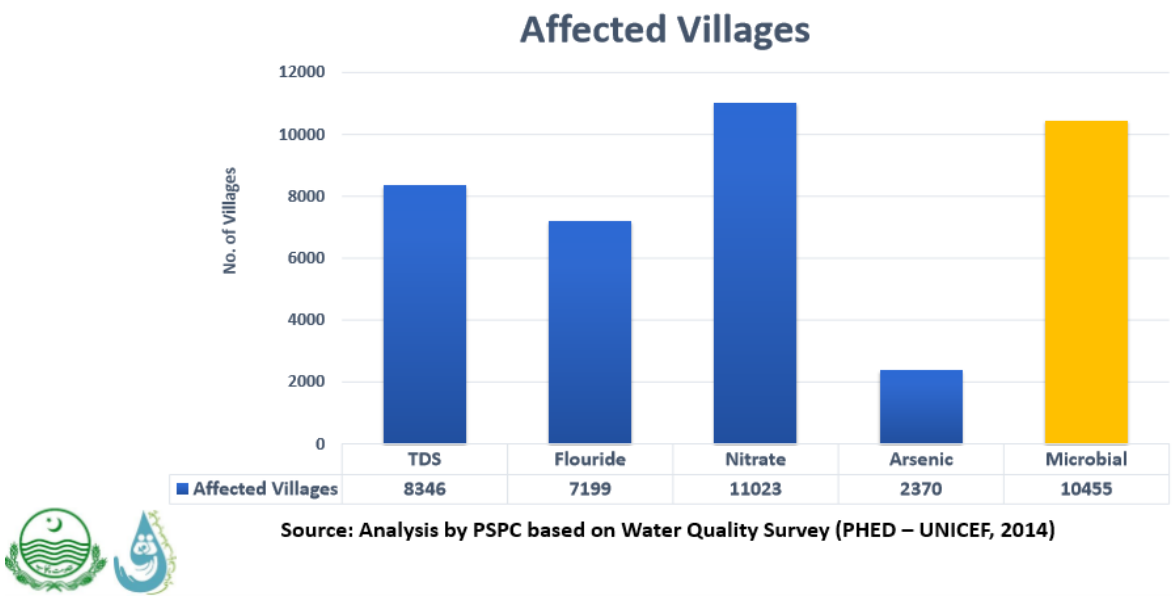

Figure 4: The status of water quality in affected villages

The main aims to combat the challenges of water crisis:

- To examine the situation of water crises in Punjab and to evaluate constraints to transfer the clean drinking water to the masses.
- To develop a socially adapted good-practice framework of risk-management in relative to drinking water safety.
- To assess the governmental strategies/policies regarding water supply and how Punjab Government can combat the challenge of water crisis.
- To recognize practical, cost-effective drinking water source protection measures applicable in the local context.

Provision of Clean Drinking Water is one the MDGs set to be achieved by 2030. It is hoped that concerted efforts should be made to ensure that by 2030 and that all people throughout globe will have been provided safe and sustainable quality water, sanitation, primary health services, adequate nutrition and basic necessities such as roads, electricity and connectivity for global information (Bos *et al.,* 2016; Samra and Fawzi, 2011; WHO, 2011; WHO, 2017; OECD, 2011; Sedlak and Schnoor, 2013; Venkatachalam and Informal, 2015).

Water resources of the world are decreasing speedily so we should adopt all measures to save every single drop of water for ours future generations even flood water can also be saved if controlled by increasing the seepage of water into the soil. The flood of 2010 was a big catastrophe of Pakistan which caused a huge devastating effect on the economy of Pakistan and retreated it fifty years back due to lack of proper management (unavailability of dams).

Situational Analysis: Pakistan is the 6th high populated country of the world having 207.87 million people. Of these 132.29 million reside in the rural areas and rest of 75.58 million individuals reside in the urban areas. It is expected that population of Pakistan will reach about 307 million people by 2050 making it 3.4% of the human population on the planet. Punjab is the most highly populated province of Pakistan having nearly 110 million people as per Population Census 2017. The present growth rate of population in Punjab is 2.13% as compared to 2.4% at national level. Achieving good sanitation and safe quality drinking water supply to public are the Millennium Development Goals (MDGs). Goal 6.1 ensures the equitable and universal opportunities to affordable and safe drinking water by 2030. Goal 6.2 addresses about the sanitation in terms of providing distinctive care to womenfolk, vulnerable, disables and elderly groups by 2030 (Assembly, 2015). The provision of quality drinking water and sanitation services are the fundamental rights of the people as implicit from Article 9, Pakistan Constitution 1973 which states that no person shall be deprived of life or liberty save under law. It is imperative to be aware about the determinants for safe drinking water and improved sanitation as well. To focus on capacity building of local governments and promoting Public- Private Partnerships (PPP mode) are utmost important to improve the operation and maintenance of water supply and sanitation schemes.

According to the Punjab Multiple Indicator Cluster Survey (MICS) 2018, almost 98% people have facility of an improved source of drinking water. Table 2 indicates overall distribution of improved water source to households (HHs) in the province.

Table 2 - Access to drinking water supply by source in Punjab.

	MICS 2018			MICS 2014		
All source of drinking water -%	Urban	Rural	Total	Urban	Rural	Total
Piped into dwelling	15.1	3.8	7.9	25.8	4.6	11.6
Piped into compound, yard or plot	4.0	3.9	4.0	1.9	1.7	1.8
Piped to neighbour	1.9	1.7	1.8	1.1	0.8	0.9
Public tap /Standpipe	7.8	3.5	5.1	10.3	2.6	5.1
Tube well	0.9	1.1	1.0	0.9	0.7	0.8
Hand pump (Mechanical)	7.2	35.7	25.3	8.6	41.5	30.6
Motorized pump (donkey/Turbine)	34.1	39.5	37.5	38.2	43.4	41.7
Tanker-truck	0.6	0.2	0.3	0.3	0.1	0.2
Cart with small tank/drum	24.9	7.2	13.6	8.9	1.7	4.1
Protected well	0.5	1.0	0.8	0.5	1.1	0.9
Protected spring	0.1	0.2	0.2	0.1	0.4	0.3
Bottled water (mineral)	1.1	0.1	0.5	1.6	0.1	0.6
Improved Water	98.2	97.9	98.0	89.1	96.8	94.3
Unprotected well	0.1	0.5	0.3	0.0	0.3	0.2
Unprotected spring	0.1	0.2	0.1	0.0	0.2	0.2
Surface water (river, stream, dam, lake, pond)	0.4	0.9	0.7	0.1	0.2	0.1
WATER KIOSK	0.8	0.1	0.4	0.8	0.1	0.4
Other	0.4	0.4	0.4	1.5	0.7	1.0
Unimproved Water	1.8	2.1	2	10.9	3.2	5.8

Likewise Punjab MICS 2018 also depicts that 80.1% of the people are living in households with good sanitation and hygienic facilities which are higher in urban i.e. 92.8% areas when compared to villages i.e. 72.8% areas. Most probably, 13% population of the Punjab mostly in rural parts is using open defecation that was17.5% in 2014 and 23% in 2011. A break-up of the sanitation services in the Punjab (urban and rural) is shown in Table 3.

Quality of Water in Punjab: Water quality is closely linked to survival of human as many diseases are water borne diseases (WHO, 2013). The contaminated water is source of pathogenic microbes and is the most burning issue of society (Khan and Ahmed, 2012; Postel *et al.* 1996, Pimentel *et al.* 2004). The drinking water for human must be free from chemical pollution (fluoride, arsenic, iron, nitrates and other heavy metals), contaminants and physical properties such as turbidity, hardness, total dissolved solids (TDS). According to MICS 2018 about 63.8% of household's water sources were free from contamination *E. coli*. This figure is 60.8% in cities areas and 66.6% in village areas. An increased industrialization, a rise in human population, wrong and excessive use of water have decreased the drinking water quality and quantity. In 1947, the per capita availability of water per annum was 5600 cubic meter while in 2020 it reduced to 870 cubic meter.

The drinking water quality is determined by water level, water source, efficacy of treatment and overall conditions of water supply lines. The physical, chemical and biological parameters of drinking water have great detrimental effects on the human health. Unfortunately, the anthropogenic activities i.e. a higher rise in human population, increased industrialization and inappropriate water utilization have decreased the drinking water quantity to a great extent (Daud *et al*., 2017; Figure 3 and Figure 4).

Table 3: Access to Sanitation by Source in Punjab

	MICS 2017-%			MICS 2013-%		
All source of Sanitation	Urban	Rural	Total	Urban	Rural	Total
Flush to piped sewer system	56.9	4.9	23.8	56.3	4.1	21.3
Flush to septic tank	32.0	50.0	43.5	33.8	49.1	44.1
Flush to pit (latrine)	2.8	15.4	10.8	1.5	12.2	8.7
Flush to unknown place/ not sure	0.6	0.7	0.7	0.3	0.3	0.3
Ventilated improved pit latrine (VIP)	0.2	0.1	0.7	0.1	0.3	0.2
Pit latrine with slab	0.2	0.7	0.5	0.1	0.8	0.6
Improved Sanitation	**92.8**	**72.8**	**80.1**	92.1	66.8	75.1
Flush to open Drain	5.5	6.6	6.2	6.2	7.2	6.9
Pit latrine without slab/ open pit	0.0	0.3	0.2	0.1	0.3	0.2
Bucket	0.0	0.0	0.0	0.0	0.0	0.0
No facility, bush, field	1.4	19.7	13.0	1.3	25.4	17.5
Other	0.3	0.5	0.4	0.1	0.3	0.2
Missing	0.0	0.0	0.0	0.3	0.1	0.1
Unimproved Sanitation	**7.2**	**27.2**	**19.9**	7.9	33.2	24.9

Quantity of Water: Only 16 countries have more water than Pakistan but it is world's 6th most populous country. Less than 10% of global population has lesser water per capita than Pakistan. Whereas, 32 countries have less water per capita than Pakistan and only 6 (all African) out of 32 are poorer than Pakistan.

Diseases Due to Contaminated Water: About 30% of diseases and 40% of human deaths in Pakistan are due to poor water quality (Kahlown *et al.*, 2006). Diarrhea, a water borne disease has been reported as a main cause of mortality in children and infants in Pakistan whilst every 5th individual of the country is suffering from water borne diseases i.e. gastroenteritis diarrhea, typhoid and worms infestation such as *Ascaridia galli*. There are about 100 million number of reported cases of diarrhea per year in the country (WHO - 1972-73).

Economic and Health Hazards: The need for improvement in water and sanitation infrastructure is the basis to the wellbeing of all citizens and these essential services will definitely contribute to socio-economic development. The impact of poor sanitation and hygiene have adverse effects on human health, cost of medical treatment, production losses due to absence from work owing to bad health, cost of time spent by caretakers / family members, time spent to access services and drastic impacts on tourism etc. It has an overall influence on the economy and socio-economic development.

Sectoral Analysis of Clean Drinking Water in Punjab: Government of Punjab under various arrangements and initiatives has given this responsibility to its various departments, agencies and authorities. This segment of the document will discuss the role and contribution of these institutions.

Role of Community Development Department and Local Government: Under the umbrella of Local Government and Community Development Department, 229 Local Governments like Metropolitan Corporations, Municipal Corporations and Municipal Committees are responsible to provide drinking water in their urban areas of jurisdiction through tube wells and water filtration plants. Local Governments have been mandated to ensure regular chlorination of drinking water to ensure its safety for human consumption. *Chlorination is a process which is adopted to inactivate pathogens.* Drinking water mechanism describes the water supply wherewithal of Local Governments. Local Governments also engage local philanthropists and NGOs which establish water filtration plants in different urban localities (Figure 5).

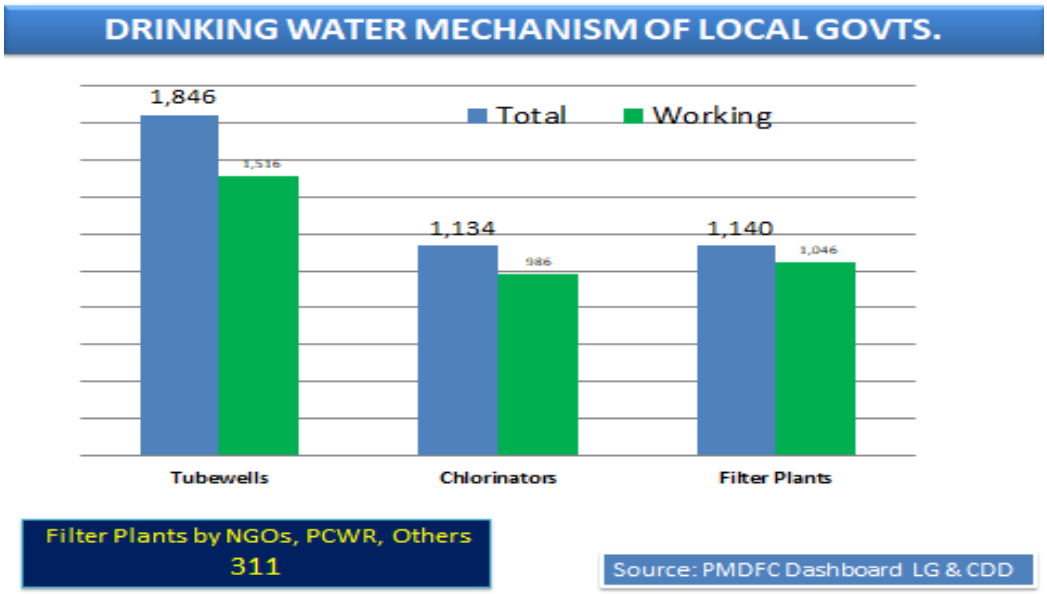

Figure 5: Mechanism of Local Governments for drinking water

Local Government and Community Development Department with the support of World Bank and Asian Development Bank have also initiated two flagship programs namely Punjab Cities Program (PCP) and Punjab Intermediate Cities Improvement Investment Program (PICIIP) in 16 and 6 cities respectively, for the rehabilitation and improvement of water supply systems of these targeted cities. Under PCP program, holistic planning of 14 cities catering to the requirements of water supply till 2050 will be made.

Water and Sanitation Agencies: Water and Sanitation Agencies in five mega cities (Lahore, Multan, Faisalabad, Gujranwala and Rawalpindi) of Punjab have been created under the Punjab Development of Cities Act, 1976. WASAs are responsible to provide safe drinking water and sanitation services in these urban areas. Figure 6 depicts the demand, supply and short fall of water on per day basis.

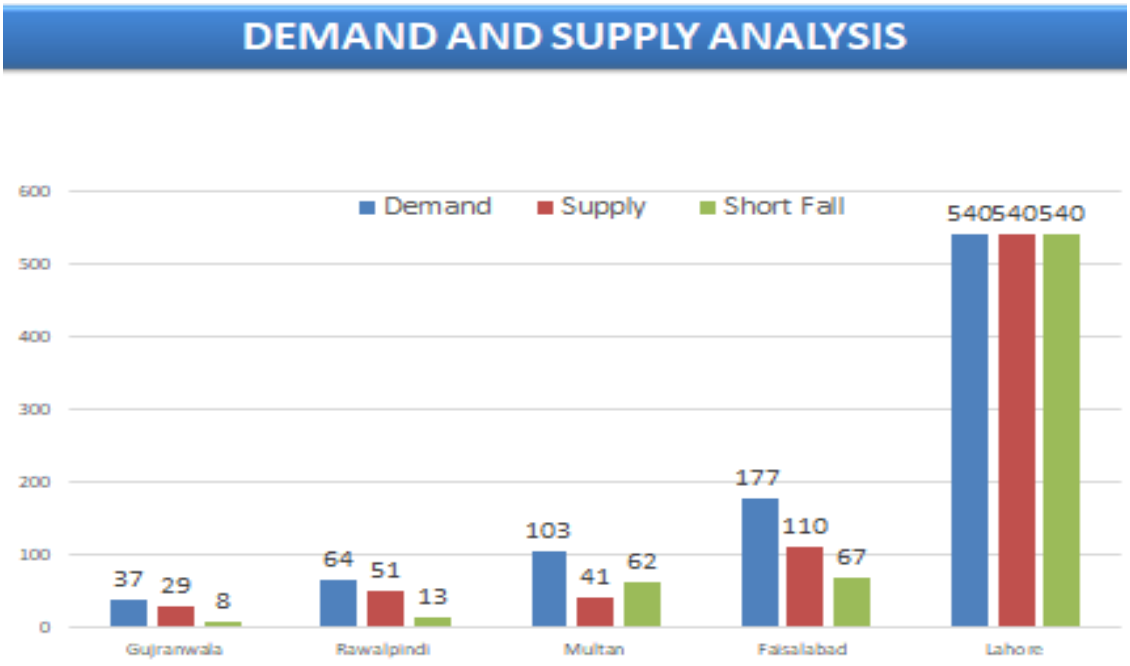

Figure 6: Demand, supply and shortfall of water on per day basis

HUD & Public Health Engineering Department: The HUD & PHED has two zones (North and South), each is headed by Chief Engineer. According to latest available data, Department is managing 5,172 rural water supply schemes in whole Punjab. Out of these schemes, 3,372 are functional whereas 1,800 schemes are dysfunctional. Almost 14,609,416 people are the direct beneficiaries of these functional schemes. These water supply schemes are run by community based organizations (CBOs). However, startling number of around 1800 water supply schemes are dysfunctional due to reasons like nonpayment of electricity dues, damage of machinery, outlived utility, community conflict, failure of the source and the stealing of transformers. Figure 7 illustrates the situation in more elaborate manners.

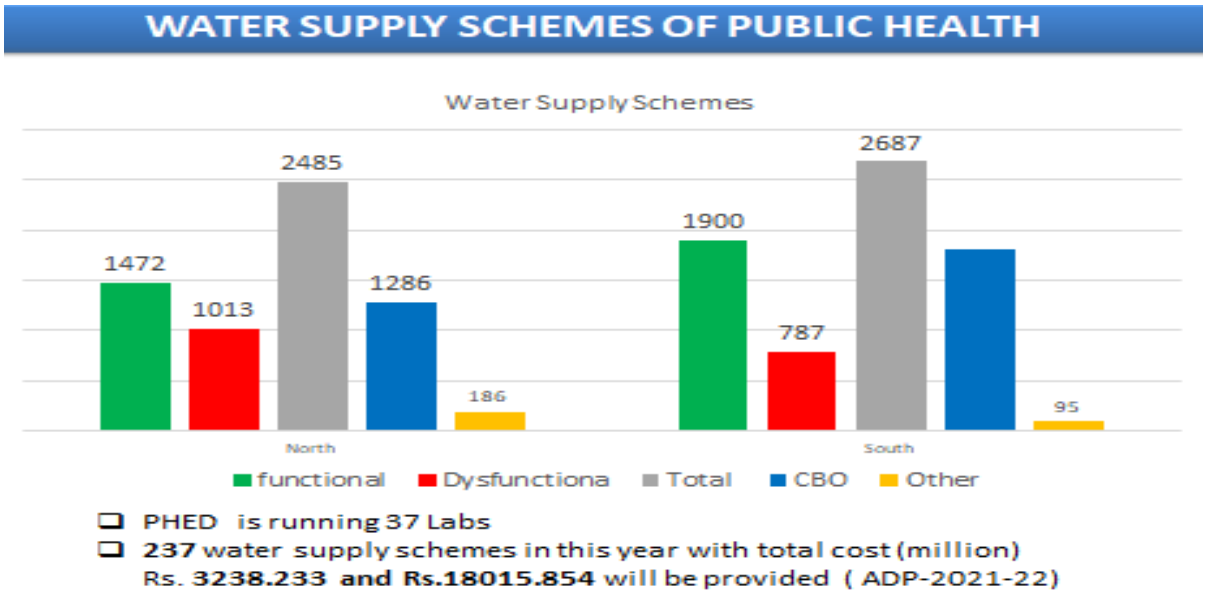

Figure 7: Schemes of Public health with respect to water supply

Government of the Punjab has approved 237 new water supply schemes in the ADP 2021-22 with approximate cost of Rs.3.2 Bn and will provide Rs.1.88 Bn during the current financial year. With the commissioning of new water supply schemes, major segment of rural population will avail themselves the blessing of clean drinking water.

Punjab Aab-e-Pak Authority: Considering the unmet needs of clean and safe drinking water and to ensure access to clean drinking water to all residents of Punjab, Government of the Punjab has established Aab-e-Pak Authority under Punjab Aab-e-Pak Act 2019.The Authority has already approved 13 out of 14 projects during the financial year 2020-21 and will launch following projects during 2021-22. The Authority has claimed that with the installation and launching of these projects, it will address the needs of safe drinking water of almost 15 million people.

- 1,538 Filtration Plants/Marakiz-e-Aab, 1 surface water treatment plant and 1 conventional treatment plant.
- Provision of safe drinking water (South Zone) by utilizing 111 existing boreholes (estimated beneficiaries 3.0 m).
- Provision of safe drinking water (North Zone) by utilizing 66 existing boreholes (beneficiaries 1.8m).
- Installation of 175 need based filtration plants in South Zone (beneficiaries 0.9m).
- Installation of 350 need based Filtration Plants in North Zone (beneficiaries 1.7m).

LEGAL FRAMEWORK: Water has been a key ingredient in the human settlement. Increase in population put the pressure on the demand of water and created the water scarcity. The Federal Water Pollution Control Act, 1948 was the first major U.S law for controlling water Pollution. Water laws in Pakistan are usually overlooked and are left to be learnt through experience, which is a high cost option for the framers and professionals (Lucy Lytton, 2013).

According to Article 9 of the Constitution of Pakistan 1973, every individual of Pakistan has the fundamental Right to life and liberty. Pakistan Superior Courts have elaborated on this fundamental Right to include clean drinking water. In 2005 the August Supreme Court of Pakistan introduces the *Doctrine of Public Trust* with respect to quality drinking water which is a national resource and the asset of entire society.

Mainly, at the federal level, the colonial-era Easements Act, 1882 deals with the groundwater rights.

Rather, main Provincial Legislation associated with water sector inter-alia was the Canal and Drainage Act 1873, Rural Area Drinking Water Supply Act 1985 and the Punjab Food Authority Act, 2011. Under the Punjab Food Authority Act, water has been defined as food under section 2f (v). Under the Act ibid, the Punjab Food Authority is the first agency of its kind in Pakistan, which aims to ensure safety and quality of all food items and products but these provincial laws do not cover all aspects relating to management of groundwater resources, sanitation and other challenges for supply of the clean drinking water (Adil Nadeem, 2021).

Ex-Chief Justice of Pakistan Mian Saqib Nisar on 7th June, 2018 took suo-moto notice of water shortage and lack of supply throughout the country. The CJP warned that, if water reserves are not well conserved, it could become more expensive than oil, gas and gold one day.

In recent years Pakistan has taken certain steps towards addressing modern groundwater challenges, safe and clean drinking water, improved sanitation and hygiene starting with the National Water Policy 2018. This was followed by Punjab Water Policy 2018, approved by the Provincial Cabinet held on 29.12.2018. The Policy inter-alia provides strategic objectives, for provision of safe and clean drinking water to all urban and rural people in the Punjab as well as protection of surface and groundwater sources and supply of clean drinking water.

The Government of Punjab has promulgated the Punjab Aab-e-Pak Authority Act, 2019 to make available a sustainable quality drinking water supply to every individual of the Punjab. The Punjab Water Act, 2019 was promulgated, which replaces the colonial-era Easements Act (1882), whereby all agricultural farmers could earlier extract groundwater on their property independent and without any state oversight. The Water Act inter-alia provides for comprehensive management of all water resources in the Punjab (Syed Hamid Hussain Shah, Irrigation Water Law in Pakistan: Chapter 3).

The Water Act establishes a licensing regime. The Act establishes the Punjab Water Resources Commission, a body tasked with conserving and allocating water resources in Punjab. The Water undertakers and sewerages undertakers shall be appointed under this Act, who shall warrant the efficient and economical system of clean water supply and improved sewerage within their areas. Under the Act, Punjab Water Services Regulatory Authority shall be established to ensure that the undertakers discharge their duties and functions as per law. The Water Act inter-alia is a comprehensive law to cope with the present challenges for provision of clean drinking water and sanitation. In KPK, a similar Act was passed in 2020, while in Sindh, a draft Water Policy is underway. However, these reforms have not been implemented so far and framing of rules and regulations are under process. Now, the challenge is to implement the Law and Policy to ensure the provision of clean drinking water, sanitation and hygiene to meet the existing challenges (www.fao.org/faolex/results/d (Pakistan Punjab) and www.punjablaws.gov.pk).

WORLD'S BEST PRACTICES:

UN-Water for Life Best Practices Award: The various countries that participated and their projects were shortlisted for awards, India and its one drop project will be our main subject of discussion owing to geographical and socio-cultural similarity and background. Other projects to be explored include South African DWS/WESSA Eco-School Project and World Vision WASH Projects. There is a process that was developed to lead to the actual plan. As it looks practicable, it can safely be replicated in other parts of the world. Although, there is not set recipe but there are best practices and experience based lessons that can be consolidated.

ONE DROP Project India: The **one drop** Project Odisha, India is project launched in collaboration with award winning NGO based in Orissa named 'Gram Vikas". One drop focused more on social and educational approach for initiating behavioral change by employing schools in the targeted villages. School children were encouraged to write plays and perform them in front of an audience made up of their communities to convey message regarding sanitation and hygiene such as hand washing, open defecation and local bathing in streams. This method proved to be efficient and cost-effective.

The aim of this project is to promote and enhance community awareness, their understanding of the impact of poor hygiene and the subsequent participation through artistic activities. For this purpose, involvement of the community leaders for social mobilization is also essential. The entertaining nature of the activities ensures participation of all people in a community irrespective of caste, class, creed and gender barriers.

100 villages were identified as target for intervention. Project India implemented sustainable solutions through Gram Vikas WASH Program using 100% inclusion method for ensuring 24/7 water availability in bathing room and toilet. The intervention gives access to sanitation first and then safe water, as sometimes the importance of sanitation is overlooked by the communities.

Another method employed by **one drop** was the production of a Film on the issue of safe water, hygiene and sanitation to cover a much wider population.

Pakistan ranks last in a list of 26 Asian countries regarding total per capita water availability (FAO, 2008). Pakistan has a total of 77 million acres of land suitable for agriculture, out of which 54 million acres are cultivatable. The remaining 23 million acres can also be

cultivated to produce food. In Pakistan 38.5 million people lack access to safe drinking water and 50.7 million people lack access to improved sanitation. Currently there are shortage of water and electricity in the country's dams. The ground water is being over-exploited and polluted in many areas. Most of the water infrastructure is in poor repair. Despite of a lowering water table, new tube wells are being installed. We have used nearly all its water resources. Pakistan needs to build new large dams on urgent basis.

DWS/WESSA Eco-Schools Water Project: The Department of Water and Sanitation (DWS) / WESSA (Wildlife and Environment Society of South Africa) Eco-School Project, implemented in 2013-2014 within 50 schools, aims to strengthen water education using a 7-step Eco-school learning plan. The learning plan focuses on water conservation, sanitation education and promotion of smart usage of water resources available to them.

The youth and communities are encouraged to identify their water and sanitation issues and take action.

SWOT ANALYSIS: SWOT Analysis is strategic planning to assess the strengths, weaknesses, opportunities and threats of any business/organization.

The SWOT Analysis of WASA Lahore has been conducted just to have a look on the issue at micro-level.

Strengths

- Water supply of 8-million population of Lahore is based on ground water extraction.
- Water supply network of WASA, Lahore is fed by 596 tube-wells.
- Water quality at all tube-wells is within National Standards for Drinking Water Quality (NSDWQ)
- Water supply to citizens is 70 GPCD (315 LPCD) which is highest in the region (Singapore 143 LPCD, Paris150 LPCD, New Delhi 130 LPCD).
- Average static water level of Lahore is 150ft.
- Special compliant center at Arfa Karim Tower has been established to improve Tower has been established to improve the customer care service.
- Databased Monitoring & Evolution System.
- ISO 17025 Certified Laboratory collects water samples on daily basis from all the areas from sources and distribution networks.

Weaknesses

- Low water tariff (2 liters per paisa).
- No waste water treatment plant.
- Limited capacity to overcome spillage during storm events.
- 0% usage of surface water.

Opportunities

- WASA must take steps to control per capita water availability to avoid excessive wastage.
- Ground water usage quota of housing societies should be made fixed according to per capita demand.
- To promote the awareness of water conservation water measuring meters should be introduced to charge the water on used volume basis.

Threats

- The Industrial Wastes of 271 Industrial Units (Chemical, Textile and Food Processing Units) directly discharged into the canal system is potential threat for future water security.
- Water is pumped abruptly by private housing schemes and industry, huge part of which is more than a need and large part of this water is wastage.
- Agriculture tubes/wells are also pumping ground water for agriculture use 623 MM/ year.
- The population of Lahore is likely to reach about 22 million by 2025 which will cause further burden on water reservoirs.

ACTION PLAN: Pakistan is facing scarcity of ground and surface water. Over the past few decades increased human population and economic expansion have intensified the use and abuse of water resources which have disturbed the balance between water availability and its demand. This imbalance is creating wide spread water scarcity, water quality deterioration and destruction of fresh water resources. Currently, having small number of dams with the capacity to store water for just 30 days, this precious resource of water goes waste. While, the unregulated exploitation of ground water resources is leading to depletion of ground water aquifers.

This RAG, keeping in view the SWOT Analysis of WASA and overall evaluation of water availability in Punjab and problems thereof suggests following action plans:

Sort Term Plan (0 to 3 Years)

i. Launching of water conservation awareness campaign, tap youth and mobilize them.
ii. Construction of ablution water tanks.
iii. Strict implementation of Punjab Water Act, 2019.
iv. Collection of aquifer charges from Industries, Companies, Housing societies, Institutions, etc.

Medium Term Plan (3 to 5 years)

v. Rain harvesting tanks in urban areas and ponds in rural areas.
vi. Cleaning and brick lining of all canals in Punjab.
vii. Car-Wash Recycling System.

Long Term Plan (5 to 10 years)

i. Use of surface water for drinking purpose – construction of treatment plants.
ii. Optimum utilization of Government Agencies like Agency for Brarani Areas Development (ABAD) and Ministry of Water Resources to harvest water of rain in Potohar region and water of hill torrents in Rajanpur and DG khan.

iii. Sewerage waste treatment plants.
iv. Introduction of modern techniques in agriculture sector to save abstraction of ground water and surface water, (bed and furrow technique cultivation saves 20% water and increases 30 production).
v. Replication of WASA Lahore model in whole Punjab.

CONCLUSION AND RECOMMENDATIONS

1. There is a dire and emergent need of awareness and proper education of people about the importance of water and campaigns need to be launched to reserve the water reservoirs. For this media and Non-Governmental Organizations should play a vibrant role.
2. An inclusive water resource / management and sustainable utilization approach should be adopted by involving all stakeholders.
3. Strong research and development needs to be strengthened.
4. The academic institutes should be promoted and encouraged to conduct research on finding indigenous low cost water treatment solutions for the industry to recycle the used water.
5. Formulation of advisory working group at the office of the President of Pakistan for Water Conservation in the country.
6. Formulation of implementation committees in all provinces to be monitored by the federal advisory working group.
7. Following are the enlisted conservative measures which need to be implemented throughout Pakistan:

a. Construction of ablution water tanks alongside mosques throughout Pakistan.
b. Installation of car wash recycling system throughout Pakistan.
c. Metering of unmetered connections by WASA's all across Pakistan.
d. Installation of waste water/sewage treatment plants with industrial units and stoppage of waste water injection in sub soil by industrial units/private housing societies throughout Pakistan.
e. Judicious utilization of surface water / canal water for plantation and irrigation throughout Pakistan.
f. Ensured payment of aquifer charges to their respective agencies all across Pakistan.
g. Chief Secretaries of Provinces to issue directions and make it mandatory content pertaining to conservation of water in every school, college and university.
h. To direct all provinces to use surface water from their respective canals, dams and ponds for the purpose of irrigation and plantation.

8. Educating households to use water more wisely.
9. Regular monitoring of water quality be ensured.
10. Water Act should be enforced strictly.
11. Solid waste management system should be introduced and strictly enforced to avoid the dumping of solid waste into water bodies.
12. A sustainable pollutions control strategy needs to be devised in order to reduce waste water volumes.
13. Population control.
14. Rapid development and management of water resources.
15. Water testing regime must be made more effective to ensure clean drinking water to all people of Pakistan.

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