



Center for Global &
Strategic Studies, Islamabad



Hanns Seidel Foundation
Pakistan

CONFERENCE REPORT

WATER SECURITY CHALLENGES AND CONSERVATION STRATEGY FOR PAKISTAN

23rd NOVEMBER, 2020



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Brief Overview of the Conference

On 23rd November 2020, Center for Global & Strategic Studies (CGSS), Islamabad and Hanns Seidel Foundation (HSF) Pakistan jointly organized a Conference on “Water Security Challenges and Conservation Strategy for Pakistan” at Margala Hotel, Islamabad. The Conference was held in continuation of a roundtable held on the same theme on 13th October 2020 at Islamabad Club. The aim of the Conference was to develop Pakistan’s perspective regarding non-traditional water security threats and to address the internal and regional water security dynamics.

The discussion commenced with the opening remarks by Major General Hafiz Masroor Ahmed (Retd), Vice President, CGSS. Dr. Steffen Kudella, Resident Representative, Hanns Seidel Foundation Pakistan presented welcome remarks at the occasion.

The Speakers of the Conference included:

- Dr. Yusuf Zaraf, TI, Former Chairman, Pakistan Agricultural Research Council (PARC)
- Dr. Muhammad Ashraf, Chairman, Pakistan Council of Research in Water Resources (PCRWR)
- Advocate Ahmer Bilal Soofi – Former Federal Law Minister
- Mr. Shahid Hameed, General Manager (Hydro), WAPDA Headquarters, Lahore
- Dr. Shaheen Akhtar, Professor, Department of International Relations, National Defence University, Islamabad
- Prof. Dr. Muhammad Khan, Member Board of Experts, CGSS
- Dr. Hifza Rasheed – Director NWQL, Pakistan Council of Research In Water Resources (PCRWR)
- Brigadier Muhammad Aslam Khan (Retd) - Chairman Gomal Damaan Area Water Partnership Pakistan

The event was attended by approximately 115 participants, and was moderated by Ms. Minahil Shawal Afridi, Research Executive, CGSS.



CONCEPT NOTE

Pakistan, a semiarid region and a primarily agricultural economy, is currently facing declining water availability and quality, growing water pollution, and overall environmental insecurity and fostering domestic discord. During the past few decades, Pakistan's water profile outlook has changed entirely. Once enlisted among the water-abundant countries, now it falls in water-stressed countries where the threat is extremely high. The World Resource Institute placed Pakistan among the top 17 water-stressed countries. The per capita water availability has decreased from 5,000 cubic meters in 1950 to 865 cubic meters in 2018¹.

A Water-Intensive country

Pakistan has the world's 4th highest rate of water usage². Its water intensity rate, the amount of water, in cubic meters, used per unit of GDP, is the world's highest, and no country's economy is more water-intensive than Pakistan's. The bulk of Pakistan's farmland is irrigated through a canal system, but according to IMF analysis, the canal water is vastly underpriced, recovering only a quarter of annual operating and maintenance costs. Meanwhile, agriculture, which consumes almost all annual available surface water, is largely untaxed. Population growth and urbanization are the core reasons behind the water crisis. The issue has also been exacerbated by climate change, poor water management and a lack of sufficient policy measures for crisis management. Water scarcity in Pakistan has been accompanied by rising temperatures. Moreover, the shortage of water reservoirs worsens the situation.

Water Consumption and Poor Irrigation System

Pakistan consumes 90% of its water agriculturally, of which 50 % is wasted³. The poor irrigation system and lack of technology application have been a major reason for water

¹ Sofia Akram, "Issues in water management and impending risks", pg. 1, 30 Dec 2019, Daily Times. <https://dailytimes.com.pk/529617/issues-in-water-management-and-impending-risks/>

² Ahmed Awais Khaver, "Pakistan is a water-stressed country and an innovative mindset is needed", pg. 2, 18 Sep 2017, The Express Tribune. <https://tribune.com.pk/story/1509400/pakistan-water-stressed-country-innovative-mindset-needed/>

³ Murtaza Talpur, "Future of water in Pakistan", pg. 1, 16 Sep 2019, Daily Times. <https://dailytimes.com.pk/466856/future-of-water-in-pakistan/>

calamity in the country. Its surface and groundwater sources are both increasingly stressed and severe drought conditions persist in parts of the country due to lack of rain.

Accessibility to Safe Drinking Water

Pakistan's water crisis is not limited to increasing scarcity, but poor water quality also poses a serious problem. Both surface and groundwater sources are affected by the issue. Currently, around 56% of the people in Pakistan have access to safe drinking water, while 30% of diseases and 40% of deaths are linked to unclean water, posing a major health hazard⁴.

Water Politics

The management and utilization of water resources in the riparian regions of South Asia are pivotal to the geopolitics of the region. Ongoing trans-border disagreements related to rivers and canals frame the relationship between the countries of the Indus River Basin (India and Pakistan), shaping the Country's internal as well as regional dynamics.

Internal and Regional Water Security Dynamics

As per the given definition of water security by the United Nations, Pakistan is facing severe water security threats internally as well as at regional level. The situation is getting out of control and water emergency needs to be announced to limit the disastrous effects of water insecurity. It is highly encouraging and commendable that Pakistan is focusing on the Diamer-Bhasha dam project; however, much is needed to be done on urgent basis. The effect of the shortage of clean water is becoming more evident with every passing day. Pakistan's much awaited 'National Water Policy' was finally approved by the cabinet on April 24th, 2018. While it is good to have a policy in place now, loopholes remain when it comes to addressing water issues in the country. A more comprehensive discussion around water related policy matters needs to take place, which this proposed workshop aims to address.

⁴ Phoebe Sleet, "Water Resources in Pakistan: Scarce, Polluted and Poorly Governed", 31 Jan 2019, pg 3, Future Directions International. <http://www.futuredirections.org.au/wp-content/uploads/2019/01/Pakistan-Water-Crisis.pdf>

Water Resource Management

Pakistan's poor water management is costing the country nearly 4 % of GDP or around \$12 billion per year, according to a conservative estimate of a World Bank report⁵. The World Bank in January 2019 released a report 'Pakistan: Getting More from Water' which builds on prior work to provide a new, comprehensive, and balanced view of water security. It identifies unmitigated water-related risks, as well as opportunities where water can contribute to economic growth and poverty reduction. The report analyzes how the performance and architecture of the water sector are related to broader economic, social, and environmental outcomes⁶.

Another Report related to 'Pakistan - Karachi Water and Sewerage Services Improvement Project' was released in 2019. The report highlighted the development objective of Karachi Water and Sewerage Services Improvement Project for Pakistan to improve access to safe water services in Karachi and to increase KWSB's financial and operational performance⁷.

South Asia is among the regions which are most affected by water scarcity. It is projected that by 2030, the existing resources will only meet 60% of the water requirements of the people⁸. There are several reasons for the poor management of resources in South Asia, such as unawareness among the people regarding water issues, lack of regional framework to address water issues, rapid population growth with increased consumption rate, lack of innovative business models in agricultural and industrial sectors, failure to design a comprehensive water policy and lack of interest by the ruling

⁵ Sana Jamal, "Poor water management costing Pakistan billions: Report", pg. 1, Feb 2019, World Asia. <https://gulfnews.com/world/asia/pakistan/poor-water-management-costing-pakistan-billions-report-1.61903819>

⁶ "Pakistan: Getting More from Water", pg. 16, 6 Jan 2019, the World Bank. <http://documents.worldbank.org/curated/en/251191548275645649/pdf/133964-WP-PUBLIC-ADD-SERIES-22-1-2019-18-56-25-W.pdf>

⁷ "Project Information Document/Integrated Safeguards Data Sheet (PID/ISDS)", pg. 5, 2 Apr 2019, the World Bank. <http://documents.albankaldawli.org/curated/ar/485871554801020855/pdf/Concept-Project-Information-Documents-Integrated-Safeguards-Data-Sheet-Karachi-Water-and-Sewerage-Services-Improvement-Project-KWSSIP-P164704.pdf>

⁸ Mandakini Devasher Surie, "South Asia's Water Crisis: A Problem of Scarcity Amid Abundance", pg. 2, 25 March 2015, The Asia Foundation. <https://asiafoundation.org/2015/03/25/south-asias-water-crisis-a-problem-of-scarcity-amid-abundance/>

elite to mainstream water issues. These South Asian countries can learn from China which constructed several small, medium and large dams to increase its storage capacity and managed water for industrial, agricultural and domestic purposes. The example of Israel can also help South Asian states in terms of innovative business models, and technological advancements to utilize the maximum wastewater through recycling. The US managed to increase its water resources by inaugurating a large number of dams and limiting flood damage and increasing water storage capacity. Moreover, it increased hydro-electric power generation, too.

Water resource management is compromised by poor water data, information, and analysis; weak processes for water resources planning and allocation; environmentally unsustainable levels of water withdrawal; widespread pollution; and low water productivity in agriculture. Water security in Pakistan is reaching a critical point that demands urgent attention and reform. The government needs to focus on initiatives that help better manage the water for irrigation purposes. In this regard, CGSS and HSF-Pakistan organized a conference to discuss the aspects of Water Resource Management and to draft future conservation strategy of Pakistan. A multipronged strategy that not only focuses on saving and conserving but also on optimal usage is severely required and needs proper consideration and policy check to water security issues.

SUMMARY AND RECOMMENDATIONS

(Based on the Speeches of the Respective Speakers)

A. Current Water Situation in Pakistan

- Pakistan's population is increasing rapidly, and the per capita water availability is decreasing. If the situation remains the same, by 2025 the country will reach absolute water scarcity level. 5% water is used for domestic and industrial purposes while the remaining 95% of water in Pakistan is consumed by the agriculture sector. The inefficient use of fresh water especially by the agriculture sector has had serious implications on the economy and water security of the country.
- There are numerous reports available on water issues in Pakistan including the Report of the National Commission on Agriculture (1988), Report of the Inter-Provincial Committee on the Apportionment of the Indus Waters (1991), WAPDA's Vision 2025 Report (2003), Pakistan Vision 2025: Pillar IV: Energy, Water and Food Security; Planning Commission, Government of Pakistan (2014) and many others. Despite all this information, the ultimate result is S2S i.e. from Surplus to Scarcity.
- In 1951, Pakistan was a water surplus country when the water availability was 5260 per cubic meter. In 2016, it reduced to 1000 (which is the minimum water requirement), thus making Pakistan a water stressed country. Till 2025, it will further reduce to 860 per cubic meter if no measures are taken, which is a serious water scarcity level.⁹
- The policy documents like Appropriation Accord in 1991, Pakistan Water Charter 2018, National water policy 2018 are available on national level. However, most of the policies in Pakistan are just wish lists unfortunately. Policies can only work if there is strict monitoring, strategic planning and appropriate funding for the implementation of these policies.

B. Water Resources in Pakistan

- To reform the water sector of Pakistan, it is imperative to understand the resource base of the country. The key water sources of Pakistan are the rainwater, rivers, lakes and the ground water. Pakistan has one of the largest contiguous irrigation systems of the world;

⁹ Dr. Yousaf Zafar

one of the largest groundwater resources of the world (4th after India, USA and China); groundwater supplement over 60% of the surface water supplies; and over 90% drinking water and 100% industrial water comes from groundwater.

- The Indus River System receives an annual influx of about 134.8 million acre-feet (MAF) of water. The mean annual rainfall varies from less than 100 millimeters to over 750 millimeters. Surface water comprises glacial melt up to 41 %, snowmelt up to 22 % and rainfall 27 %. Pakistan has three hydrological units. The Indus Basin, Kharan Desert and Arid Makran Coast.¹⁰

C. Challenges to Water Security in Pakistan

- There are several issues related to the Water Resources Development in Pakistan. These include the growing water scarcity, recurring floods, inadequate storage facility, sedimentation in storage reservoirs (about 5.5 million tons of sediments are being deposited in Tarbela dam due to which the capacity of reservoirs is being depleted), and unutilized potentials of hill torrents. Water Governance is another key issue. There are number of problems like low water pricing, no groundwater regulatory framework, and lack of crop zoning.
- The other major reason is poor Water Resources Management. This includes low system efficiency (less than 40%), low productivity per unit of water (more than 60% of water that is stored and is utilized is lost from source to sink because of conventional methods and poorly maintained channels), groundwater depletion/degradation (because of lack of any groundwater regulatory framework) and the wastewater disposal.
- In Pakistan, the ground realities are contrary to the worldwide slogan of 'more crop per drop'. Crops which demand high level of delta water are being planted in water stressed areas. The farmers have reduced the area for crops which require less amount of delta water (cotton, wheat and sunflower). While the area for the crops that require a very high amount of water like banana, sugar cane and rice, have been increased. Rice growing has increased by 16% in Pakistan.

¹⁰ Dr. Muhammad Khan

- Other major water-related challenges in Pakistan that should be addressed are; preserving and transferring water from wet season to dry season, improving water productivity, and the development of climate smart technologies to cope with the climate change.
- One of the alarming things is that water storage capacity in Pakistan is enough merely for thirty days. There is a dire need to enhance storage capacity as it is depleting. Until now 27% of water storage capacity has been lost and by 2050 it is predicted to deplete even more (45% of storage capacity will be lost due to increasing sedimentation). Mangla dam might not be available for water storage in future as it is being filled up by sedimentation.¹¹
- In Pakistan, the marginal utility has become zero. There is no profit and sustainability model for water supply system. Pakistan ranks 4th highest among world countries at consuming water. So, if there is no cost recovery model, the people will suffer in the future. Authorities should take appropriate steps to curb the illegal and uncontrolled ground water extraction and ensure its equitable distribution.
- Furthermore, there are major constraints in the supply of safe tap water. These issues arise from improper disposal of municipal, industrial and hospital waste; lack of institutional and technical capacity of water supply agencies; lack of profit and loss model for water supply service providers; outdated infrastructure of water supply schemes; inadequate water treatment facilities; lack of coordination among stakeholders; and lack of public awareness on water issues.
- Pakistan stores only 10% of average annual water while some of the other countries have 3 to 5 times more water storage capacity than this. Due to climate change and rapid demographic shifting, there is more stress on resources in the country. Pakistan is among 15 most water scarce countries. Unfortunately, maximum water is being used for minimum productivity. The country has one of the most water intensive agriculture and minimum production value, while only 2% water is recycled.

D. Shortcomings in the Indus Water Treaty

- There are sets of issues that are emerging from the Indus Water Treaty (IWT). It does not account for several problems that have risen over recent years like Climate Change, which has become a serious concern and requires suitable measures, and the

¹¹ Mr. Shahid Hameed

Environmental flows that has only recently been recognized and needs to be coordinated between India and Pakistan to protect the downstream ecosystem.

- Similarly, there is problem of transboundary aquifers. IWT is surface water treaty which does not cover ground water. Over-extraction of water has put the Indus Basin's water table at risk. Pollution is another issue. Water from the eastern rivers enter Pakistan heavily polluted as lots of industries having severe environmental implications on downstream water bodies.
- There are certain risks and crises in the Indus Basin which need proper policy to carry out i.e. cost and benefit analysis of building and maintaining infrastructure of water control and management, uncertain transition of institutional structures, indiscriminate cutting of mangroves and clearing lands for infrastructure development, sea water intrusion mainly because of extended zero flow periods and then governance issues due to number of agencies with overlapping duties and responsibilities. Hydro diplomacy can play a role in stabilizing the IWT regime.

E. Hydro-Diplomacy and its Potential to Address Water Challenges

- The concept of the hydro-diplomacy has lately emerged in the policy domain. Water management in most of the trans-boundary basins is highly politicized and it has considerable impact on water sharing, water development and conflict prevention, thus it is linked with regional stability in term of the rising tensions. However there has been disconnect between science and policy regarding the management of the water sector in Pakistan.
- Hydro diplomacy calls for greater cooperation over trans-boundary waters to resolve political conflicts and greater regional integration. There are three areas where Pakistan can bring this concept in terms of trans-boundary dimensions and internal waters of Pakistan; facilitating agencies, improving coordination and enabling actors.
- Facilitating Agency: There is a lack of agency at the international level. Foreign policy makers can ensure stronger agency at the international level, realize potential synergies between political and technical engagement, and build the necessary capacity at the national, basin and global levels.
- Improving Coordination: To manage the challenges, driven in part by climate change, foreign policy makers must drive an internationally coordinated, cross-sectoral

engagement. In particular, the international community could more vigorously pursue the potential synergies between low' politics of technical and financial cooperation and the "high politics" of foreign policy.

- Trust building through real time data sharing by installation of telemetry system and a mechanism for data sharing regarding the construction of Indian projects on Western Rivers is required. Sharing of Environmental Impact Assessment (EIA) of the Indian projects on the western rivers will help to build trust between India and Pakistan.
- Prospects of improving scientific coordination and trans-boundary cooperation can be covered under Article VII of the IWT which talks about the optimum utilization of the river system, like the joint study on the behavior of Himalayan glaciers; joint study on the effects of Glacial Retreat on run off; joint monitoring of impact of climate change on the Indus basin river system; joint mapping of aquifers; and joint study on water pollution issues.
- A proactive hydro diplomacy can play an important role in effective management of water resources. It also deepens the knowledge base on which decisions are made at national and sub-national levels, and improves water resources planning and management.

F. Government Initiatives

- The Pakistan Tehreek-e-Insaf (PTI) manifesto mentioned agriculture and water preservation together. The present government has started many initiatives. Projects worth of 320 billion Rupees have been approved by the Planning Commission and are functioning. There are three projects on Wheat, Rice, and Sugarcane. Three projects on Fisheries; one on trout in Northern areas, one on shrimp and one for enhancing fish availability. One project on Livestock.
- A task force has been formed under Ministry of Food Security and Research. The department is working very efficiently. A project submission to Planning Commission for the conservation and increased water productivity has been drafted under the initiative of the Prime Minister. 200 billion PKR have been allotted on three projects to support government efforts to solve water challenges. These include; conserving water through lining of watercourses & laser land leveling; enhancing command area of small

and mini dams in Barani areas; and water conservation in Barani areas of Khyber Pakhtunkhwa.

- In regards to the concept of more crop per drop of water, the PCRWR has determined crop water requirement of major crops grown in Pakistan through lysimetric studies. This helps farmers in determining the amount of water a crop needs.
- Flow measurement and management between provinces has remained a problem for long. Water can only be saved or managed if water is measured. For this purpose, the concept of Indus telemetry system for real-time flow measurements has been introduced in Pakistan. In provinces, large canals especially in KPK have been instrumented so as to regulate and measure the flow of water.

G. Recommendations

- The National Water Policy-2018 should be implemented in letter and spirit. It has provided guiding principles as well as targets in the relevant areas. The hard path is to increase the storage capacity and improve water governance. The authorities must construct small and large dams; improve the surface water governance with proper pricing (as free commodity will never help to conserve it); and control the increasing population which is very important.
- The soft path is to improve water productivity by using agriculture water efficiently; applying high efficiency irrigation system, improving conveyance and application efficiencies; restricting high delta crops like sugarcane and rice to area where surplus water is available; using domestic water efficiently, and the use of improved agronomic practices.
- Pakistan harvests only 20% of the 40 MAF rainfall it receives annually. Other countries capture almost 98% of the rainfall. Thus there should be more effective techniques to harvest the rain water. There are some countries where NGOs and Governments have taught the residents of slum areas how to harvest the rain water for one house. So, this can be one of the solutions.
- The country needs to increase its agricultural productivity and hydropower share; reduce floods and droughts; and promote urban and rural water management. The population of Pakistan is expected to exceed 300 million by 2050. Therefore, at least 70-million-acre feet of more water is required to meet the food requirement of the nation.

- The olive plants grows for 900 years and only initial two years require irrigation. National Olive Project under the government is in process. This year Pakistan produced 80 tons of olive oil. This is a positive impact by replacing crops that require less water like olives, pistachio and walnuts. The government must focus on productivity enhancement of oil crops because they require less water.
- Putting water pricing for all water usages is highly recommended. Rampant water pumping is going on, especially in Baluchistan where they flood apple orchids and pluck apples so that they don't fall on the ground. There is 34 billion rupees subsidy because of which farmers in Baluchistan are using water very extravagantly. There must be a legislation on water pumping.
- Pakistan faces both, inter-state water issues with India and Afghanistan and the intra-state water issues between provinces. In this regard, firstly as similar to the IWT, Pakistan needs to sign a treaty with Afghanistan to protect its historic water rights as lower riparian state. Then the exchange of real time data between India and Pakistan is a prerequisite for better management of water resources. If India agrees to release water at the critical time of crop requirement, it could benefit Pakistan tremendously.
- Moreover, as intrastate conflicts are more dangerous than interstate water disputes, therefore Pakistan needs to effectively manage its water sources through water conservation, construction of dams and water storages at national level.
- The government must spread awareness regarding the principles of reduce, recycle and reuse of water whether it is at house level, street level or at the community level. There are certain advanced technological interventions which includes desalination and distillation where Pakistan still lags behind. So the respective institutions, academia and R&D sector should work on it collectively and share data as well as information in this regard.
- A national framework to bring sewage and industrial waste water treatment plants into fully functional status is necessary, which could provide innovative business models. Bridging the gap between R&D Organizations, Academia and Industry is another important thing to do. There is a dire need of strengthening disaster risk management strategies at the local level.
- There is so much confusion in the existing laws concerning water related issues in Pakistan. There is a need to clarify the legislative confusion of interprovincial governance,

district governance as well as federal governance to bring everything in line. Similarly there must be executive clarity on issues regarding management of the water resources. Government should make laws of water conservation. The government must also legislate and restrict indiscriminate groundwater abstraction. It is very important because it provides more than 90% drinking water.

- To tackle the large-scale challenges, the country must move to the next generation of smart water management mechanisms. It includes role of Information and Communication Technology (ICT) in Water Resource Management. It is a technological innovation and will address the water and food security issues in Pakistan.
- Pakistan may consider climate change as not just a challenge but as an historic opportunity to build a climate resilient and a low carbon economy. Additional storage reservoirs must be constructed to enhance storage per capita and carry over capacity. Strengthening and fortifying the flood infrastructure i.e. water reservoirs and water channels is required. Enhancing resilience of local communities to the adverse impacts of climate change along with increased plantation is also a key to solve major water challenges.
- There is a need for making Pakistan a water secure country by less use of chemical farming; better distribution infrastructure; supporting clean water initiatives; and improve farming practices. Moreover, people should be educated to conserve water by cooperation.
- Efforts must be made to convert the present rotation-based irrigation system to demand-oriented system. The modern irrigation techniques, that is trickling, sprinkling etc., which have a potential to improve water distribution and its utilization. Irrigation distribution system needs to be privatized through water user associations to make the distribution better.
- There is a need to increase the water prices to make irrigators realize the importance of this asset. Farmer's organizations, water user association, and private sector be involved in construction, operation, and maintenance of the irrigation system. Engineered water reuse systems harnessing natural cycles have been successfully employed worldwide to help meet the growing demand for clean water. This should be done in Pakistan as well.

- Institutional capacity building is needed to develop a better understanding of the technical, social, cultural, environmental and economic dimensions of waters. Dissemination of information and stakeholders' consultation is important in this regard. There were several initiatives that were taken in past in this regard but unfortunately, they did not meet the targets, due to the lack of coordination among the authorities and there is overlapping of responsibilities. Several organizations are working on similar projects but there is no sharing of data. Therefore a centralized data base is required.
- Pakistan should have a National Water Quality Surveillance Agency which can watch the water quality not for the drinking purpose but also for the ecological, aquatic life and other aspects along with monitoring the transboundary contamination transportation. The Pakistan Council of Research in Water Resources (PCRWR) is a good candidate in this regard.



Opening Remarks

Major General Hafiz Masroor Ahmed (Retd), Vice President, Center for Global & Strategic Studies (CGSS), Islamabad

Major General Hafiz Masroor Ahmed (Retd), Vice President, Center for Global & Strategic Studies (CGSS), Islamabad greeted the audience and panelists on behalf of CGSS. He thanked all for joining the conference. He said that the organizers were indebted by the fact that panelists had spared their time and made this event a success because of their presence. He also thanked HSF Pakistan for collaborating with CGSS in organizing the event. He stressed that water was not important for life, water was life as stated by the UN Secretary General and it highlighted the importance of water management. He emphasized that water crisis was looming large in Pakistan but general public was not aware of it and the water situation in country was suggestive of this fact. He also said that at the state level, we had not been prompt to take requisite measures to mitigate and resolve this issue. He went on to add that to throw light on all these issues and problems, they had a panel of experts who would shed light on this topic with their knowledge and expertise.



Speech by

Dr. Steffen Kudella, Resident Representative, Hanns Seidel Foundation Pakistan

Pakistan could be ruined by the lack of water. We are here today to analyze and control one of the greatest long-term risks of Pakistan.

Let me try to discuss why the water supply of the Indus River System seems to be risky:

1. Pakistan is one of the most naturally arid countries in the world: It has an average of only 240 mm of rainfall per year. Without the Indus River System, most of the country could become semi-desert and scrub-forest.
2. The power of water can actually be shown in the history of South Asia: this history starts with the cities of the Indus Valley People 4,000 years ago, and it doesn't end with the great floods of Pakistan in 2010. History teaches us that many cities here have either been abandoned by their people because life-giving rivers have changed their course, or the cities have been mercilessly flooded away.
3. Around one fourth of the country's land area is cultivated, and most of this agriculture is water-intensive and dependent on man-made irrigation systems.
4. Pakistan is one of the most water-stressed countries in the world. Many of its natural springs have already dried up. The quality of ground-water is declining, too. Which means: the dependency on the Indus River System has increased even further.
5. Pakistan is one of the most heavily populated countries in the world. According to projections of the World Bank, it may have over 335 million people by the middle of this century. Its current water resources cannot possibly support so many people.
6. The glaciers feeding the Indus River System are melting due to climate change. According to scientific predictions, they might disappear in the near future.

7. The increase of Monsoon rains in the past years could help to balance this out. However, these rains can only be of long-term use if their water is properly stored and effectively distributed.

Therefore, Pakistan's dependence on a single river system is extremely risky. In order to reduce this risk, the country needs to continue to support: the fight of water shortages, reforestation, water infrastructure, the harvesting of rainfall, and efficiency in terms of water management. Effective long-term measures can make sure that the water supply of Pakistan becomes an event that isn't uncertain, but likely to happen.

"Water" also needs to become a topic of regional dialog: Pakistan's challenge is important not only for this country, but for South Asia as a whole region where one fifth of the world's entire population lives and will live. Regional dialogs on water need to be prepared by discussions on Pakistan's national level first. Today's event is such an important national discussion. The findings of today's Conference with CGSS have been prepared by a Roundtable Expert Group, and shall be presented to a broader regional audience soon.

HSF gladly supports CGSS to host this Conference.



Closing Remarks:

Dr. Steffen Kudella, Resident Representative, Hanns Seidel Foundation Pakistan

Thank you all very much. Thanks to the worthy speakers for your valuable time. In events like this you cannot stop learning. Thank you so much CGSS, which is our newest but one of the best partners in Pakistan. Thank you all of you participants for being with us today. The COVID-19 situation does not make this type of gathering easy but I think that we all are coping well. Thank you very much for the social distancing and wearing masks. This is not a stand-alone event. HSF will have more events on non-traditional security challenges in future. Water is not one challenge but there are obviously more non-traditional security threats. We will put the key points of this event at international level as well. Thank you to all of you for coming and see you soon.

Major General Hafiz Masroor Ahmed (Retd), Vice President, CGSS

I would like to end with a very important point that if your enemy intends to harm you but does not have the capability you do not need to worry. But if he has the capability to harm you but no intention then you need to worry because intention could be changed anytime. If India has constructed over dozens of dams over river Jhelum and Chenab as well as Ravi. It has built up a capability. They claim that they have no bad intentions against Pakistan but they have capability and their intention can change anytime. I will thank all worthy panelist, HSF and all participants. Thank you very much.



ANNEXURE 1: PROFILES OF THE SPEAKERS

Dr. Yusuf Zaraf, TI, Former Chairman, Pakistan Agricultural Research Council (PARC)



Dr. Yusuf has served as Head of Division Plant Biotech and Director, National Institute for Biotechnology and Genetic Engineering at Pakistan Atomic Energy from 1992 to 2007. Later, he was appointed as the Director General of Pakistan Atomic Energy. He also served as Chairman Pakistan Agricultural Research Council.

Dr. Muhammad Ashraf, Chairman, Pakistan Council of Research in Water Resources (PCRWR)



Dr. Ashraf has more than 22 years of research experience in water resources development and management in arid and semi-arid areas and has a proven record of over 70 national and international research publications. During his professional career, he worked for the integrated management of water resources, particularly surface and groundwater resources of the irrigated and dry areas and is currently the Chairman of Pakistan Council of Research in Water Resources (PCRWR).

Mr. Ahmer Bilal Soofi- Former Federal Law Minister



Mr. Ahmer Bilal Soofi is an Advocate of the Supreme Court of Pakistan. He served as the Federal Minister for Law, Justice & Parliamentary Affairs and Human Rights. He is also the founding President of the Research Society of International Law. He has also served as the Member Advisory Council of United Nations Human Rights Committee.

Mr. Shahid Hameed, General Manager (Hydro), WAPDA Headquarters, Lahore



Mr. Shahid Hameed is an expert on water issues. Currently, he is serving as the General Manager (Hydro), WAPDA Headquarters, Lahore

Dr. Shaheen Akhtar, Professor, Department of International Relations, National Defence University, Islamabad



Dr. Shaheen Akhtar is a Ph.D in International Relations. She is currently working as Professor in the Department of International Relations, Faculty of Contemporary Studies (FCS) at the National Defence University, Islamabad. She is a scholar with wide experience in research and teaching. Her area of interest is non-traditional security issues – water, energy and gender issues in particular; regional stability, conflict resolution and peacebuilding with particular reference to Kashmir, and Sri Lanka. She is author of over sixty eight research articles that have been published in internationally abstracted journals and as book chapters. She has participated in numerous international seminars, workshops and conferences focusing on the regional affairs.

Prof. Dr Muhammad Khan, Member Board of Experts, CGSS

Prof. Dr Muhammad Khan is the former Head of International Relations Department, in the National Defence University (NDU), Islamabad until July 18, 2016. He completed his PhD in International Relations from the University of Karachi in 2002. He is the founding member of the Faculty of Contemporary Studies (FCS) in NDU, having five departments now. He also established the Department of Strategic Studies, Department of Peace and Conflict Studies and Department of Government and Public Policy in the NDU Islamabad. Besides, he acted as a pivot in Conceptualizing and restructuring “Institute of Strategic Studies Research and Analysis” (ISSRA)-a national and international think tank. Dr Khan has been on the Panel of Federal Public Service Commission of Pakistan from 2007 to 2015. Besides, He is a member of the AJK Public Service Commission. Dr Khan is also Chairman of the Research and Policy Forum, being established by AJK Government, the first-ever Think Tank AJK Government will have.

Dr. Hifza Rasheed – Director NWQL, Pakistan Council Of Research In Water Resources (PCRWR)



Dr. Hifza has more than 18 years of research experience in water/ wastewater quality assessment and management, water/food safety and risk modeling, water treatment and capacity building. On these subjects, she holds a proven record of 45 national and international research publications and 5 patents and is currently the Director Water Quality in Pakistan Council of Research in Water Resources.

Brigadier Muhammad Aslam Khan (Retd) - Chairman Gomal Damaan Area Water Partnership Pakistan



Brigadier Aslam (Retd) holds a unique blend of senior management experience acquired through various military and civil appointments. His professional experience stretches over 45 years, in which he served as the Chief Executive of Faisalabad Electric Supply Company and Director of National Commission for Human Development. He was also appointed as the senior Joint Secretary Political Affairs, and one of the founding Directors of Pakistan Water Partnership. He is a member of the International Water Association, World Water Council and Global Water Partnership. He established an NGO named Gomal Damaan Area Water Partnership and 3 Water Security and Emerging Threats in Pakistan is also the Chairman of Committee on Water Resources Good Governance Forum and Director Eco Environment Initiative.

ANNEXURE 2: SPEECHES BY THE SPEAKERS

Speaker 1

Dr. Yusuf Zafar, Former Chairman Pakistan Agriculture Research Council

Topic: Water Security as Pakistan's Most Critical Development Challenge

In National water policy of 2018, it is documented that 95% of water goes to agriculture sector and the farmers get it almost for free. The major user of fresh water in this country is agriculture. This has a serious implication on our economy as well as our water security. Unfortunately, Pakistan has since 70 years, treated water with power, i.e. hydropower. Therefore, water remains secondary in our policy issues.

Development & Management of Water Resources in Pakistan *Studies & Reports- 3 decades*

- Report of the National Commission on Agriculture, Chapters 6,17,18 (1988)
- Report of the Inter-Provincial Committee on the Apportionment of the Indus Waters (1991)
- Water Sector Strategy by the Asian Development Bank (2002)
- WAPDA's Vision 2025 Report (2003)
- Pakistan's Water Economy Running Dry by John Brisco (2005)

Development & Management of Water Resources in Pakistan *Studies & Reports- 3 decades (Contd.)*

- Development of Integrated River Basin Management for Indus Basin: World Wildlife Fund-WWF (2012)
- A Productive and Water Secure Pakistan: Report by Friends of Democratic Pakistan (2012)
- Pakistan Vision 2025: Pillar IV: Energy, Water and Food Security; Planning Commission, Government of Pakistan (2014)
- A Region at Risk – the Human Dimension of Climate Change in Asia and the Pacific: Report by Asian Development Bank (ADB) and Potsdam Institute for Climate Impact Research: (2017)

We have plenty of information available on water issues in Pakistan by different international organizations which have made huge reports on water issues in Pakistan, which are available on the web. Sartaj Aziz commission report which was published in 1988 is very important in this regard and has several chapters on water conservation, enhancing productivity etc. John Brisco report (2005) is also very important. The last report was in 2017 by Asian Development Bank with the help of Postdam Institute for Climate Impact Research, as climate change and water are tightly linked as we know. Despite all these reports, the ultimate result is S2S that is from Surplus to Scarcity.

S2S **Surplus to Scarce**

ar	Availability (cubic meter)	Scale
51	5260	Surplus
16	1000	Minimum water requirement/ Stressed
25	860	Water Scarce

We have been unable to develop sufficient water storage. Our population is increasing officially by 2.2% each year. In 1951, from surplus we have gone to minimum water requirement that is 1000. As per the international standards, any country where per capita water availability is 1000, is water stressed country. Unfortunately, Pakistan is going from water stressed to water scarce if the adequate measures are not taken to prevent such disaster.

Moving forward to the national policy framework available to us at the national level. We know in the past we had two major treaties; the Indus Water Treaty and Water Appropriation Accord. Since Pakistan was going from surplus to water stressed, the

National Policy Framework

Past

- Indus Water Treaty (IWT)-1960
- Water Appropriation Accord-1991

Recent

- National Environment Policy-2005
- National Drinking Water Policy-2009
- National Climate Change Policy-2012
- National Disaster Risks Reduction (DRR) Policy-2013
- National Food Security Policy-2018
- National Water Policy-2018

government started conducting different baseline and impact studies on how water issues can be resolved in Pakistan. After the Earth Summit, the government developed national environmental policy in 2005. NDMA was formed after the earthquakes in AJ&K in northern areas, and later by parliamentary act, the National Disaster Risk Reduction was created. Floods of 2010 and 2011 had impacted 5.6% GDP of Pakistan. While tsunami in Japan affected 4.3% of its GDP. National Food Security Policy and National Water Policy were also issued in 2018. Former Government of Pakistan separated power from water which was a major paradigm shift in policy making sphere. The creation of new federal ministry on Water Resources was a milestone.

After Appropriation Accord in 1991, Pakistan Water Charter 2018 is the first document which all provincial governments and federal government signed. Especially after the 18th Amendment, water issues have been allocated to the provinces. National water policy 2018 is a 43 page long document. National water policy has all the subsectors, i.e. storage, conservation, drainage, flood control, rehabilitation and research. These subsectors have many major projects under them. However, any policy which lacks to address questions of when it will happen, who will do it and how it will happen is just a wish list. Unfortunately, most of the policies in Pakistan are just the wish lists, except for a few. So such policy will work if we have the strict monitoring for implementation. Moreover, strategic planning and appropriate funding is missing in these policies.

Estimates of Investment Needed by 2030-NWP

Sub Sector	Investment	Major Projects
Storage	1600	Diamer-Basha. Mohmand
Conservation	800	HEIS project, lining of distributaries' and minors, telemetric, monitoring, improvement of conveyance efficiency
Drainage	150	RBOD-I, RBOD-II and RBOD-III, new reclamation projects
Flood Control	186	National Flood Protection Plan-IV (NFPP-IV)
Rehabilitation	300	Rehabilitation of barrages, headworks and canals

There is a worldwide slogan of more crop per drop. Reality is that farmers in the country are the most inefficient users of fresh water. The cost of growing rice, cotton etc. is the highest in South Asia. The crops for which delta water requirement is less, we have reduced the area, for example in cotton which is a very less water requiring crop and in wheat and sunflower. Last year Pakistan has imported edible oil and edible oil seed worth of \$ 3.5 Billion whereas our import bill for pulses last year was \$ 1.2 Billion. This implies

that we have 4-billion-dollar negative in our food import and yet Pakistan is regarded as an agriculture based country.

The crops which require a very high amount of water like banana, sugar cane and rice, their areas this year have been increased. Rice growing has increased by 16% in Pakistan. In Punjab, 35% area for rice crops has increased this year. The rice demand in Pakistan is only 3.8 million to 4 million ton of rice, however, it has increased from 4.8 million tons to 7 million tons. This is a phenomenal increase. Banana production is also increasing. If we want to overcome this threat we have to enhance the investment. At present, because of the 18th Amendment the investment has gone down. So it is recommended that investment should be increased from 3.7% to 10%.

Situation is not that gloomy and there is some ray of hope. The olive plants for example grows for 900 years and only initial two years are required irrigation. Previous government realized this and allocated 2.2 billion rupees to have Potohar valley as the olive valley. This year Pakistan produced 80 tons of olive oil. This is a positive impact by replacing crops that require less water like olives, pistachio and walnuts. KPK government has completed billion tsunami tree project in the last five years. Another ten billion tree project is ongoing. Present government has started productivity enhancement of oil crops because they require less water.







New Government Initiatives

PTI manifesto mentioned agriculture and water preservation together. They have started many initiatives. 320 billion projects approved by planning commission are in operation. There are three projects on Wheat, Rice, and Sugarcane. Three projects on Fisheries; one on trout in Northern areas, one on shrimp and one for enhancing fish availability. One project on Livestock.

Lead Role	No.	Areas
PARC	03	Wheat, Rice, Sugarcane
FDB	03	Fisheries
LDDB	03	Livestock
OFWM	02	Water
PODB	01	Oil crops

Task force has been formed under Ministry of Food Security and Research. They have daily meetings in the Prime Minister house and many experts work day and night. Project submission to planning commission under the topic of conservation and increased water productivity was made after multiple meetings with the Prime Minister.

Recommendations

- 1** Dramatically increase yields of major crop & boost adoption of oilseeds 
- 2** Harness untapped potential of fisheries 
- 3** Conserve and increase productivity of water 
- 4** Initiatives for small and medium livestock farmers 
- 5** Transform agriculture produce markets 
- 6** Increase access to finance 
[To be done by State Bank through National Financial Inclusion Strategy]

200 billion PKR was allotted on three projects to support government efforts to solve water challenges. 1. Conserving water through lining of watercourses & laser land leveling, 2. Enhancing command area of small and mini dams in Barani areas, and 3. Water Conservation in Barani areas of Khyber Pakhtunkhwa. Among these projects, command area of small and mini dams is getting complicated somehow because of lack of coordination and poor governance in this country. KPK government has done well in this regard for constructing smaller dams and conserving water over the years.

Rice straw burning is a major issue in many parts of the world. But in Pakistan and India on both sides of the border there is a very serious issue of smog which needs to be addressed. Moreover, rampant pumping is done by farmers especially in Baluchistan province. The farmers flood apple orchids and pluck apples so that they do not fall on the ground. There is 34 billion rupees subsidy to Baluchistan because of which they are using water very extravagantly. There must be a legislation on water drawing/pumping. We have a lot of base line studies. The issue is to implement them.

Speaker: 2

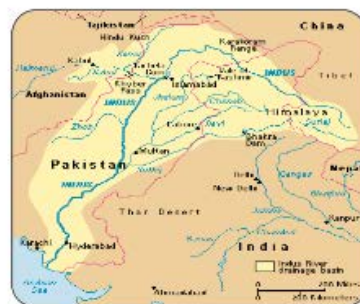
Dr. Muhammad Ashraf, Chairman, Pakistan Council of Research in Water Resources (PCRWR)

Topic: Water Resources Situation in Pakistan: Challenges and Future Strategies

No country can developed without using science and technology. Pakistan's national security is dependent on food security. Food security is in turn dependent on water security. So any decline in water quality or quantity will have negative impact on water security, food security and finally impact national security. The water security is lifeline to Pakistan's national security and existence. It is very important to understand the resource base of Pakistan. It is said that Pakistan has one of the best irrigation systems.

Water Resources of Pakistan

- Major storage reservoirs: 3
- Live storage capacity (designed): 15 MAF
- Barrages, head works and siphons: 23
- Main irrigation canals: 45
- Command area: 16.6 Mha
- Total geographical area = 80 Mha
- Culturable land = 30 Mha
- Rainfed farming = 12 Mha
- Rainfall – less than 200 mm to over 1000 mm



World's Largest Surface and Groundwater Resources

- One of the largest contiguous irrigation systems of the world
- One of the largest groundwater resources of the world (4th after India, USA and China)
- Groundwater supplement over 60% of the surface water supplies
- Over 90% drinking water and 100% industrial water comes from groundwater

The country has a huge resource base which is one of the best. However, there are major water sector issues Pakistan is facing. One is the water resources development. As the population is increasing, per capita water availability is decreasing. If the situation remains the same, by 2025 the country will be touching absolute water scarcity line. In 2016, water scarcity situation in Pakistan was analyzed and it was concluded that if the situation remains the same, i.e. if water resources and reservoirs remain at the same level and population keeps on increasing, by 2025 the country will reach absolute water scarcity level. Another issue is of recurring floods because of which Pakistan lost almost 90 MAF of water (which pertains to losses of 90 billion US dollars) besides having devastating effects on human, livestock and infrastructure as well. Sedimentation in water storage reservoirs is another key issue. About 5.5 million tons of sediments are being deposited in Tarbela dam due to which capacity of reservoirs are being depleted. Unutilized potential of like hill torrents also is a major issue.

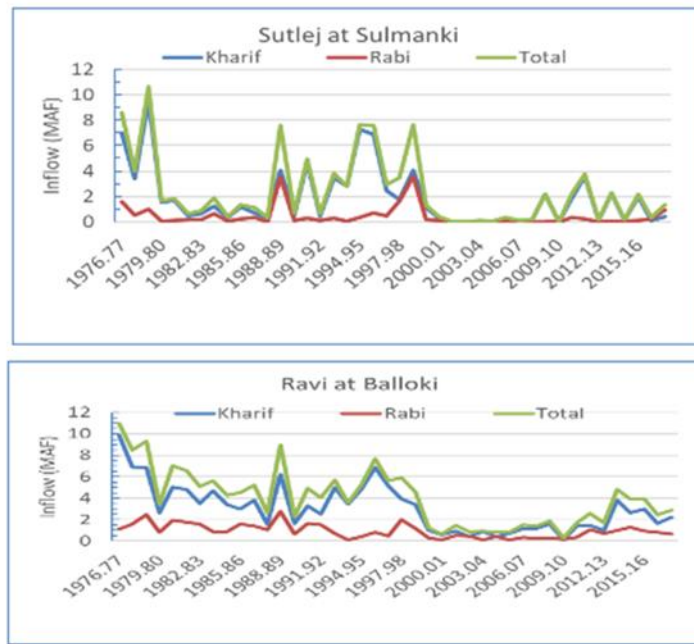
The water that is stored and is utilized, more than 60% of it is lost from source to sink because of conventional methods and poorly maintained channels resulting in Low Productivity per unit of water. This is putting a lot of pressure on the ground water and ground water is depleting in almost all urban settlements. Subsidence is a big issue which is usually ignored. It is basically the shrinking of the soil as a result of pumping. Studies tell us that in Quetta valley there is a 10 cm per year subsidence.

There is a huge ground water depletion because of lack of any groundwater regulatory framework. Anybody can install tube wells anywhere and can pump any amount of water anywhere and can sell this water to his neighbor who cannot afford a tube well. Salinity can also increase because of this excessive pumping due to which regulating groundwater has become increasingly important. Because of salt water intrusion, water quality will be deteriorated and it has already started happening.

Another issue regarding water governance is lack of crop zoning. As mentioned before, rice and sugarcane are being planted in water-stressed areas. For example, growing crops which demand high level of delta water in Southern Punjab will put pressure on water resources there. Since there is no water there, therefore, water will be pumped from deep underground water reservoirs which are saline. Provincial and federal government along with other important institutions have to play their fatherly role in stopping such growing of rice and sugarcane in these areas. Salinization is a slow poison, it takes decades to build, and once a land is saline, it takes years to reclaim.

Due to climate change, wet years/seasons are becoming more wet and dry years/seasons are becoming drier. Government must take measures to transfer water from wet year/season to dry year/season, which is a serious challenge. Increased precipitation intensity and variability - floods and droughts: storage and optimum reservoirs operations becomes critical. Because of global warming, urban flooding have become more frequent than before. Changes in water quantity and quality will impact food production. Thus Pakistan needs to improve water productivity. We need development of climate smart technologies. Then another challenge is that of population growth which needs to be controlled.

Flows in the Eastern Rivers



The National Water Policy 2018 although has its own shortcomings, still it has provided guided principles as well as targets in certain areas. So if it is implemented in its true letter and spirit, the country can achieve a lot more. The government should construct small and large dams wherever nature provides the chance. There is a strong need for improving the surface water governance with proper pricing - free commodity will never help to conserve it. Farmers will never be eager to save and conserve water if they don't have any incentive in return. The government must also legislate and restrict indiscriminate groundwater abstraction. It is very important because it provides more than 90% drinking water. 100% industry water comes from it. Control in population growth is very important. We have neglected this issue and now nobody talks about it. This is very serious issue because even if you make water reservoirs and your population keeps increasing with the same rate, you will be again back to square one.

The soft path is to improve water productivity; use agriculture water efficiently; improving conveyance and application efficiencies; using high efficiency irrigation systems; changing the existing cropping patterns, Using domestic water efficiently is very important. Though only 2% to 3% is used in domestic systems, yet it has a number of effects on the ecosystem. We have all kind of knowledge, we know the issues and challenges. Now the major issue is how to transform already known knowledge into action. For this political will and commitment is required. Pakistan should believe in the local capacity and believe in the expertise of local experts. The concept of more crop per drop of water should be implemented. Farmers should know how much water a crop needs. For this, PCRWR determined crop water requirement of major crops grown in Pakistan through lysimetric studies. For example, rice crops need only 480-500 mm of water in Central Punjab while our farmer is applying 5000 mm of water. In other words, for growing 1 kg of rice, farmers are using water worth 5 tons. So exporting one kg of rice,

means giving away 5 tons of water as well which makes it a losing endeavor. Therefore, Pakistan should focus on growing water and sugarcane according to domestic requirement only.

Research has also been done on high efficiency irrigation system. The myth regarding rice is that it can only go in standing water. This is not necessary. Rice can be grown in standing water but it does not need standing water to grow, it can also grow well without it. Moving further to develop any ground water regulatory framework, we must know the kind of ground water. After working for 10 to 12 years PCRWR has mapped the upper Indian basin and the lower basin. About 23 million hectares of land in entire upper Indus and lower Indus has been mapped. A lot of water is lost on the field because of the lack of irrigation scheduling. Because our farmers don't know when to apply water and how much water to apply. Conventional methods are very laborious in this regard. So PCRWR has collaborated with University of Washington and developed a technology sending 20,000 texts to farmers every week in 43 districts telling them whether their crops need water or not. The organization is planning to spread this messaging to 100,000 farmers. Similarly, if water is measured, it cannot be saved or managed. Flow measurement and management between provinces has remained a problem for long. So the concept of Indus telemetry system for real-time flow measurements has been introduced. In provinces, large canals especially in KPK have been instrumented so as to regulate and measure the flow of water.

Speaker 3:**Advocate Ahmer Bilal Soofi – Former Federal Law Minister****Topic: Introducing Effective Law Reforms to Ensure Water Security**

This seminar is an occasion to flag the quality input that our experts and scientists give and we hardly notice and realize the significance of their work. We need to honor them and we need to honor their advice. Pakistan needs to devise a framework to promote and materialize the vision of outstanding water experts and scientists in the country. Their input and advice can only be preserved through a legal framework which provides the pedestal on which this technical advice can move ahead. The issue of food security is linked with water security and we need to have a holistic approach and a permanent regular systematic approach towards it. The executive authority in the country is scattered and confused. There are issues relating to dispute of water between provinces. There is so much confusion in the existing laws. So where will the work and suggestions of all these scientists and researchers which is the work of their entire life will be taken? That is a big question. Many of these suggestions and recommendations of these scientists for which they have worked their whole life cannot be implemented until confusion of interprovincial governance, district governance and provincial governance is clarified. There is a need of executive and legislative clarity on management of the water resources. There is confusion between WAPDA Act and Provincial Act of canal and drainage, there are hardly any laws which identify that because they discussed the issues which existed pre-partition relating to canal and drainage and their management. In 70 years the scientists and experts are telling us that the goalpost of the crisis has changed. The nature of issue of food security is completely changed. There are politicians, policy makers and lawyers who are whole hearted towards this. But people are all struggling and everyone has their face in different direction. The consensus can be better represented when the Supreme Court takes cognizance of this matter. The judicial arm of the state is non-technical. The judges and the lawyers have no clue about what agriculture and water scientists are saying but they only have to believe them. In the Water policy 2018, there is no legislative way forward. It is a diagnostic paper giving some ideas, but no specific legal framework has been presented as a way forward. We need to bring major stakeholders in this regard to discuss the issues and find practical solutions. If they come up with an agriculture based solution, we can implement it through executive arm and have it executed. Many things in Pakistan are doable with the help of a notification. Resolutions by think tanks and their experts can be implemented.

Speaker 4:**Mr. Shahid Hameed, General Manager (Hydro), WAPDA Headquarters,
Lahore****Topic: Water Security Challenges & Conservation Strategy for Pakistan**

Water is life. Politics related to water exist on all levels including provincial, federal and even regional level. Challenges related to human security, economy and national security are those issues for which water plays a vital role. Pakistan is touching the water scarcity level, less than 1000 cubic meter per capita and by 2025 it will further reduce. This is very alarming. The sources of water; 25 to 35% is from rain while 65 to 75% is from the glaciers and ice. Pakistan has around 166.6 million acre-feet water that is Indus water including the hill torrents. Ground water extraction is around 50 MAF Population is exponentially increasing and storage capacity is depleting.

In Pakistan, 80% of water is available in 100 days while 20% of water is available in the remaining 265 days of the year. So this situation demands that the country needs reservoirs to use the rain water, flood water in seasons with low water-flow. For that, reservoirs are required. One of the alarming thing is that storage capacity of water is just enough for thirty days. The government must take steps to enhance storage capacity for more days as it is depleting. Until now 27% of storage capacity has been lost and by 2050 further 45% of storage capacity will be lost due to increasing sedimentation. Mangla dam might not be available for use till then which has storage capacity of 8.3 MAF.

Pakistan is storing only 10% of our average annual water while other countries are storing 3 to 5 times more water storage capacity than this. Due to climate change and demographic shifting, there is stress on water resources. Pakistan is among 15 most water scarce countries, due to using maximum water for minimum productivity. Pakistan has one of the most water intensive agriculture and minimum production value, and only 2% water is recycled. It is difficult to build water reservoirs and storage capacity because it takes more time for planning and construction of such projects. Media also adds to the controversies regarding new water projects and hinders construction of such reservoirs due to the 5th generation warfare. Therefore, a long term support from the nation is required for implementation of these projects.

The main tasks under the mandate of WAPDA are to develop all water and hydropower resource, prevention of waterlogging, flood mitigation etc. Various projects were completed by WAPDA in the last 20 years including drainage projects, canals, distribution system, thermal plants and many more. All the projects are working at their maximum capacity. Until now through hydropower projects, the country is able to generate around 9400 MW power. WAPDA has reclaimed more than 18 million acres of area which was brought back into agricultural productivity.

Pakistan should increase its agricultural productivity; increase hydropower share; reduce floods and droughts' and urban and rural water management. The population currently is 207 million and by 2050 it is expected to be more than 312 million. We need at least 70 MAF of more water to meet the food requirement of the nation. Regarding hydro-thermal mix, currently it is 30% and by 2050 we need to improve it to 50%. We

have to do some management, conservation and storage. We have to apply high efficiency irrigation system to conserve water.

WAPDA has short (up to 2025), medium (up to 2030) and long term (up to 2050) plans for increasing our agricultural growth and water storage. These projects will give job opportunities to more than 27, 000 people and more than 1, 650 engineers will be hired. Different projects are under planning stages, and national support is needed to implement these projects. Mohmand dam project is already started which is located on Swat River. This project will provide 1.2 MAF storage which will be available for drinking water in Peshawar valley, local irrigation to tribal areas and also lower Swat canal command areas. It will also save the Peshawar, Charsaddah and Nowshehra valleys from flooding. WAPDA is committed to develop water storages, to food and energy security.

Speaker 5:

Dr. Shaheen Akhtar, Professor, Department of International Relations, National Defence University, Islamabad

Topic: Water Diplomacy: A Tool to Counter Water Challenges in Pakistan

The water is not a scientific subject alone, rather it is also has a lot of politics. There is an emerging concept about the hydro-diplomacy, which has lately emerged in the policy domain. It also has a trans-boundary dimension. Water management in most of the transboundary basins is highly politicized and it has considerable impact on water sharing, water development and conflict prevention, thus it is linked with regional stability in term of the rising tensions. So the environmental peacemaking becomes difficult. For the last 7 decades, water governance has been largely a topic for technical people and there has been attempt to find technical solution, which is very important. However these has been disconnect between science and policy regarding the management of the water sector. Hydro-diplomacy intends to actually develop synergies between the “low politics” of technical and financial cooperation and the “high politics”.

There is a lack of agency at the int. level. Foreign policy makers can ensure stronger agency at the int. level, realize potential synergies b/w political and technical engagement, and build the necessary capacity at the national, basin and global levels.

The challenges that Pakistan is facing range from the growing population to unsustainable management practices and mounting environmental pressures. These factors are exerting increasing strain on the Indus Basin, which is very vital resource for fresh water. Demographic change is one of the big threat multiplier when it comes to access of water and the availability per capita water per person annually. Pakistan has a very unique position. We are a single basin country and a lower riparian and 78% of our water comes from outside our boundaries. That creates vulnerability. Pakistan's economy and livelihood is linked to agriculture sector. 18.5% of GDP and 90% of crops is produced by the agriculture sector.

There is an interesting 2014 Adelphi report on the topic of “The Rise of Hydro Diplomacy: Strengthening Foreign Policy for Transboundary Waters”. It called for stronger political leadership in water diplomacy and to actively accompany and facilitate the efforts of technical and development experts. That was the political patronage which is very much important in implementing various proposals and initiatives by the experts. It argued that hydro diplomacy asked for the greater cooperation over transboundary waters which is going to resolve political conflicts and greater regional integration. There are three areas where Pakistan can bring this concept in terms of transboundary dimensions and internal waters of Pakistan. First one is the facilitating agencies, for example World Bank played a key role in building water infrastructure in Pakistan. Second element is improving coordination at regional as well as national level. The third one is enabling

actors, which is most important at the national level. It helps in addressing the capacity related issues which hinder the transboundary water cooperation.

Facilitating Agency:

- There is a lack of agency at the int. level. **Foreign policy makers can ensure stronger agency at the int. level, realize potential synergies b/w political and technical engagement, and build the necessary capacity at the national, basin and global levels.**

Improving Coordination:

- To manage the coming challenges, driven in part by climate change, foreign policy makers must drive an internationally coordinated, cross-sectoral engagement.
- In particular, the int. community could more **vigorously pursue the potential synergies between 'high' and 'low' politics.**

Enabling Actors:

- There are a number of **capacity-related problems** that hinder greater cooperation on transboundary waters.
- The int. community and individual donors can undertake a number of specific policies to **develop institutional, human, and financial capacities** and
- **to enable basin stakeholders and external actors to contain the risks and harness** the opportunities of engaging on transboundary water governance.

Within the IWT the delays in providing prior information and data sharing is happening. This is creating a lot of problems especially regarding the construction of projects. Even data sharing is based on the old mode. There are set of issues that are emerging outside the treaty.

- The IWT does not account for several issues that have risen over recent years. These include:
- **Climate Change:** Climate Change **has become a serious concern in recent years** for sustainable management of IB **which requires** suitable measures.
- **Environmental flows:** Environmental flows is an **issue that has only recently been recognized** and needs to be coordinated b/w the two countries to protect

These issues are very important to address as they are affecting the sustainable management of the Indus Basin. On the top of it is climate change, which is going to have adverse long-term impact on the Indus Basin. Environmental flow is another issue and is affecting the management of eco system. The three eastern rivers which Pakistan has, have very less water flow in Sutlej and rest of the water bodies has turned into the drains and are very polluted. It is good that now Pakistan is going towards the mapping of the ground water aquifer. Pollution is another issue. Water from the eastern rivers enter Pakistan heavily polluted as there are lots of industries on Indian side, having severe environmental implications on downstream water bodies. There were some efforts taking place by the Indus Water commissioner to cleaning of the Hudiera dam water in the beginning but it has to be done at a larger scale.

Pollution: Water from the eastern rivers enter Pakistan heavily polluted having severe environmental implications on downstream water bodies.

The role of hydro diplomacy in stabilizing IWT regime, is very important. A proactive hydro diplomacy can help in stabilizing IB regime created in 1960. Building potential synergies between political and technical engagement, and building the necessary capacity at the national, basin and global levels is relevant to the management of the Indus basin. In terms of trust building which has been really affected. It can be done by the international facilitation. Mechanism for data sharing regarding the construction of Indian projects on Western Rivers is important. However there is no mechanism so it could be developed by the assistance of international bodies, particularly under the UN. Assessment of the cumulative impact of the Indian hydro projects on Western Rivers on the down stream flows & environment. So, Pakistan could go on a neutral science-based analysis of the cumulative impact.

Role of Hydro diplomacy in stabilizing IWT regime

- A proactive hydro diplomacy can help in stabilizing IB regime created in 1960.
- **Facilitating Agency:** Building potential synergies b/w political and technical engagement, and building the necessary capacity at the national, basin and global levels.
- Trust building:
 - Real time data sharing through installation of telemetry system.
 - Mechanism for data sharing regarding the construction of Indian projects on W. Rivers.
 - Assessment of the cumulative impact of the Indian hydro projects on W. rivers on the down stream flows & environment.

Sharing of Environmental Impact Assessment (EIA) of the Indian projects on the western rivers will build trust and it is very important it can help to add trust between both sides. Prospects of improving scientific coordination/ transboundary cooperation can be covered under Article VII of IWT which talks about the optimum utilization of the river system. Those are as follows:

- Joint Study on the behavior of Himalayan glaciers.
- Joint study on the effects of Glacial Retreat on run off.
- Joint Monitoring of impact of Climate Change on the Indus basin river system.
- Siachen must be demilitarized. Parties showed interest & offered new ideas to resolve the issue, by turning it into a 'mountain of peace' or 'zone of peace', but political will is missing to move forward.
- Joint mapping of aquifers; joint study on water pollution issues
- Coordination in integrated watershed & pollution management to protect quality of water in the basin

Hydro-diplomacy has major role in managing Internal Waters with special focus on certain enabling actors' i.e. the role of international community and individual donors can undertake a number of specific policies to develop institutional, human, and financial capacities and to enable basin stakeholders to harness the opportunities of engaging on transboundary water governance. Another important thing is changing water discourse which is based on water nationalism and water cooperation. Then building institutional capacity for improving efficiency of water sector institutions, effective management of agriculture/irrigation sector in efficient water conservation technologies and practices, rain water harvesting, waste water management, increasing storage capacity, effective

implementation of the principles of Integrated Water Resources Management (IWRM) in respective water policies and sharing best practices in water conservation techniques in agriculture, industrial & domestic uses.

To conclude, a proactive hydro diplomacy can play an important role in effective management of water resources through political dialogue, technical/financial support to capacity building of the water institutions to creating conditions for changing water discourse/ perception from water nationalism & securitization to shared management of fractured Indus Basin. A proactive hydro diplomacy will help in deepening the knowledge base on which decisions are made at national and sub-national levels. It will strengthen the frameworks that govern water resources management and adaptation to climate change. It will Improve water resources planning and management, prove the capacity of water managers at all levels and the engagement of water users and improve financing of CC adaptation activities, & develop climate smart infrastructure.

Speaker 6:

**Dr Muhammad Khan, Member Board of Experts CGSS, Professor IUII,
Department of International Relations**

Topic: Security of Water Sources and Catchment Areas

Water sources of Pakistan are declining hence, it is rapidly becoming water scarce country. Pakistan needs to take immediate actions in order to avoid the difficulties that are to come. The main water sources of Pakistan are the rainwater, rivers, lakes and the ground water. The Indus river system receives an annual influx of about 134.8 MAF of water. The mean annual rainfall varies from less than 100 millimetres to over 750 millimetres. Surface water comprises glacial melt up to 41 %, snowmelt up to 22 % and rainfall 27 %. The irrigation system of Pakistan is indeed considered as one of the most integrated networks in the world having 3 major storage reservoirs, 19 barrages, 12 inter-river link canals, 45 independent irrigation canals and 122,268 water courses. Pakistan has three hydrological units. The main is the Indus Basin, but we also have the Kharan Desert and the Arid Makran Coast.

Pakistan has Three Hydrological Units

- **The Indus Basin**
- **The Kharan Desert**
- **The Arid Makran Coast**

Indus Basin covers more than 566,000 square kilometres (71 % territory) comprising the whole of the provinces of the Punjab, Sindh, KP & eastern part of Balochistan. The Indus River has two main tributaries, the Kabul on the right bank and the Panjnad on the left bank. The Panjnad is the resulting flow of five main rivers. Kharan desert is in the west of Balochistan Province. It covers 15 % of the territory. The Mashkel and Marjen rivers are the principal sources of water in this basin. The water is discharged in the Hamun-i-Mashkel lake-Iranian border. The Mashkel is the tehsil that gets electricity from Iran and most of the trade activities are taken place with Iran. The Arid Makran Coast. It is along the Arabian Sea. It covers 14 % of the territory in its south western part of Balochistan. The principal rivers are; Hub, Porali, Hingol & Dasht in this coastal zone.

The catchment is an area where water is collected by the natural landscape. In a catchment, all rain and run-off water eventually flows to a creek, river, lake or ocean, or into the groundwater system. Natural and human systems such as rivers, farms, dams, homes, plants, animals and people can co-exist in a catchment. Water catchments are widely recognized as the most effective management unit for the protection of water resources, both water quality and supply.

Water Catchment Areas; Scale Planning and Conservation

A water catchment area is home to a complete water-cycle system.

In order to manage these systems for a healthy future, we must learn to catch, conserve and make wise use of all water in the system, rather than “shed” that water away as the term “watershed” implies

Water and land are inseparable; clearly what we do on the land affects water resources within a water catchment

There is tremendous public value in adopting policies that reward landowners for practicing stewardship that enhances our region’s water supply

Unfortunately, Pakistan has inaccessibility to water sources of three Western rivers, which were dedicated exclusively for Pakistan with few exceptions which are mentioned in some of the appendixes of the IWT. Moving further to the Trans frontiers water security issues. In Indus Basin there is an overexploitation of water resources and downstream water flow in the Jammu and Kashmir. There has been construction of dozens of water dams, hydroelectric projects, water storages and water diversions in Jammu and Kashmir that ultimately affect the down flow of water that comes to Pakistan. Construction of these facilities coupled with climate change cause melting of glaciers and irregular monsoons that has further posed a serious environmental security challenge that Pakistan is facing all along. Both India and Pakistan must adhere to the IWT. The treaty requires India to inform Pakistan about the constructions of any engineering work that impacts the water flow downstream. India is required to inform Pakistan six months in advance, and Pakistan, if it takes any activity in its area, has to inform India three months in advance.

Pakistan is facing two very severe challenges. These are the inter-state water issues with India and Afghanistan, and the intra-state water issues between four provinces. According to the IMF, Pakistan ranked third among the countries facing severe water shortage. Pakistan Council of Research in Water Resources (PCRWR) announced that by 2025, there will be very little clean water available in the country. Coupled with water scarcity, Pakistan is facing the issues like floods, droughts, and domestic mismanagement. It is also linked to the political will. Diminishing water quality is yet another emerging threat. All these factors can contribute towards domestic unrest and socio-political tension.

Water security is an increasingly important issue that constitutes one of the biggest challenges to Pakistan’s development. Pakistan needs to put serious thought into how it will provide adequate water for agriculture, industry, and human consumption in the face of rapidly dwindling reserves. Agriculture is the largest sub-sector of water-use, as it consumes around 93% of total water resources available apart from the surface and groundwater. Mismanagement of water will have its biggest impact on Pakistan’s

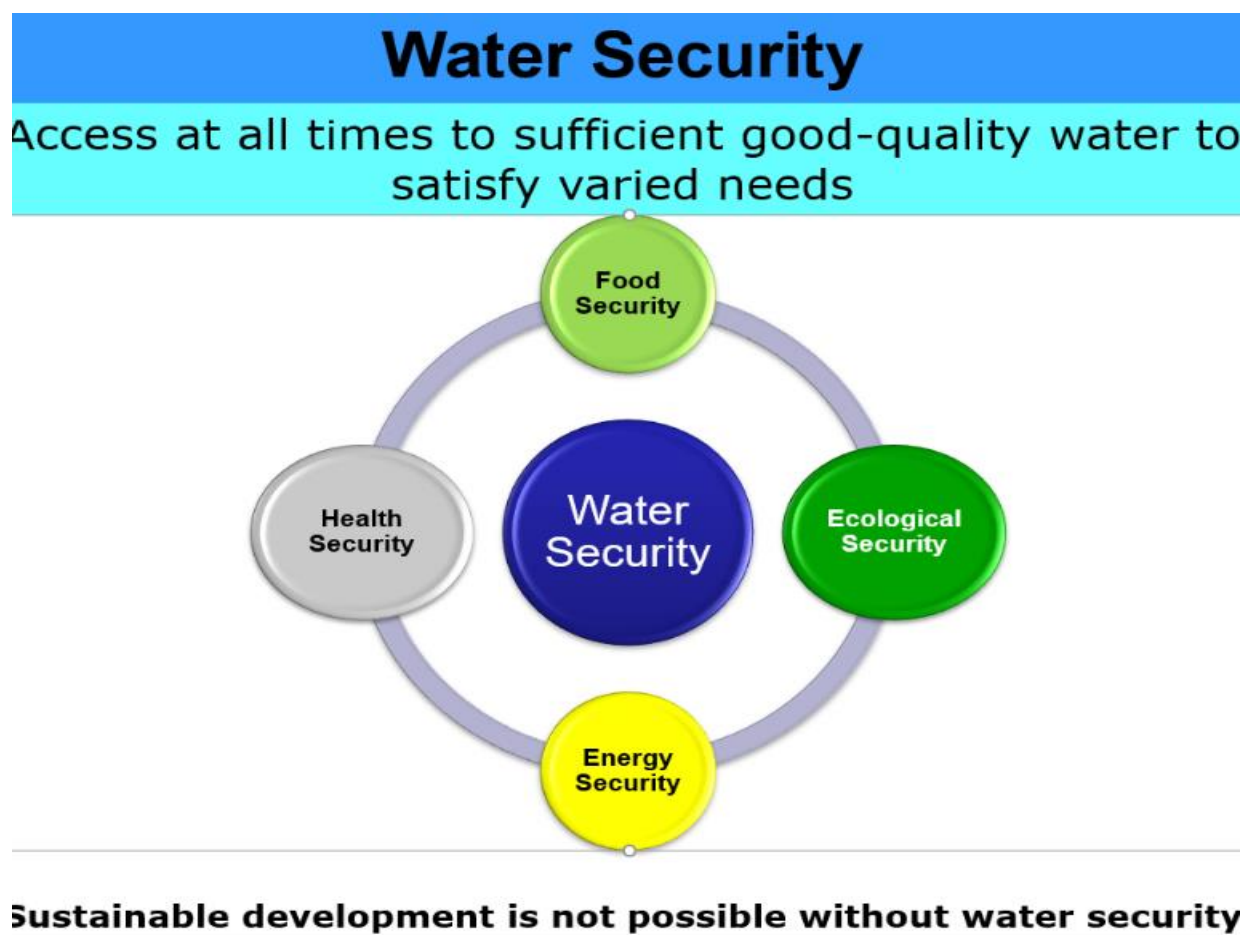
agricultural sector. Pakistan's water issues are multi-dimensional, there is no single all-encompassing problem, and hence there will be no single solution. It needs solution in every direction. These multiple problems are interrelated problems; therefore, systems analysis becomes key to help the country's develop optimal solutions to its challenges.

Pakistan must address its water scarcity problems to alleviate its economic and social vulnerabilities on priority. At domestic level, it needs to effectively manage its water sources through water conservation, construction of dams and water storages at national level. Ensuring the distribution of water as per agreed formula of IRSA-1991. It was a pivotal breakthrough in water distribution and a leap towards the 21st century. To maintain water quality, government should take anti-pollution measures. To tackle the large-scale challenges, Pakistan must move to the next generation of smart water management. It includes role of Information and Communication Technology (ICT) in Water Resource Management. ICT powered and involve extensive knowledge transfers and virtual water transfers. It is a technological innovation and coupled water and energy systems models. It will address the water and food security issues. Pakistan needs to have a proactive diplomatic approach on water sources with India, involving World Bank and UN.

Speaker 7:**Dr. Hifza Rasheed, Director NWQL, Pakistan Council of Research in Water Resources (PCRWR)**

Topic: Water security challenges and conservation strategy for Pakistan

Pakistan has both internal and external water security challenges. Water security is the access at all times to sufficient good-quality water to satisfy varied needs. Pakistan's water security is connected to some of the major sectors. i.e. food security, ecological security and human security. For sustainable development, ensuring all these is very important.



Following is the description of Pakistan's water resources.

Pakistan's Water Resources

No. of major rivers	5 (Indus, Jhelum, Chenab, Ravi and Satluj)
No. of major reservoirs	3
No. of barrages / HW / Syphons	23
No. of main canal system	45
No. of interlink canals	12
Length of canals	60800 Km
Length of watercourses	1.6 Million Km
No. of tubewells	>550,000
Irrigated area	36 Million Acres

The Indus River originates from Tibet in the upper reaches of the Himalaya, moves through Indian-controlled Kashmir and finally enters its most dependent area, across the international boundary into downstream Pakistan. It flows through the fertile plains of Punjab and then Sindh, eventually draining into the Arabian Sea. 70% of the population is directly or indirectly employed in the agriculture sector accounting for 26% of its GDP. (80% land is irrigated). Snowmelt and glacial runoff contribute between 35 to 40% and 25 to 35% of Indus Basin river flows, respectively, making their contribution indispensable to Pakistan's hydrological cycle.

Pakistan is a water rich country but since 1951, the country has moved from “Water Stressed” to a “Water Scarce” Country (the minimum water requirement to avoid food and health implications of water scarcity is 1,000 cubic meters per capita per year).

Per Capita Water Availability

Year	Population (million)	Per capita water availability (M ³)
1951	34	5,650
2003	146	1,200
2010	168	1,000
2025	221	800

(The World Bank, 2006)

Pakistan is facing a lot of challenges for example: climate change, irregular rainfalls, glacier melt, droughts, flooding. At the same time there are several climate changes impacts that are varying from one region to another. The country receives 40 million acres feet rain annually but unfortunately only 20% is harvested. Whereas, the developed countries are harvesting up to 90% of the rain.

The storage capacity is limited and it is prone to the siltation problem in the dams. Tarbela dam storage capacity has been declined by 35%. In this regard, Pakistan needs to raise storage capacity by 18 MAF (6 MAF for replacement of storage lost to siltation and 12 MAF of new storage) by 2025 in order to meet the projected requirements of 134 MAF (The Pakistan Water Strategy).

Limited Storage Capacity

Limited Storage Capacity & Increased Water Scarcity

Pakistan's Storage Capacity

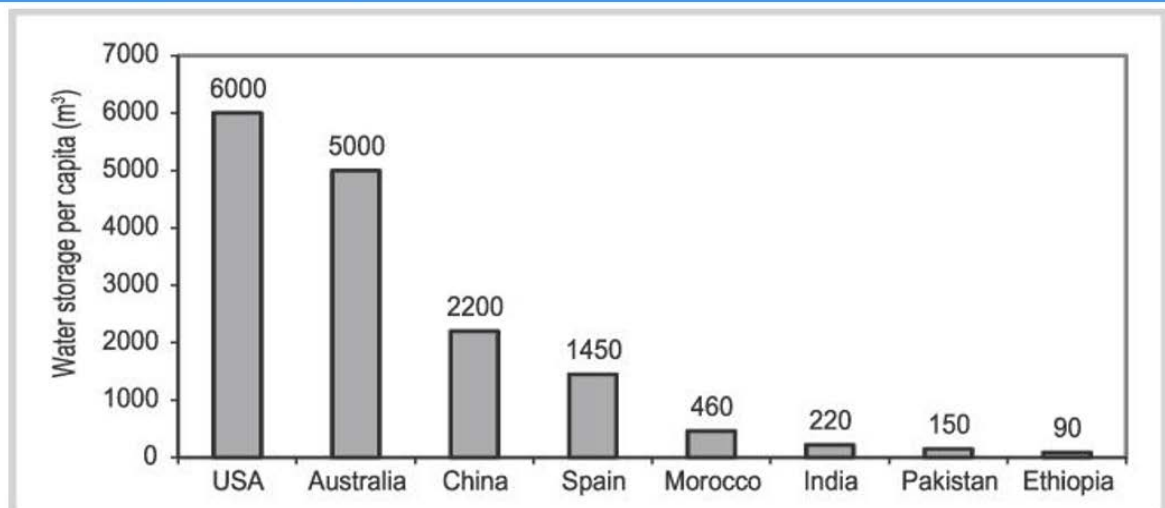
- Limits the amount of water available during the dry season
- Contributes to flooding during wet seasons

Sedimentation has also compounded the problem. Silt that naturally exists in rivers becomes trapped by reservoirs, sinking to the bottom, and thereby decreases storage capacity.

Storage capacity of the Tarbela Dam declined by 35% since it was commissioned (2015 hydrographic survey)

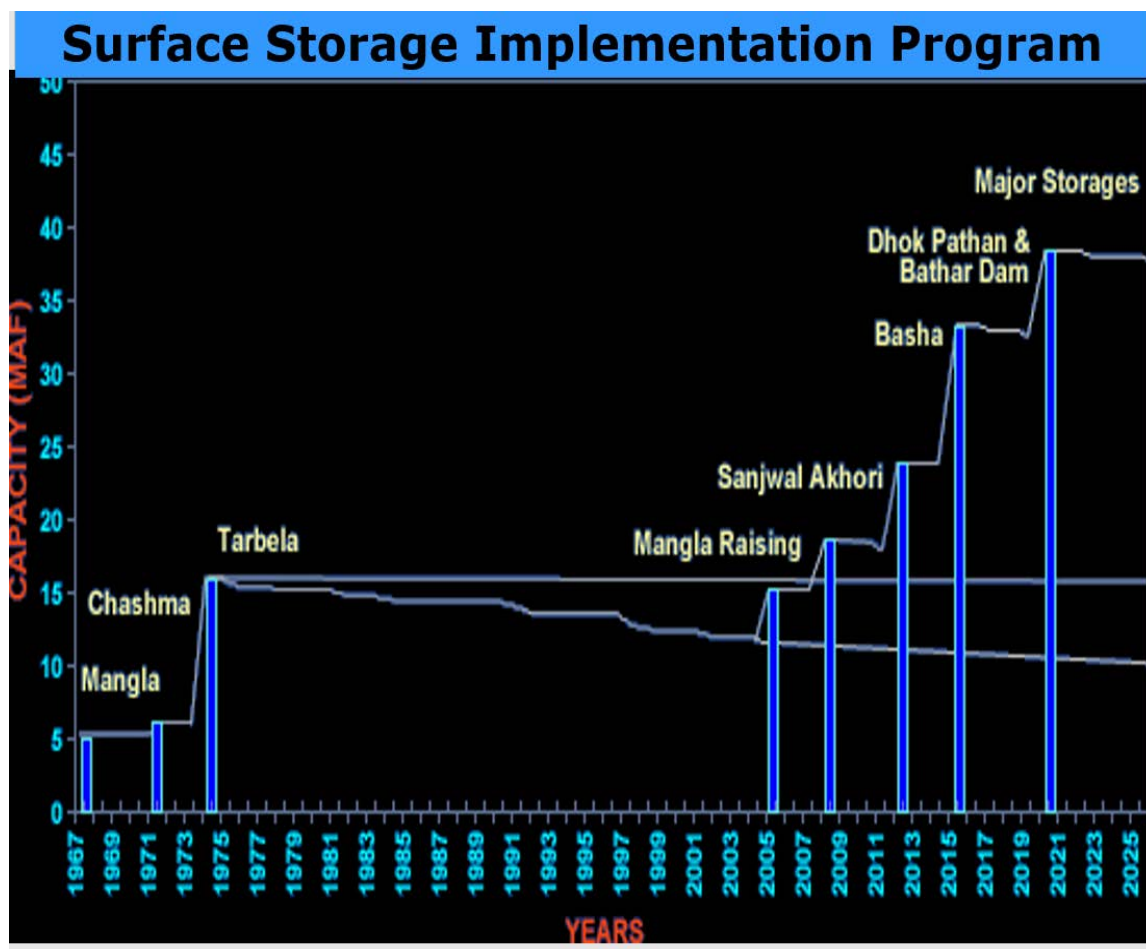
Pakistan needs to raise storage capacity by **18 MAF** (6 MAF for replacement of storage lost to siltation and **12 MAF** of new storage) by 2025 in order to meet the projected requirements of 134 MAF (*The Pakistan Water Strategy*)

Storage Per Capita in Different Semi Arid Countries



Pakistan has up to 30 days' worth of storage capacity

There have been certain projects initiated to raise the storage capacity. For example, as shown in the slides that Mangla has raised its storage capacity



Pakistan lacks any pricing mechanism for water usage in agricultural or industrial sector. Similarly, a behavior is developed in the state where the marginal utility has become zero. There is no profit and sustainability model for water supply system. Pakistan ranks 4th highest among world countries at consuming water. So, if government does not opt for a cost recovery model, the nation will suffer in future.

- **Wastage:** Pakistan's Flood irrigation System; wastage from water supply leaks
- **Behaviour is developed to consume water up to a point where marginal utility is zero**

The national water policy of Pakistan (section 12.2) emphasizes on effective reduction in wastage, theft and non-revenue water allocation and 100% metering.

Pakistan's rate of water usage – the fourth-highest in the world
Water Intensive Economy

Free Water Supply - No Cost Recovery Model

Then there is significant decline in groundwater of 1.5 m/year and it varies region to region. There is no ground water management system. The list of different regions is mentioned in the slide. We lack a ground water regulatory framework.

Groundwater Abstraction

Significant decline in groundwater tables @ 1.5 m/year

- 3rd source of water is the ground water
- Provides approximately 40% of crop water requirements of the country
- **Total Groundwater Potential = 55 MAF**
- **Groundwater Abstraction = 41.5 MAF**
- **Punjab: 81% abstraction (80% Fresh water, 20% Saline)**
- **Sindh: 12% abstraction (23% Fresh water & 77% Saline)**
- **KPK: 5% Abstraction**
- **Balochistan: 1.2% Abstraction**

1991 Water Accord mitigated some provincial concerns (by allocating water to provinces based on a particular formula) but it requires mutual trust. PCRWR, IWMI and IRSA have made efforts by installing the Telemetry set ups at different canals. They are doing data recording online. Through this mechanism further issues would resolve.

Real-Time Canal Monitoring



But there are certain risks and crises in the Indus Basin which need proper policy to carry out. i.e. cost and benefit analysis, uncertain transition of institutional structures, indiscriminate cutting, sea water intrusion and then governance issues.

Risk & Crisis in Indus Basin

Costs & benefits of building and maintaining infrastructure are controversial and endless

Uncertain transition of institutional structures of water control and management

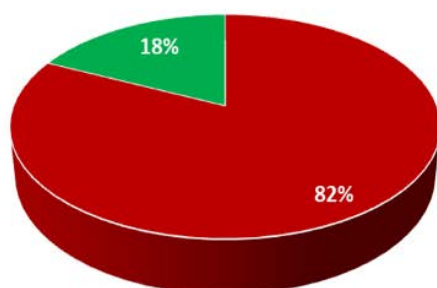
Indiscriminate cutting of mangroves and clearing lands for infrastructure development.

Seawater intrusion has been significantly increased, mainly because of extended zero flow periods

The domestic consumption of water is about 7%, which includes 3% mainly for the drinking purpose. This 3% is very important because the life and health of the people of this country depends upon this 3%.

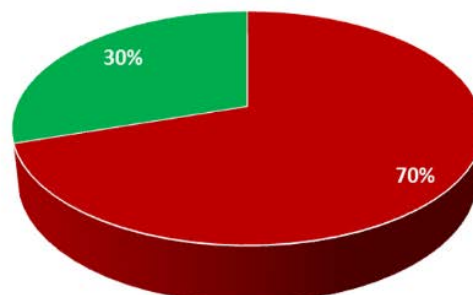
Safe Drinking Water Status

Drinking Water in Rural Areas



■ Unsafe ■ Safe

Drinking Water in Urban Areas



■ Unsafe ■ Safe

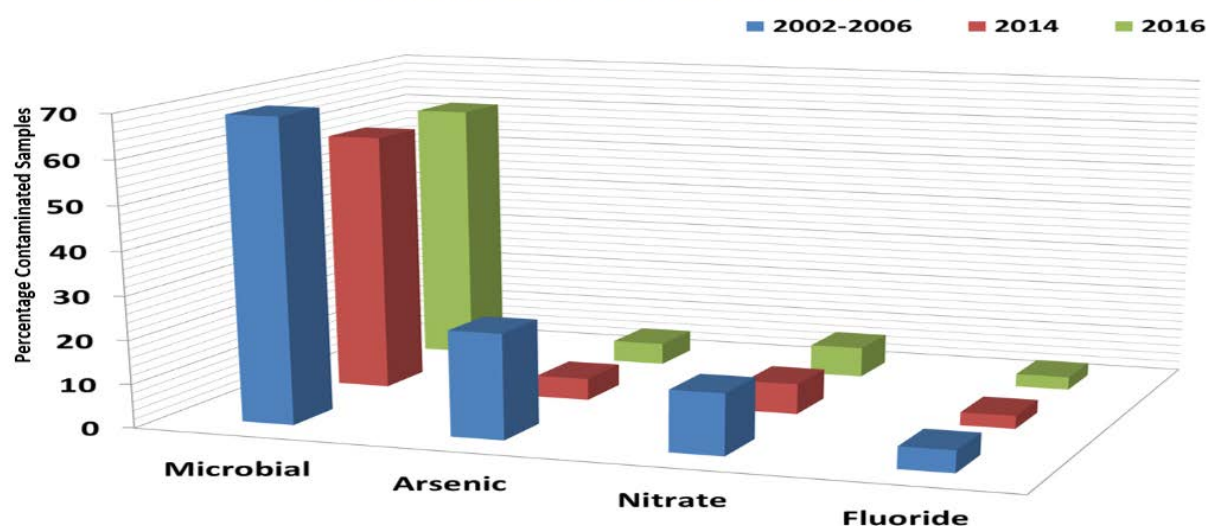
Pakistan Vision 2025 and UN Sustainable Development Goals (SDG's) 2030 impose obligations towards achieving its WASH goals.

Drinking water, priority No. 1 in the approved National Water Policy 2018

The safe drinking water in rural areas is 18%. In urban areas it is 30%. Pakistan Vision 2025 and UN Sustainable Development Goals (SDG's) 2030 impose obligations towards achieving its WASH goals. There are certain major prevailing contaminations as flagged in the slide. Which includes microbial, arsenic, nitrate and fluoride.

Safe Drinking Water Status

Major Prevailing Contaminants



The infrastructure work has been done and there are certain water filtration plants and water supply scheme but the access to safe drinking water is low because of certain reasons as mentioned in the slide below.

Major Constraints In Supply Of Safe Water From Filtration Plants



Improper design & technology selection



Untimely replacement of treatment components



Lack of water source protection



Unhygienic conditions



Inadequate capacity of plant operators



Lack of 3rd party monitoring systems

After 18th Amendment, the Provision of Safe Drinking Water falls within the domain of the Provincial Governments

Lack of Sustainability and Ownership

Political will along with capacity is very important. Pakistan should have National Water Quality Surveillance Agency which can watch the water quality not for the drinking purpose but also for the ecological, aquatic life and other aspects which are required to be watched along with monitoring the transboundary contamination transportation. There is also an issue of sustainability and ownership. If there is no ownership there is no sustainability. There were several initiatives that were taken in past in this regard but unfortunately, they did not meet the targets, as there is a lack of coordination among the authorities and there is overlapping of responsibilities. Several organizations are working on similar projects but there is no sharing of data. There is no centralized data base.

There are major constraints in the supply of safe tap water. For example, water shortages and increasing competition for multiple uses, improper disposal of municipal, industrial and hospital waste, lack of institutional and technical capacity of water supply agencies, lack of profit and loss model for water supply service providers, outdated infrastructure of water supply schemes, inadequate water treatment facilities, lack of coordination (and overlapping roles) among stakeholders, uncontrolled groundwater extraction causing quality issues, lack of public awareness on water quality issues. These constraints are further compounded by inadequate compliance to the national drinking water standards, bottled water quality standards, national environmental quality standards. Different guidelines are followed but no national standard is there. They need to be established.

Waste water is another issue. Which is generated everyday by the industry and 1.4 MAF of untreated wastewater is disposed of into rivers directly. We just have the capacity of 8% recycling of water. It can be a great asset if we recycle it and use it for irrigation purposes.

Wastewater Issues in Pakistan

- **Pollution of surface water – sewerage, industrial (about 5.0 MAF wastewater from major cities of Pakistan)**
- **1.4 MAF of untreated wastewater is disposed off into rivers directly**
- **Pollution of groundwater – agriculture, industrial (6.8 million tons of fertilizer and 153170 tons of pesticides are consumed in the country every year)**

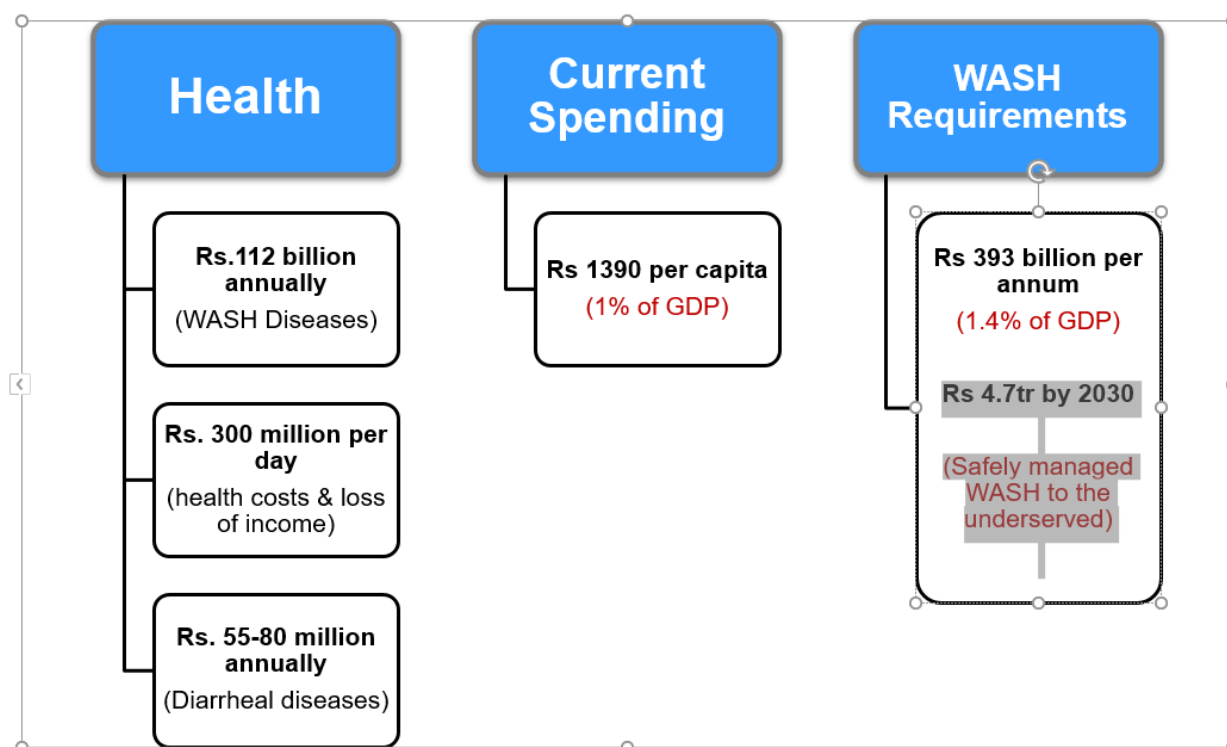
S. No.	Source	Wastewater Generation	
		MAF	%
1	Industry	0.320	6
2	Commercial	0.216	4
3	Urban Residential	1.319	26
4	Rural Residential	2.478	48
5	Agriculture	0.839	16
Total		5.172	100



Source: Pakistan's Wetlands Action Plan, 2000 (WWF)

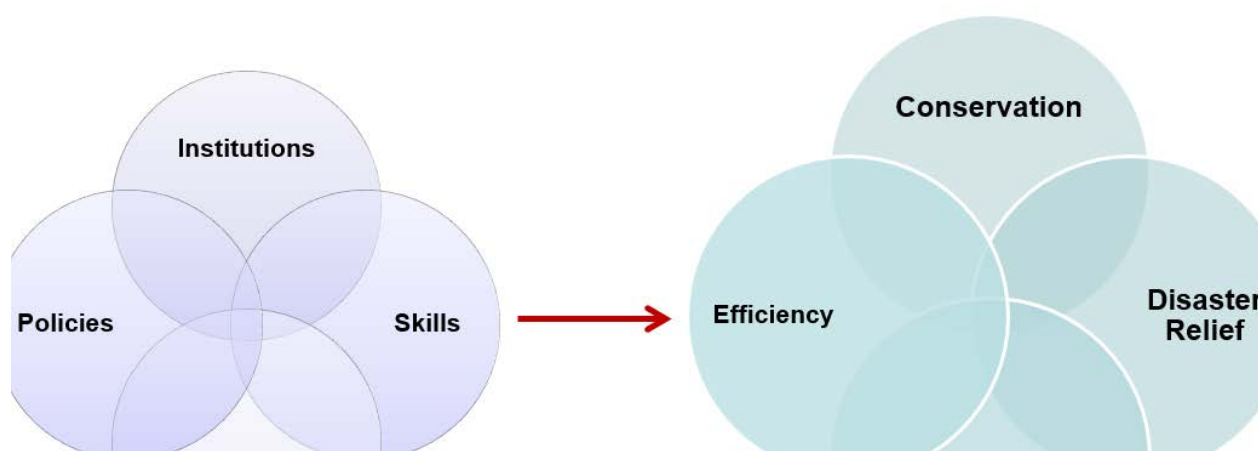
There are certain financial implications as well. Government spends Rs.112 billion annually on water sanitization and hygiene diseases. There is a need for more resources to channelize them.

Financial Implications



To all of these problems there can be strategies. However, until there is consolidation of institutions, policies, skills and technologies, we would not be successful. The unity of these four factors will help in improving the situation.

Strategies and Outcomes



Pakistan should adopt the principles of reduce, recycle and reuse for waste generation whether it is at house level, street or community level. There are certain advanced technological interventions which includes desalination and distillation. Pakistan still lacks in so many techniques and we are importing from outside. So, we need to work on it. Institutions, academia and R&D sector should work on it and committed to each other for sharing.

Technological Strategies

- **Rainwater harvesting:** 20% of 40 MAF is harvested. Countries capture almost 98% of the rainfall.
- **Principle of 3Rs – Reduce – Recycle – Reuse (Wastewater)** can save up to 40% of water
- Sea water desalination
- Solar water distillation
- Fog harvesting
- Water pricing using smart meters: Water savings/conservation in all sub-sectors
- Early warning system for disaster preparedness

The government can make low-cost technological solutions to tackle the issues. There are also trans-boundary strategies which can be adopted which will help to build trust with our neighbor country. There are some government and management problems as well which needs to be solved at national, federal and provisional level. We need to build mechanism by engaging public, private, and civil sectors in the development of shared policy framework of NWP. Similarly, we lack on designating the National Water Quality Surveillance Agency. PCRWR is a good candidate of that. Also, a National Framework to bring sewage and industrial waste water treatment plants into fully functional status is necessary, which could provide innovative business models. Bridging the gap between R&D Organizations, Academia and Industry is another important thing to do. There is also dire need of strengthening disaster risk management strategies at the local level. There are also certain strategies to address the impact of climate change as mentioned in the slides.

Strategies to address Climate Change Impacts

Pakistan may consider climate change as not just a challenge but as an **historic opportunity** to build a **climate resilient** and a **low carbon economy**

Additional storage reservoirs must be constructed to enhance storage per capita and carry over capacity.

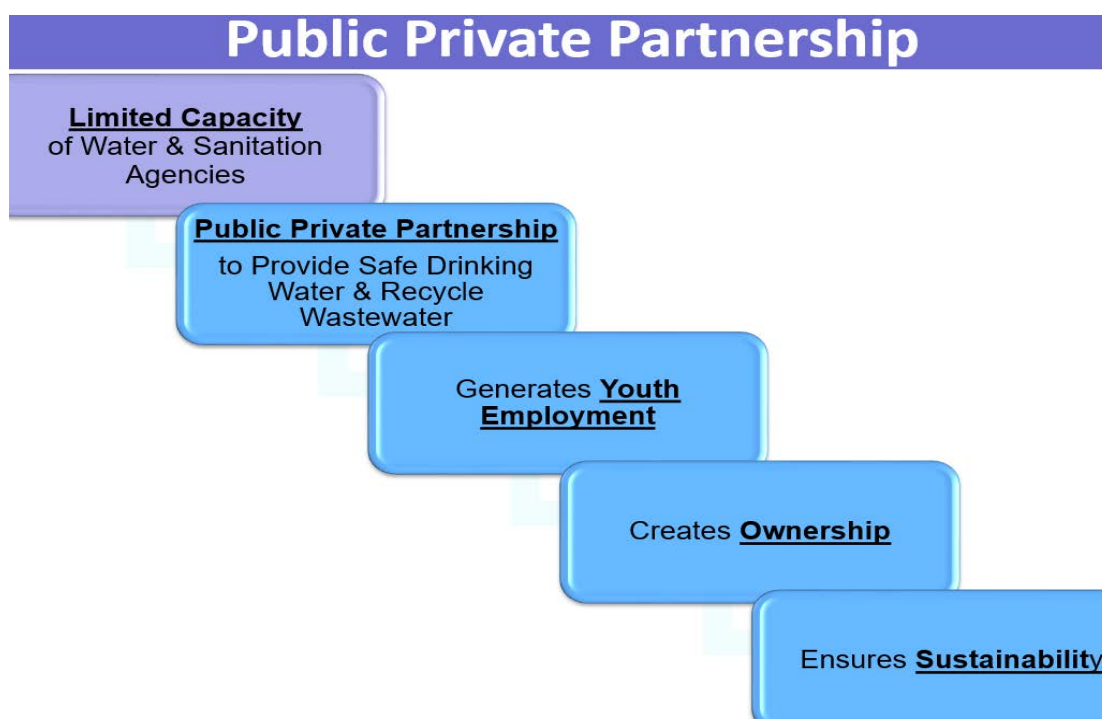
Strengthening and fortifying the flood infrastructure i.e. water reservoirs and water channels.

Enhancing resilience of local communities to the adverse impacts of climate change

Increased plantation

Pakistan needs to have both software and hardware solutions to meet its future water related challenges

Moreover, public private partnership will be helpful in curtailing the challenges and review the water policies. Without engaging public in any of the project, we could not guarantee the success of the problems.



Speaker 8:

Brigadier Muhammad Aslam Khan (Retd) - Chairman Gomai Damaan Area Water Partnership Pakistan

Topic: Pakistan's National Water Policy: Addressing the Loopholes and Way Forward

We usually say that there is water shortage at global level, but at the global level, the water is 43,659BCM and if it is divided among whole of the world's population, it is 7.3 billion (about 6,064M/person). So, there is inequity and inequality because there are different rain patterns and desserts that are not equally spread. Therefore, water conversion methods are needed.



GLOBAL PERSPECTIVE

- **97% SALINE WATER - 3% FRESH WATER. 2% FRESH WATER CAPED IN GLACIERS AND ICEBERGS. OUT OF REMAINING 1%, 20% CANNOT BE CAPTURED – INACCESSIBLE.**
- **REMAINING FRESH WATER GLOBALLY AVAILABLE IS ONLY 0.8% AND IS FINITE.**
- **THIS 0.8% AMOUNTS TO 43,659 BCM. IN CASE IT IS UNIFORMLY DISTRIBUTED OVER THE GLOBE, IT IS IN ABUNDANCE.**

43,659 BCM ÷ 7.2 BILLION PEOPLE = 6,064 M³/PERSON

- **WITH 1,700 M³/P/Y IT CAN CATER FOR A POPULATION OF 26 BILLION.**
- **PROBLEM: VARIABILITY IN SPACE AND TIME – RAIN FOREST ON ONE HAND AND DESERT ON OTHER.**




There are a lot of challenges which also include the political challenges as well. The best solution is Reduce, Recycle and Reuse. The biggest and very good examples is of Singapore. Singapore recycles and reuses water 3 times. Singapore used to purchase water from Malaysia but now it has trained their population and has built its own capacity. There is sectoral division of water according to a specific ratio. They have made use of the technology. They have automatic smart showers that provide water as per the specific ratio so that the water does not go wasted. These technologies are not that expensive. They all are do-able. There is a great initiative of clean water project in Mandi Bahauddin. It was mentioned as a success story in international magazines and reports. Through the project a controlled water usage mechanism has developed. So, there is a need of hydro diplomacy. There can be infrastructure development, building networks, building storage capacity, institutional development at larger scale, and sectoral reforms.

Then there is future scenario where government has taken initiatives that will have impact, like the 10 billion tree tsunami projects. They all are going to make impact. At the end. Water security is national security. It should be considered as strong component of Pakistan's foreign policy. Pakistani nation must pledge to save at least 1-liter of water daily.

Acknowledgments



Presentation of Memento to Advocate Ahmer Bilal Soofi – Former Federal Law Minister



Presentation of Memento to Dr. Yusuf Zafar, TI, Former Chairman, Pakistan Agricultural Research Council (PARC)



Presentation of Memento to Dr. Muhammad Ashraf, Chairman, Pakistan Council of Research in Water Resources (PCRWR)



Presentation of Memento to Mr. Shahid Hameed, General Manager (Hydro), WAPDA Headquarters, Lahore



Presentation of Memento to Dr. Shaheen Akhtar, Professor, Department of International Relations, National Defence University, Islamabad



Presentation of Memento to Dr. Hifza Rasheed – Director NWQL, Pakistan Council of Research In Water Resources (PCRWR)



Presentation of Memento to Prof. Dr. Muhammad Khan, Member Board of Experts, CGSS



Presentation of Memento to Brigadier Muhammad Aslam Khan (Retd) - Chairman Gomal Damaan Area Water Partnership Pakistan



Presentation of Memento to Dr. Steffen Kudella, Resident Representative, HSF Pakistan by Major General Hafiz Masroor Ahmed (Retd), Vice President, CGSS for cohosting the Conference



Presentation of Memento to Ms. Meher Ghawas Senior Programme Manager, HSF for cohosting the Conference



Presentation of Memento to Ms. Minahil Shawal Afridi, Research Executive, CGSS for Moderating the Conference



Presentation of Memento to Ms. Madiha Ghaffar, Media & Communication Manager, CGSS for Organizing the Conference



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