

The Bulletin

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Welcome to The Bulletin, our quarterly newsletter covering U Bank's innovation and research work.

In our quarterly newsletter, we not only highlight our achievements but highlight the global and local issues that need attention. We highlight the importance of financial sector and how it can help the society in overcoming the challenges.

In our latest issue we are highlighting the current issue of water scarcity and water intense crops in Pakistan. We will look into the possible alternate ways of enhancing water use efficiently and how farmers can fight water scarcity by growing water intense crops but using advanced technology.

We welcome your feedback. Our hope with this newsletter is to build a community of engaged readers interested in sincere discourse about the challenges and opportunities we face as a sector, the disruptions (technological or otherwise) required to serve our customers better and build an inclusive Pakistan.

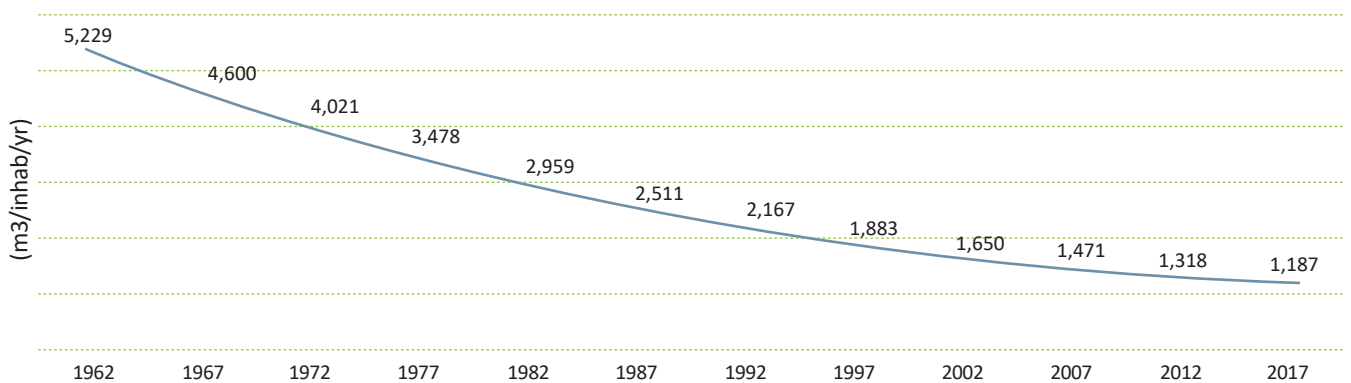
Yours sincerely,
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Water Scarcity and Water Intensive Crops in Pakistan Which Need to Be Rethought

Pakistan is experiencing devastating environmental issues such as air pollution, deforestation, water scarcity and climate change. In the technologically advanced era, almost everyone is aware of the issues, but how many are actually doing something to overcome the issues or to conserve the depleting resources?

For a few decades now, Pakistan has faced a drastic change in terms of being a water abundant country to a water scarce country.

Fig. 1. Trend in Water Availability in Pakistan, 1962-2017



Source: FAO 2021

Indus River is the backbone of Pakistan. However, dependence on a single source for a country of 230m (Source Worldometer and World Population Review) population for industrial and agricultural use will always be a greater risk. According to the IRSA, Pakistan receives approx. 145m acre feet of water but due to shortage of dams and reservoirs, it can save only up to 13.7m acre feet of water. Pakistan needs only 40m acre feet of water but due to the lack of sources, 29 acre feet water is wasted.



Reasons of Water Scarcity

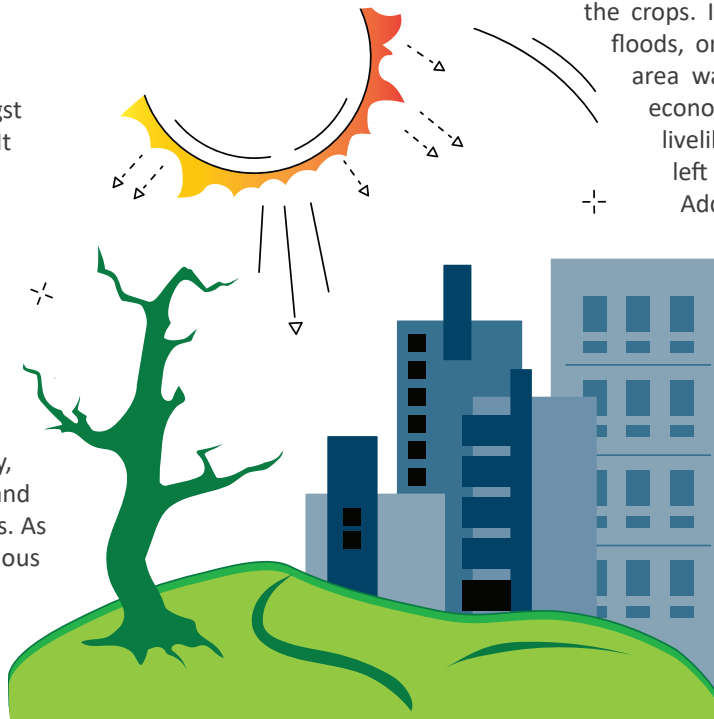
Amongst the major reasons of water scarcity, a few include; Pakistan population, climate change, water wastage (poor management of storing the water, and increased agriculture sector demand).

Population

According to the UN, the population of Pakistan is expected to reach 338m by the end of 2050. Similarly, the population in cities will increase by approx. 15%. For the past few decades, the consumption of water has increased significantly due to significant growth rate of the population. However, there is no significant change in the water resources and the reservoirs. Water is the most basic human necessity. With an addition of a person's demand, the water scarcity issue becomes even more critical.

Climate Change

Changing climate is amongst the biggest threats to all. It is not only impacting the human life, but also the economy of the country as floods, famines, droughts and cyclones have increased. In countries like Pakistan, the impact is usually many folds as it reduces the agricultural productivity, water availability and variability of climatic events. As the sixth most populous country in the world, with a population growth rate of approximately 2% per year, Pakistan is ranked fifth on the most vulnerable countries in



the world on the Global Climate Risk Index for 2020. Due to global warming, glaciers are melting and is causing flooding on yearly basis. In the past few years, Pakistan has been experiencing the intense monsoon rains and due to a lack of reservoirs, most of the rain water gets wasted. In 2022, almost one third of Pakistan has been affected, nearly 33 million lives are affected and displaced due to devastating floods. This has not only washed away the homes, but roads and crops too which has created deadly havoc across the country.

According to the National Disaster Management Authority, between June and September 2022, at least 1,208 people were killed, a third of which were children, and 6,082 people injured, with numbers increasing as the rain continued. Over 1 million houses have been damaged, with 436,307 completely destroyed and almost 736,242 partially

damaged. Livelihoods are also being heavily impacted as 173 shops have been destroyed and more than 733,488 livestock – a critical source of sustenance and livelihoods for many families – have died. Over 2 million acres of crops and orchards have been impacted, including 304,475 acres in Baluchistan, 178,186 acres in Punjab, and 1.54 million acres in Sindh.

Farmers in the agriculture sector do not get enough water in time, but then there are times when the water is not required and it rains so heavily that it destroys the crops. In the aftermath of the 2010 floods, one fifth of the country's land area was submerged, damaging the economy, infrastructure and livelihoods, with 90 million people left food insecure (World Bank). Additionally, every year the Sindh and Baluchistan provinces also face severe heat waves which not only limit agricultural activity but also result in considerable death tolls.

Water Waste Management

Globally, around 63% wastewater is collected. Only 11% is reused and Pakistan is amongst those countries which has the lowest water treatment rate. Due to inefficient infrastructure, ignorant consumption and lowest recycling, Pakistan is wasting its water resources. In return, we can see a greater tension between the provinces itself. Due to poor management of water and drainage system across the country, inequalities have raised in terms of access to basic needs and underinvestment by the government.

Agriculture Sector Demand

Water is a critical input for agricultural production and plays an important role in food security.

Water Intense Crops

Agriculture sector is by far the biggest source of income for the labor class and the largest source of foreign exchange earnings (Source Pakistan Bureau of Statistics). It is an important sector from a social and economical perspective for Pakistan. Population growth rate of Pakistan is forcing the sector to not only increase the production but also meet the changing consumption patterns of the consumers. Majority of the population, directly or indirectly, is dependent on this sector. It contributes about 24 percent of Gross Domestic Product (GDP).

<i>Water Intensive Crops In Major World River</i>		
Region	River Basin	Water Intensive Crops
Africa	Niger River and Lake Chad Zambezi River	Rice, Vegetables, Sugar, Wheat
Asia	Indus River	Rice, Cotton, Sugar, Wheat
	Yangtze River	Rice, Wheat, Maize, Soy
	Mekong	Rice, Sugar, Vegetable
Europe and Middle East	Konya Closed Basin	Wheat, Sugar, Grapes, Alfalfa
Australia	Murray Darling River	Pasture, Cotton, Rice, Cereals
North America	Rio Grande River	Alfalfa, Maize, Cotton, Wheat

Source: WWF

<i>Water Intensive Crops</i>	
Crops	Typical Water Requirement in liters per KG crop
Cotton	7,000 - 29,000
Rice	3,000 - 5,000
Sugar cane	1,500 - 3,000
Soya	2,000
Wheat	900
Potatoes	500

Source: WWF

Water Intensive Crops Performance 2021-2022

Despite the shortage of water, the agriculture sector has surpassed the target and shown a robust growth of 4.40% in 2021- 22. This was mainly due to the high yield, supportive policies by the government, availability of agricultural credit and seeds and pesticides. According to the Economic Survey of Pakistan, water availability during Kharif 2021 was recorded at 65.1 million acre feet (MAF) compared to 65.1 MAF of Kharif 2020. Rabi season 2021-22 received 27.4 MAF, a decrease of 12% over Rabi 2020-21. However, the growth in production of important crops namely cotton, rice, sugarcane and maize is estimated at 17.9%, 10.7%, 9.4% and 19% respectively. The cotton crop has increased from 7.1 million bales last year to 8.3 million bales during 2021-22 while rice production increased from 8.4 million tons to 9.3 million tons. Sugarcane production increased from 81 million tons to 88.7 million tons whereas maize production rose from 8.9 million tons to 10.6 million tons.

As these crops are contributing highest in the GDP of the country, it would not be wise to advise to replace the crops with those crops that require less water. However, in the technological advanced era, there are different solutions that can help the agriculture sector in improving their farming ways and increase water usage efficiency.

To increase the water usage efficiency, and improving the farming ways, steps are to be taken at various levels.

Water management system

Overall only 20-50 percent of water withdrawn actually reaches the crop, and losses occur before it gets to farms and in the farm application itself.

Improving the irrigation system

Yield, product and crop quality depend on the irrigation system that a farmer uses. Due to the modern and advanced technologies, such systems are developed that can not only increase the yield, give high quality crops, but help in saving the water by reducing the need for water and eventually strengthen the economy. This is specifically for those countries where agriculture contributes significantly to the GDP.

With the currently used watering system, the water is wasted and remains unused as crops draw the water through roots from a certain depth. Globally, a lot of countries have shifted towards precision irrigation. It is the system through which water and nutrients are supplied to the plants in desired quantity and at a desired time. As the exact amount of water is supplied to the plants, there is no wastage of water. However, farmers can decide which one to use depending on the type of soil, sources of water supply, area of land and the amount of precipitation. Most common types are Drip Irrigation, Sprinkler irrigation, Surface irrigation and Sub-surface irrigation.



Drip Irrigation

Pakistan and China's weather condition are more or less similar. Foreseeing the challenges in agriculture sector, Southern Xinjiang (province in China) has been using drip irrigation system for almost 22 years now. They have particularly promoted the use for cotton field. It has guaranteed them increased productivity, high yield, less labor, and efficient mechanical operations. It has also improved the quality of cotton. Eventually it has improved their economy as 87% of China's cotton is produced in that area. China has also extended their drip irrigation system to countries like Uzbekistan, Pakistan, Kazakhstan and Tajikistan. There is a significant increase ~40% in the yield of cotton in Uzbekistan.

Similarly, sugarcane is much more water intensive crop. With the use of drip irrigation technology, water shortage can be addressed and eventually it will motivate the growers to invest in this crop.

Why Cultivate the Crops Using Drip Irrigation System

Rice

Rice typically takes around 5,000 liters of water per kg, however, with the use of drip irrigation system, it can be reduced to 1,500 – 1,600 liter per kg.

Farmers can shift to high income crops by choosing a close spacing crop (space efficient crop) after rice crop.

In paddy farming, consumption of metals is highest with the increase in arsenic in the crop. It affects the quality of the crop hence the market value. With the use of drip irrigation system, the consumption of metal can be reduced by 90% and hence farmers will get high quality crop.

It helps in reducing the costs at different levels like labor cost, water cost, increased yield. It eventually increases the profit margins for the farmers.

Drip irrigation will not only help the farmers in getting high yield and profits, but it is ecofriendly as well. Rice cultivation produces methane gas. With the help of drip irrigation system, it can be reduced significantly.



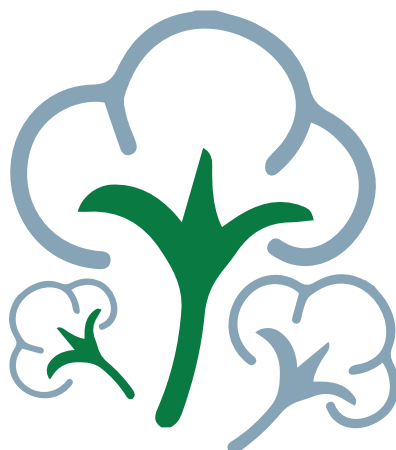
Cotton

When cotton is grown using traditional irrigation system, approx. 900 mm of water per cycle is required. However, if the crop is grown using drip irrigation system, it will reduce to 500 mm per cycle.

Using drip irrigation system, the yield of cotton crop can be increased by 20% without having any negative impact on the quality of the plant.

In the traditional irrigation system, excessive water is applied to the rice crop. However, if the measured doses of water is applied, drip irrigation system will help the farmers in controlling the stress level during growth period. It will result in an ideal plant with high yield.

Humidity plays a vital role in the growth and yield of the crop. Unlike traditional methods, drip irrigation system waters the roots instead of plant canopy. Hence the humidity level is controlled and it results in high quality of the crop.



Sugarcane



With the help of drip irrigation system, yield of sugarcane crop can be increased by 50% as compared to the yield using traditional flooding or furrow irrigation system.

It will not only increase the yield but usage of water can be reduced to 50%.

In comparison to traditional flooding irrigation system, drip irrigation system increases the sucrose by 2%.

Drip system is not only ideal for measured water usage, but for the use of fertilizers too. With the precisions, farmers can reduce the cost of fertilizer application and have increased the efficiency of each resource.





Drip irrigation could dramatically reduce water use in Pakistan, but uptake of the technology is being hampered by high costs and lack of awareness

Steps to be Taken to Ensure Acceptability of the New Technology

As the farmers are prone to the traditional flood irrigation system, they are not trained for the drip irrigation system. The higher authorities in agriculture departments should provide educational training to the farmers on how to use and maintain these systems. Trainings should be done at local level and ensure through incentivization that farmers are willing to adopt these new systems.

As one of the biggest barriers in switching to drip system is the equipment maintenance. Technical support should be provided to the farmers by the industry experts and the technical teams. Workshops should be established and there should be repair facilities to extend the support to the farmers.

As the system is not common in Pakistan, a very few companies are manufacturing the equipment and its spare parts locally. Majorly it is imported at a very high cost. To reduce the prices significantly, there is a need to start manufacturing the main part and the spare parts locally.

If the system is not installed effectively, it will be a waste of time, effort, water and harvest. Hence there is a need of technical teams who can not only guide the farmers but install the system on their farms. Apart from that, all the minor details of how to keep the system safe from different factors should be given to the farmers on regular basis.

It is quite often seen that people are not open to the innovation. Even if they agree to try something, they want the result in no time. In this case, to get the acceptability by farmers at large scale, there is a need to educate the farmers about use of new technologies and what would be the long term benefits.

Switching to drip irrigation system in the existing field is a time consuming task as it involves change in mindset. However, Government can identify the potential areas for implementation of drip system and could be made mandatory in light of water shortages.



Role of Financial Institutions in Helping Farmers in Building Less Water Consumption System

Availability of funds is vital for technology advancement. Due to lack of investment, and financing options, farmers are bound to use traditional ways of farming. However, for the past few years, awareness regarding the water management system has increased across the globe, and the financial sectors have started playing an important role in facilitating the farmers.

Understanding the importance and significance of modern irrigation system, SBP has highlighted the guidelines for efficient agri. water management financing.

SBP has allocated the indicative agriculture credit disbursement targets of Rs 1,700 billion for FY2022 which is 24.5 percent higher than last year's disbursement of Rs 1,366.0 billion. Currently, 50 formal financial institutions are providing agriculture loans to the farming community, which include 5 major commercial banks, 14 medium-sized

domestic private banks, 5 Islamic banks, 2 specialized banks (ZTBL & PPCBL), 11 Microfinance banks besides 13 Microfinance Institutions/Rural Support Programs (MFIs/RSPs).

Financial institutions are already playing a major role in the growth of agriculture sector by giving loans to small and medium-scale farmers so that they could easily and timely purchase seeds, fertilizers, pesticides, modern agricultural machinery & tools, and additional agricultural land. However, the financial institutions should collaborate with the industry experts like Syngenta, Bayer, Jaffer Agro, etc, in educating the farmers. Industry experts can organize seminars, field visits and give demonstrations to the farmers of how advanced technology can help in saving water and increasing the profit margins. At the same time, financial institutions' representative can explain that how they will be covered financially.

Apart from that, financial institutions should...

Develop product(s) for efficient water management technique like giving loans for the installment of advanced technology i.e. drip irrigation system.

Encourage the farmers to use modern and efficient techniques by offering term financing for medium to long term credit needs— each activity can be broken down in small parts like construction of ponds, watercourses, small dams etc. for installation of drip system, purchase of equipment / machinery etc. This can be done in collaboration with Syngenta, Bayer, Jaffer Agro. etc.

Encourage the farmers to get the funds for their working capital - for instance, purchase of any spare part, maintenance of the system, running cost of drip system, electricity charges etc.

Clearly identify the loan limit and repayment terms for each task. this will increase the task of bank of conducting a market survey to get the prices of all the items available in the market. Mark-up should be defined. Initially it should be low as the purpose is to shift more and more farmers to new effective technology. Ease should be given on early repayment and the adjustments.

Develop transparent loan repayment terms and system as the farmers usually fear non- timely payment of the loan. Financial institutions can finance the individuals for this specific purpose via Small Farmers Group (financing scheme for small farmers by SBP).

The available potential in agriculture sector needs to be explored for the economic growth, job creation and encouraging country's exports. For this purpose, synchronization of programs, reforming of institutions and encouraging public-private partnership, simplification of laws and investment reforms is the need of the hour.