PAKISTAN's VIRTUAL WATER EXPORT AUDIT: FORMULATION OF STRATEGIES THROUGH CASE STUDY

By:

BSUO Awais Javed **CMS 0000281236**

GC Umar Abdullah **CMS 0000281239**

GC Ali Haider **CMS 0000281207**

GC Muhammad Zubair **CMS 0000281237**

GC Zaryab Yousaf **CMS 0000281233**

Project advisor

Lt Col Rai Waqas Azfar

Military College of Engineering Risalpur

National University of Science and Technology

Islamabad Pakistan


بسم الله الرحمن الرحيم
إبراهيم أبو طوق
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This is to certify that

Thesis entitled

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GC Muhammad Zubair	CMS 0000281237
GC Zaryab Yousaf	CMS 0000281233

Has been accepted towards the partial fulfillment of the requirements for

Bachelors of Engineering in Civil Engineering

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Lt Col Rai Waqas

Military College of Engineering Risalpur

National University of Science and Technology

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Dedication

To our esteemed parents and beloved teachers.

"We can never forget when we took our first step into this world and you not only hold our hands with extreme compassion and affection but also give us the right direction to achieve success."

Acknowledgements

We humbled our heads in front of Allah Almighty, the most Gracious and Merciful for completing this research. He blessed us with such blessings, which makes words unable to deliver justice and sometimes makes us beyond our reach. He ignored our sins and shortcomings, led us on the road of knowledge and wisdom, and explored our unfamiliar horizons and boundaries.

We are very grateful to our parents for their countless prayers and endless support. They have been and will always be our strength and the source of our continuous motivation and encouragement.

We are convinced that just mentioning Lt Col Rai Waqas Azfar of our Advisor cannot express our gratitude for his guidance and support. His easy-going and interesting attitude makes our work much easier, and the constant demand for quality work makes us harder than ever.

We also thank Capt. Yassar Jan for his guidance and supervision in the early stages of the project to push the project to its current state.

Abstract

The quantity of water used in the production of the crops, traded worldwide makes up the virtual water (VW) trade linked with food. Scholars use primarily physical water availability when evaluating a country's water abundance or shortage when entering the global VW trade, ignoring economic water scarcity. Out-of-the-box solution to ensure that Pakistan can retain a supply of clean water is to stop the export of virtual water, country needs to shift its focus away from water-intensive crops. For this study, the rice crop is considered only due to its characteristics as rice is a major water consumer crop and water exporter crop from Pakistan. Rice is a major water consumer and exported by Pakistan, hence it was included in this research because of its characteristics. Pakistan's virtual water trade requires balance. Pakistan's reliance on blue water for rice agriculture has caused groundwater scarcity. Better virtual water export management is needed. Virtual water export potentially affects water sustainability, according to the findings. Another way to deal with virtual water export is to improve water efficiency. In Pakistan's semi-arid regions, this research examined at wheat grain yield and water usage efficiency (WUE) under inadequate irrigation. DSSAT was used to simulate yield and evaluate alternative irrigation schedule based on various irrigation levels, ranging from the current irrigation level to 55 percent less irrigation. Different amounts of irrigation had significant effects on wheat grain production and overall water usage, according to the data. On semi-arid, the best irrigation level was obtained with 40% less water (T9), with wheat grain yield of 4940kg/ha and WUE of 5.975kgm^{-3}. Pakistan can save up to 10 times of ground water by adopting new cropping pattern, sowing edible oil crops (sunflower, canola and soybean) which requires less water instead of water intensive crop like rice.

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CHAPTER # 1

INTRODUCTION

Pakistan faces a significant and growing challenge in terms of water security, which stretches far beyond the conventional water industry. It has an impact on a number of facets of economic and social growth as well as national and regional security. This effort contributes to Pakistan's economic water scarcity solution.

Water is not only a vital source of life, but it also plays a crucial part in the world's social, economic, and environmental development. It is still a common and inequitably shared resource today. Water managers, customers, and service providers face numerous obstacles in obtaining long-term, cost-effective, and fair water utilities based on their increasingly sophisticated resources. Although worldwide water crises are mostly caused by a shortage of water, in other parts of the world, water scarcity is caused by a lack of water management.

Water supply, according to researchers, comprises of providing sufficient water for agricultural and urban purposes. Irrigation, watering, and farm home use are all examples of agricultural uses. Water will be cheap when it is plentiful and overpriced when it is scarce, according to the rule of buyers and sellers(Adebayo, 2007). Water management for drinking purposes is a disaster in today's globe. Meanwhile, those living downstream are not sufficiently protected from floods or calamities due to inadequate management. Irrigation is the lifeblood of Pakistan's economy; it accounts for over 90% of the country's total agricultural output. The preceding data demonstrate how important it is to effectively control water resources and agriculture. In Pakistan, due to inadequate irrigation methods and policy reforms poses serious dangers to the country's water and food security. Deficit irrigation will become the norm more the exception in the future, as water shortage will increase in future.

As a result, precise water application and irrigation management are required. Pakistan's key challenges in the twenty-first century are sufficient water for agriculture production and food shortages. Agriculture production and food security can be harmed by unsustainable usage of fresh water in agriculture (Yang, Lu, & Yin, 2015). Pakistan is one of the world's driest countries, with an average annual precipitation of about 250 mm and agriculture accounting for over 90% of water use(Ruane, Dargie, & Daly, 2016). In arid and semi-arid countries, water scarcity is the most significant constraint to agricultural production(Deng, Wang, & Song, 2015).

Deficit irrigation is defined as the application of water below the needed evapotranspiration level(J. Jones et al., 2003). Water supply is reduced when deficit irrigation is used to achieve the optimum evapotranspiration rate(English, 1990). Automated irrigation systems plan irrigation applications in real time depending on the soil availability of water at the root crop zone, increasing “water use efficiency” (WUE) by conserving a significant quantity of water(Wang et al., 2012). Deficit irrigation, on the other hand, is a straightforward strategy for increasing economic output in the face of limited water availability, but it also necessitates several adjustments in the agricultural system.

1.1 Water Scarcity

Lack of water can refer to a limited access due to a physical scarcity, as well as an inadequate access due to organizations' failure to ensure a regular supply or an absence of suitable infrastructure. Water scarcity has already impacted every continent. Rapid growth, coupled with industrialization and unfamiliarity with water-saving lifestyles, has led to water problems worldwide. In 2000, approximately 1.1 billion people (almost one-fifth of the world's population) lacked access to safe drinking water. In Asia, 65 percent of the population lacks access to safe drinking water, while in Africa, 28 percent of the population lacks access to safe drinking water. All through the 1990s, there have been some turns of events: around 438 million individuals in non-industrial nations approach safe water, yet because of the quick increment, the quantity of metropolitan inhabitants without admittance to safe water has expanded by almost 62 million. Declining groundwater levels are normal and cause major issues, every one of which prompts water deficiencies and salt considerations in waterfront regions. Severe metal pollution in rivers, lakes and reservoirs is a major problem worldwide. The global supply of fresh water cannot be doubled. Like food security, water security is becoming a serious national and regional priority in several regions of this planet.

1.1.1 Types of Water Scarcity

Water scarcity can be divided into two categories:

i. Physical Water Scarcity

ii. Economic Water Scarcity

- **Physical Water Scarcity**

Physical, or absolute, water scarcity occurs when a region's demand exceeds its limited water supplies. According to the United Nations Food and Agricultural Organization (FAO), around 1.2 billion people live in areas of physical scarcity, with the majority of these people living in arid or semi-arid regions. Water shortages may occur on a regular basis; an estimated two-thirds of the world's population lives in areas where water is insufficient at least once a year.

- **Economic Water Scarcity**

Economic water shortage is caused by a widespread inadequate water infrastructure or by poor water management when infrastructure exists. According to the “FAO” over 1.6 billion people are affected by economic water scarcity. There is usually enough water to meet social and environmental demands in locations with economic water shortages, but access is constrained. Economic water shortage may also be caused by unconstrained water consumption in agriculture or industry, which often comes at the cost of the general public. Finally, owing to an economic undervaluation of water as a scarce natural resource, huge inefficiencies in water consumption may lead to water shortages(Petruzzello, 2022).

1.2 Water Scarcity Limits

Per capita renewable water is the most well-known metric of national water shortage, with threshold values of 500, 1000, and 1700 m3/person per annum used to discriminate between different levels of water stress(Falkenmark, Lundqvist, & Widstrand, 1989). According to this criterion, nations or areas are seen as to be experiencing absolute scarcity of water if renewable fresh water resources per capita are less than 500 m^3; chronic water shortage unless renewable water resources per capita are between 500 and 1000 m^3; and regular water stress if renewable fresh water resources per capita are between 1000 and 1700 m^3 as shown in table 1-1.

Table 1-1: Water Scarcity Limits

ANNUAL RENEWABLE FRESHWATER (m^3/pers. yr)	**LEVEL OF WATER STRESS**
<500	Absolute water scarcity
500-1000	Chronic water shortage
1000-1700	Regular water stress
>1700	Occasional or local water stress

Source: Water scarcity limits by Falkenmark Indicator

1.3 Problem Statement

Global warming and climate change have exacerbated water scarcity in Pakistan and quantity of ground as well as surface water is reducing due to ineffective water management, inappropriate crop zoning and export of water intensive crops (rice & cotton fabrics).

1.4 Literature Gap

Previous researches focused on other factors of water scarcity due to climate change and the increasing atmospheric temperature bringing severe heat waves which are causing droughts as well decrease in the ground water table.

There was another factor from which people were blindfolded due to lack of knowledge and studies about it, is Virtual Water Trade (VWT). There were no comprehensive studies about the water being trade out in the form of commodities to different countries also causing a decline of water presence. Different crops like Rice, wheat, Cotton fabrics etc. are comprising of the huge amount of water present in them which we export on massive scale per annum without having any idea of virtual water export. According to small scale studies done on Virtual Water trade explains that the volume of water present in those commodities are enough to solve to our water crisis issue.

1.5 Objectives

Our main objectives are to highlight this issue of water trade.

- To estimate Virtual water export in agricultural commodities.
- To formulate strategies to reduce virtual water export by enhancing water use efficiency and balancing the trade.

1.6 Scope

This study intends to analyze data of virtual water trade of Pakistan and ways to reduce virtual water export by maintaining the balance in trade. And suggesting reduced water footprints of the crop, enhancing its water use efficiency and yield.

CHAPTER # 2

LITERATURE REVIEW

2.1 Background

During the Kharif season, which began on April 1, sowing of important crops such as cotton, sugarcane, rice, and maize, Pakistan is experiencing a severe water scarcity of 38% for irrigation reasons. According to the government, the water scarcity has worsened from the previously forecasted 22-percent shortage. A 38-percent water scarcity is currently affecting the 2 significant crop-producing regions of Punjab and Sindh, as well as the present crop planting schedule(Israr Khan, 2022). There is a 38-percent shortfall, which is wreaking havoc On these two provinces. In 2021, Pakistan's Sindh province got 5.38 million acre-feet (MAF) of irrigated water, a 35 percent reduction in its share of the provincial allotment. The red chile, cotton, and rice harvests have been hit the worst by the drought. Climate change, according to the Pakistan Meteorologist Department, is to blame for the decrease in province allotment(Aneel Salman, 2021).

The first National Water Policy of Pakistan, issued in 2018, does not pay enough attention to water-sensitive urban development, natural-hazard risk management, or trade in water-intensive crops. Any policy addressing these concerns should include personalized, site-specific solutions that include geography, receiving water bodies, source water bodies, and the environment's socioeconomic background.

Figure 2.1 depicts Pakistan's water consumption, with agriculture taking the lead by a significant margin, necessitating more attention. Water scarcity affects a third of the world's population. Water is becoming increasingly scarce due to increased competition from a variety of industries. Industry, agriculture, and power generation, to name a few. It's becoming more prevalent for domestic use as well as the environment.

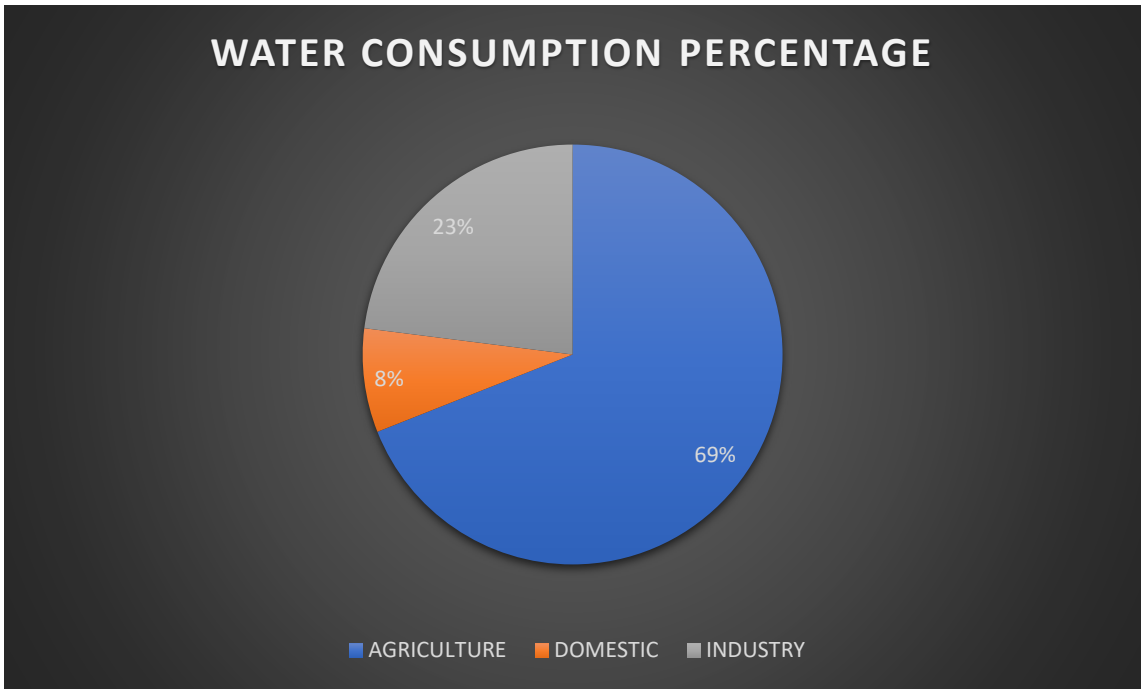


Figure 2-1: Water Consumption Percentage in Pakistan

2.1.1 UN Statistics

According to UN figures, around 2.3 billion people lack access to clean water for drinking or other household purposes, with 844 million people lacking access to drinking water. Contaminated water, either released from factory outlets into rivers or lakes, or from other sources such as oil tankers crashing in the oceans, is assisting a large number of people.

According to another study, water extraction increased at about twice the pace of the population in the last century, resulting in a big gap in meeting water needs. By 2025, a total of 2 billion people would be affected by global water scarcity. It demonstrates that if preventative actions are not taken to resolve this issue, our society will face an alarming situation.

2.2 Water Availability

During the last several decades, Pakistan has evolved from being a water-rich nation to one that is water-stressed. Pakistan has a population of 2.8 percent of the global population, but only 0.5 percent of the world's fresh water resources.(Biswas & Tortajada, 2018).

2.2.1 Water Availability Indicator

Following indicators can be used to analyze a country's water availability:

- The Falkenmark Indicator (Falkenmark et al., 1989)establishes a link between available water and human population. A country is deemed to be water-stressed if per capita water resources are below 1700 m3. Water shortage occurs when per capita water availability falls below 1000 m3, and absolute water scarcity occurs when it falls below 500 m3 per person. Pakistan breached the water scarcity line in 2005, and it will cross the extreme water shortage line by 2025, according to this indicator(Qureshi & Ashraf, 2019).

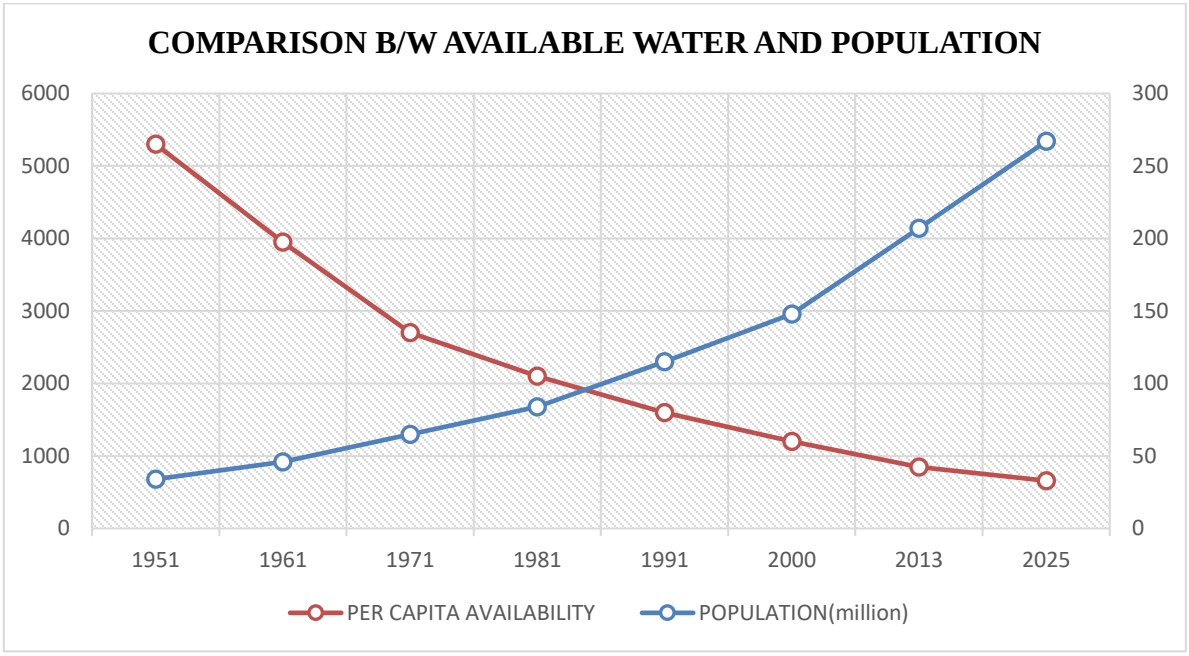


Figure 2-2: Comparison b/w Available Water and Population

- Physical and Economic Water Scarcity Indicators from the IWMI (Seckler, Molden, & Sakthivadivel, 2003). Countries that will not be able to meet expected water demands in 2025 after accounting for future adaptive capacity are classified as 'physically water scarce,' whereas countries with ample renewable freshwater resources but would need to invest heavily in water infrastructure to make these resources available to people are classified as 'economically water scarce'. The effect of economic water shortage on Pakistan's economy is depicted by figure 2-3.

Figure 2-3 : Economic Water Scarcity

2.3 Pakistan getting more from Water

The World Bank team issued a paper titled "Pakistan Getting More from Water" in 2019. A thorough analysis was released to emphasize the escalating water scarcity problem in Pakistan, as well as the causes and potential remedies. The analysis stated that a lot of the reasons were simply due to a lack of information in the subject of water use efficiency and a few myths about underground water utilization. IWMI (International Water Management Institute) was commissioned to write the report, and the IFPRI handled the economic modelling (International Food Policy Research Institute). Pakistan, as an agricultural country, relies on a vast supply of water for irrigation, which accounts for around one-fifth of the country's GDP, or US$22 billion. Rice, sugar, wheat, and cotton are four traditional crops that use 80 percent of all water supply, but they only contribute 5% of our annual GDP, or US$14 per year. The fact that 80 percent of Pakistan's water supply contributes only 5% to the country's GDP demonstrates an obvious lack of knowledge about water use efficiency strategies. 80% of the water supply of Pakistan is playing a role of only 5% for its GDP shows us the clear lack of knowledge in regard to Water Use Efficiency techniques. Contrary to popular belief, access to the other 20% of the water supply is extremely difficult, although hydropower generation has a market worth of $1-$2 billion.

According to the report, Pakistan is not a "Water Secure" country because it is an agricultural and developing country. The term "Water Secure" refers to the current water percentage as well as the projected water percentage in the upcoming era of urbanization and modernization.

The subject of water resource management is also addressed in the paper. According to them, it is jeopardized as a result of the five causes listed below:

- Inadequate water data, knowledge, and analysis
- Inadequate water resource planning and allocation methods
- Environmentally unsustainable water extraction levels
- Widespread pollution

Figure 2-4 depicts past water withdrawals as well as prospective withdrawals and the declining situation.

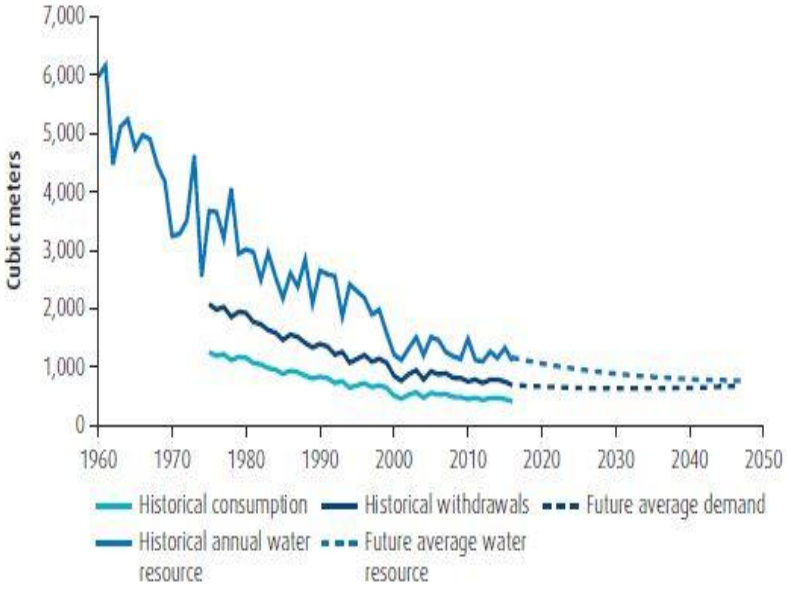


Figure 2-4: Water Availability, Withdrawal and Consumption Per Capita

2.4 Major Reasons

2.4.1 Population Growth

Population expansion and urbanization pose the greatest threat to Pakistan's declining water resources and diminishing per capita water supply. Pakistan's population grew by 2.6 times from 1972 to 2020, taking it from 9th to 5th place. Bangladesh's population increased by 1.5 times over this period (from 66.6 million to 164.7 million)(Bank, 2021). From 1977 until 2017, Total water usage in Pakistan increased by around 0.7 percent each year, but total water resources remained same at 246.8 billion cubic meters (BCM), resulting in a decrease in per capita water resources from 3,478 to less than 1000 cubic meters per year. If water efficiency continues constant in the next decades, the ratio of water extraction to water resources may exceed 100%.

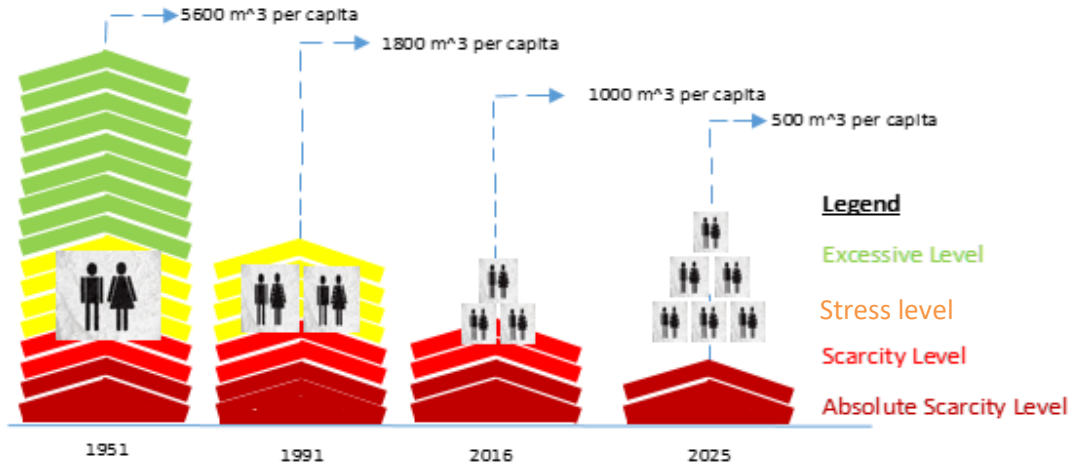
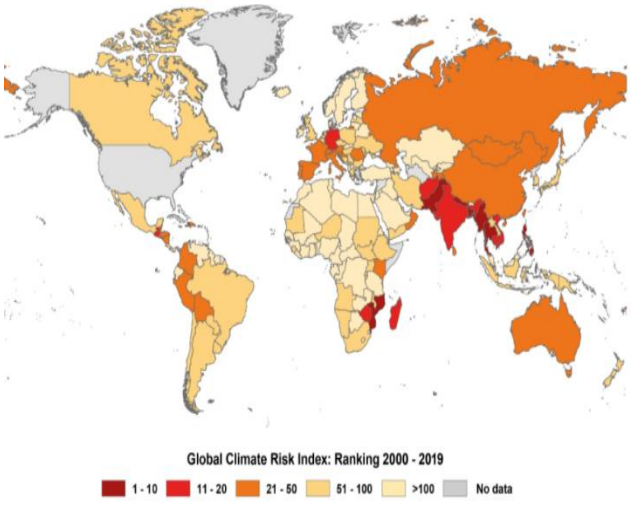


Figure 2-5: Water Availability per Capita

2.4.2 Climate Change

Pakistan is one of the world's 10 most climate-vulnerable nations (Figure 2-6). Monsoon patterns have changed, glaciers are melting, temperatures are increasing, and droughts and floods are becoming more often, indicating that the nation is already facing climate-related threats to its water supplies. In recent years, Pakistan has experienced a number of floods as well as long periods of drought. Climate change is now a fact, and Pakistan is particularly vulnerable. The Global Climate Risk Index says so. During the period 1996-2015, Pakistan was the world's eighth most vulnerable country to climate change, with an average yearly loss of 3.8 billion US dollars(Jan, Kakakhel, Batool, Muazim, & Ahmad, 2017).



CRI 2000-2019 (1999-2018)	Country	CRI score	Fatalities	Fatalities per 100 000 inhabitants	Losses in million US$ PPP	Losses per unit GDP in %	Number of events (2000-2019)
1 (1)	Puerto Rico	7.17	149.85	4.12	4 149.98	3.66	24
2 (2)	Myanmar	10.00	7 056.45	14.35	1 512.11	0.80	57
3 (3)	Haiti	13.67	274.05	2.78	392.54	2.30	80
4 (4)	Philippines	18.17	859.35	0.93	3 179.12	0.54	317
5 (14)	Mozambique	25.83	125.40	0.52	303.03	1.33	57
6 (20)	The Bahamas	27.67	5.35	1.56	426.88	3.81	13
7 (7)	Bangladesh	28.33	572.50	0.38	1 860.04	0.41	185
8 (5)	Pakistan	29.00	502.45	0.30	3 771.91	0.52	173
9 (8)	Thailand	29.83	137.75	0.21	7 719.15	0.82	146
10 (9)	Nepal	31.33	217.15	0.82	233.06	0.39	191

Figure 2-6: Global Climate Change Risk Index around the Globe

2.4.3 Global Warming

Increased water demands for domestic and economic reasons are expected to rise from 5% to 15% by 2047 as a result of global warming caused by pollution and the presence of CFCs in the atmosphere. A study by (Wang et al., 2012)looked at the relationship between greenhouse gases and water management, and found that as the demand for food, transportation, and cultivation of, and other resources develop, more energy will be necessary to adequately balance for the amount of water consumed. Additional resources will be necessary in areas where water supplies are not readily available. A substantial increase in water consumption would undoubtedly cause major disruptions in people's daily lives as well as economic sectors.

2.4.4 Ground Water Withdrawal

Pakistan is ranked 160th in the world in terms of groundwater extraction to water resources (as of 2017), outperforming only 18 countries. Agriculture consumes the most water, accounting for 70% of total annual withdrawals, followed by residences (5.3%) and industry (including power generation).

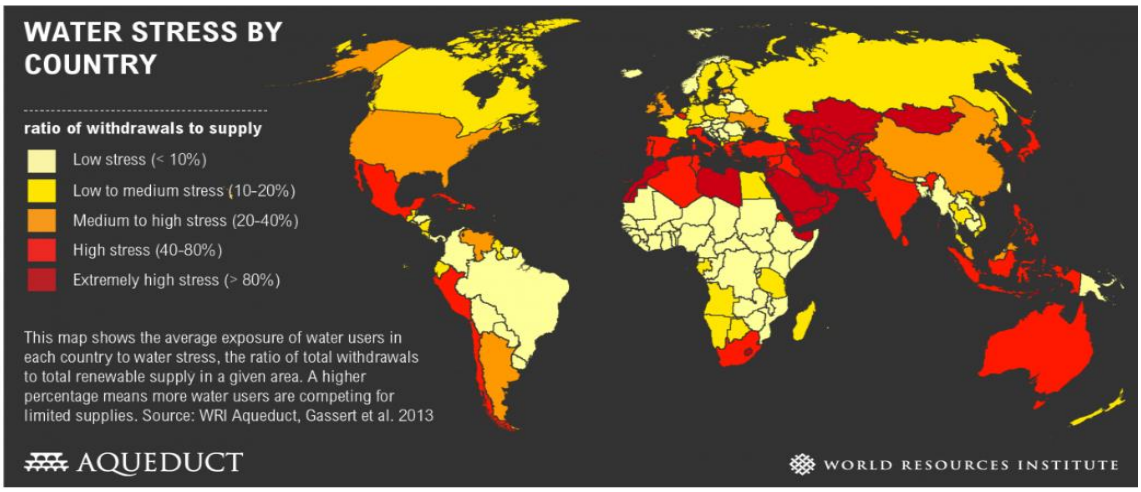


Figure 2-7: Water Withdrawal around the Globe

Every leader under his era subsidized the installation of electric and diesel tube wells. So, the ground water is being extracted at the higher rate than in the past. The groundwater recharge and discharge are out of equilibrium. Ground water is the only source of drinking water for the majority of the population. If the graph continues to increase in the same manner, this will result in a disturbing situation in the near future.

Table 2-1: Increase in number of tube wells in Pakistan

YEAR	Diesel Tube well	Electric Tube wells	Total
1965	30000	0	30000
1970	60000	0	60000
1975	100000	0	100000
1980	180000	500	180500
1985	200000	2000	202000
1990	220000	5000	225000
1995	400000	20000	420000
2000	420000	30000	450000
2005	760000	40000	800000
2010	780000	50000	830000
2015	820000	90000	910000
2020	800000	95000	895000

Source:The ground water economy of Pakistan

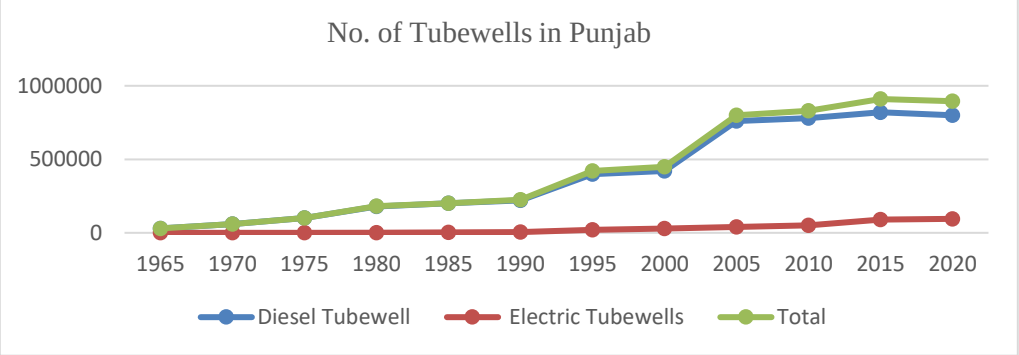


Figure 2-8: Growing Numbers of Tube Wells in Punjab

2.5 Water Losses in Irrigation

Irrigation accounts for almost one-fifth of all fresh water consumption. Deep percolation and surface run-off are the two biggest losses in Pakistan's surface irrigation system, and when they combine, they can lower water application efficiency by half if not handled appropriately.

2.5.1 Poor Water Management

Irrigation accounts for the majority of the country's water usage; the four primary crops, rice, wheat, sugarcane, and cotton, consume 80% of the water yet only generate 5% of the country's GDP. On a conservative basis, it was estimated that poor water management would cost 4% of GDP, or $12 billion each year.(Report, 2019).

In comparison to other major agricultural economies throughout the world, Pakistan's crop productivity is poor.

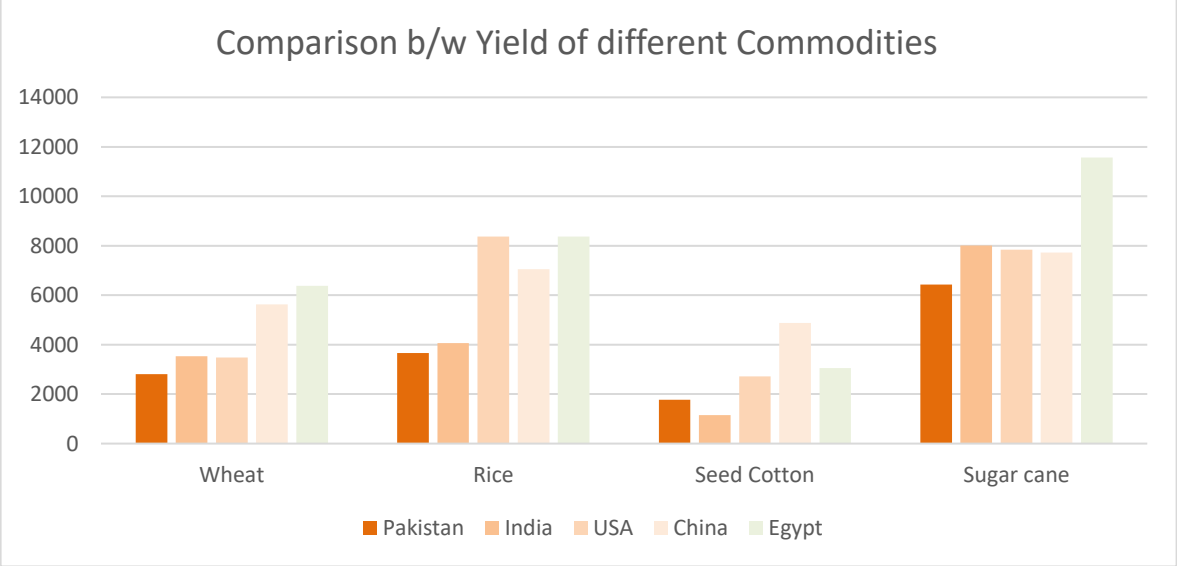


Figure 2-9: Comparison b/w Commodities Yield with Other Countries

2.5.2 Inappropriate Crop Zoning

The incorrect cropping pattern and absence of the crop zoning are two of the most prominent indicators of inadequate farm management. Rice and sugarcane are high delta crops that can be grown even in regions where surface water is scarce and groundwater is deep and saline. Groundwater is depleted and secondary salinization occurs as a result of the planting of these crops in such places.

Rice should, logically, be limited to areas with sufficient water and little reliance on stored water reserves. Furthermore, crops such as sugarcane should only be grown to meet the needs of the country, and their export should be prohibited because the export of sugar and rice involves the export of a large amount of fresh water.


World

Sindh CM asks farmers to not cultivate rice amid acute water scarcity in Pakistan

ANI 9 May, 2022 10:00 am IST

Source: dawnnews.pk/com

2.6 Sustainable Development Goals

SDGs are 17 goals developed by the United Nations General Assembly (UNGA) for the welfare, betterment and to achieve sustainable future for all the nations around the world regardless of their ethnicity, race or creed as shown in figure 2-10. These are globally interlinked goals act as a blueprint of sustainability for nations. Each goal has few targets and indicators which are the base of that specific goal and a leading way for its fulfillment. The targets are set for a specific time period in which specific target must be achieved. The figure below shows all 17 sustainable development goals in a chart.

Figure 2-10: Sustainable Development Goals Chart

2.6.1 Sustainable Development Goals linked to this Project

1. Goal no 6: Responsibility for provision and availability of Water.
2. Goal no 12: Responsible Consumption and Production

- **Goal no 6: Responsibility for provision of Clean Water**

This Goal ensures the availability of clean water and sanitation for all, consist of 8 targets and 11 indicators to be completed till year 2030. Our project comprises of ideas and practical experiments to have plenty of fresh ground water for our society fulfilling target 6.4 and 6.5 and indicators of particular sustainability goal. Targets include

Target 6.4: To increase Water Use Efficiency among all the sectors to increase supply of freshwater.

Target 6.5: Implementation of Integrated Water resource management.

- **Goal no 12: Responsible Consumption and Production**

This goal covers the responsible and efficient production and consumption aspects, it consists of 11 targets and 13 indicators to be accomplished at the end of this decade.

Target 12.2 Efficient management and use of natural resources.

Target 12.9 Strengthen third world countries approach towards its scientific and technological capacity to accomplish more patterns of Production and Consumption.

CHAPTER NO 3

METHODOLOGY

3.1 Introduction

This chapter contains all the methods used along with strategies, and procedures which were undertaken for various processes like data collection, software usage, and analysis carried out throughout. It incorporates descriptions of all the steps followed to attain the specific objectives as well as solutions. The research methodology adopted to achieve the objective is discussed in this chapter. The research approach framework for obtaining objective of this research is shown in figure 3.1. The phases include problem identification, the calculation of the virtual water export and solution of virtual water export by using DSSAT seasonal modular of soil water balance model. These particular events were further divided into multiple plans that develop the salient features of study leading from literature review that deals with the literary purpose of the project, Pakistan's commodities export review that refers to commodities being exported by country and calculation of virtual water being exported by the country in the term of these commodities and finally solution with the help of case study.

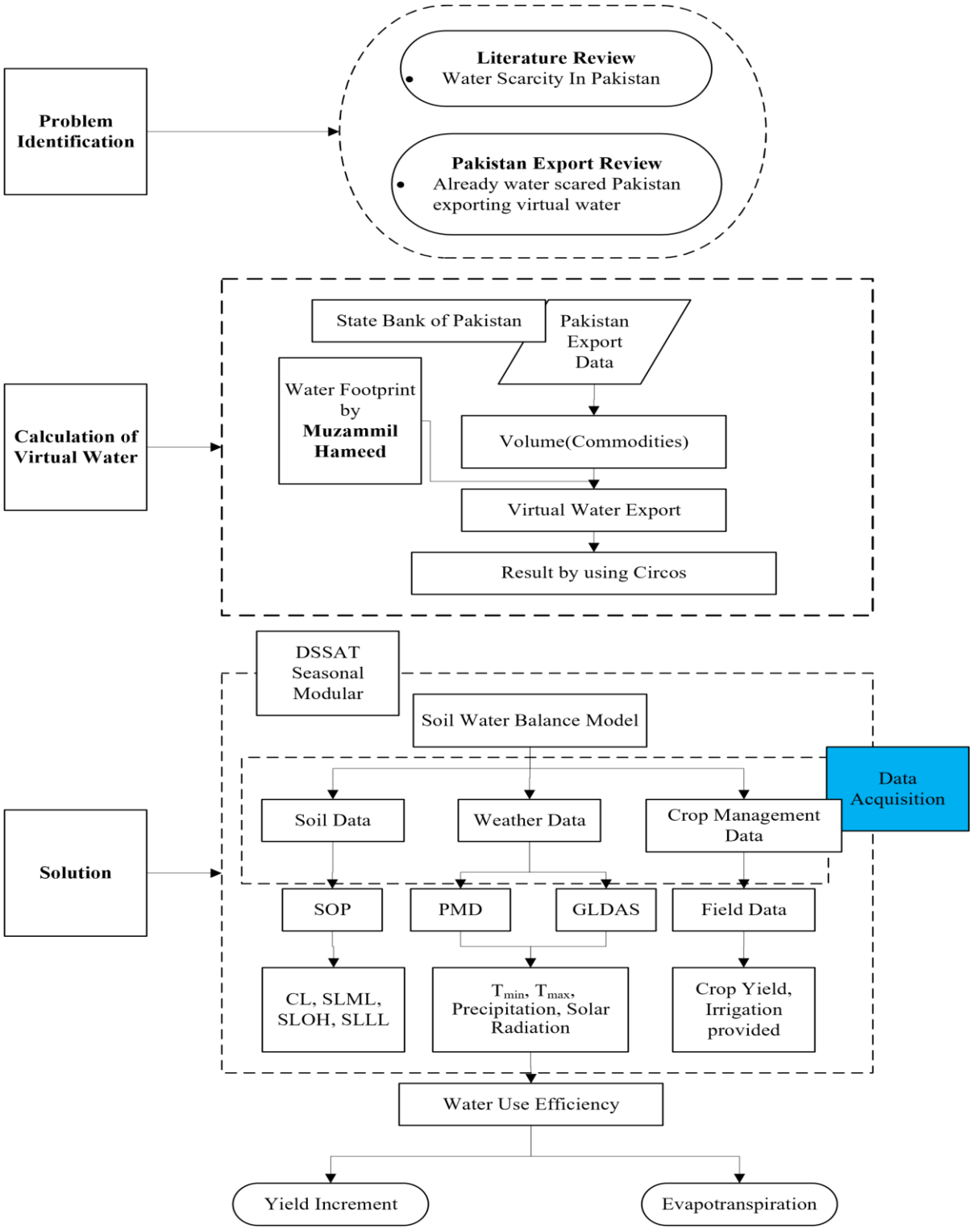


Figure 3-1: Research Methodology Framework

3.2. Calculation of Virtual Water Export

The figure 3-2 shows the methodology for the calculation of the virtual water export of Pakistan 4 major commodities responsible for 4 by 5th of blue water consumption.

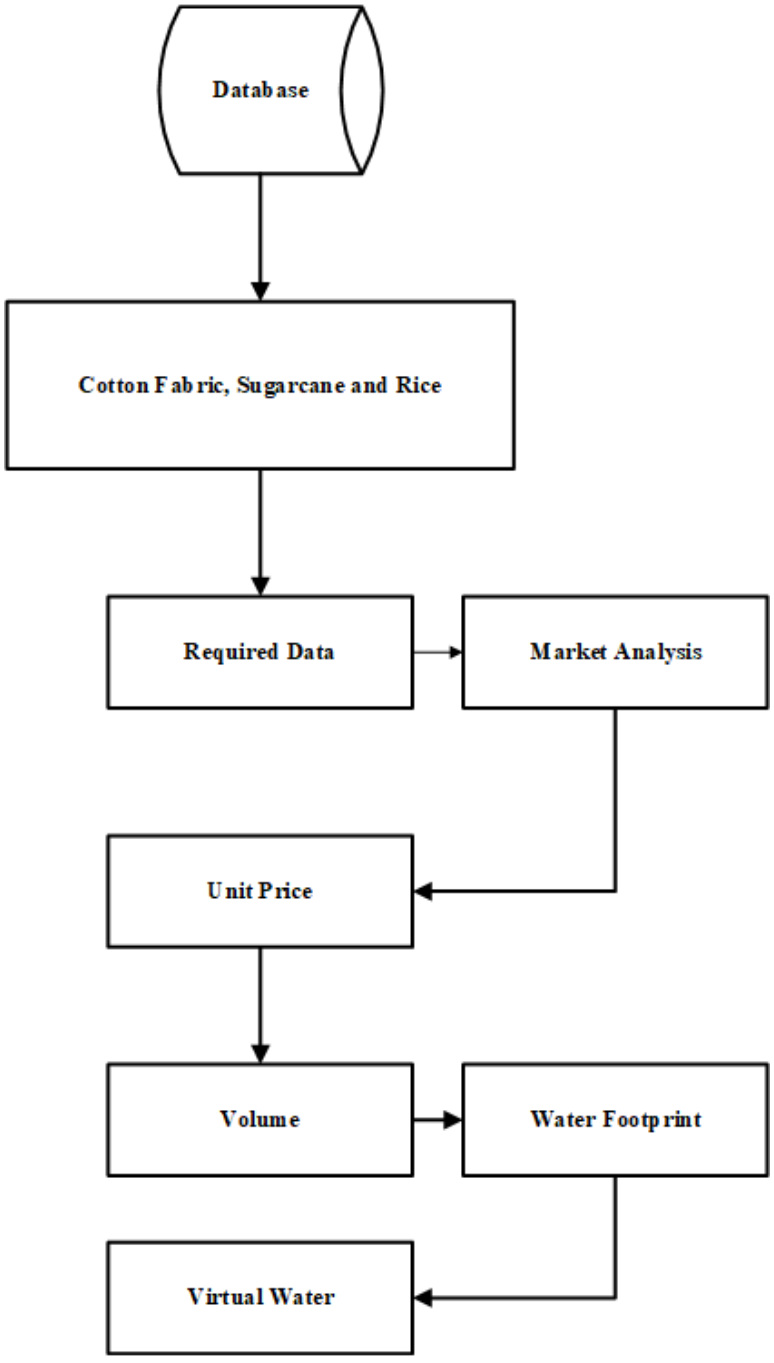


Figure 3-2: Calculation of Virtual Water

3.1.1. Virtual Water Export

Prof. Tony Allan proposed the term "virtual water" in 1998 to describe the quantity of water for a commodity's manufacturing process. It is found in a variety of items and is transported through supply networks. This notion is proposed as a significant economic strategy for addressing national water scarcity issues. Water-scarce places can make significant economic benefits while also protecting local water resources through virtual water commerce (e.g., importing water-intensive items or exporting water-scarce products). Figure 3-3 actually depict the scenario of the virtual water export of Pakistan and its future effects on the country water resources. Agricultural commodities trade accounts for over 90% of all virtual water (VW) transferred for human utilization.

Figure 3-3: Virtual Water Export Drying Pakistan

3.1.2 Water Foot Print

Virtual water refers to the water resources embedded in a product supply chain, and is most commonly used to calculate the water footprints of food and agricultural products. The water footprint, that is commonly used to describe the potential water requirements in a certain area required to sustain product and service consumption in support of population production and living standards, contains physical water as well as VW. Blue, green, and grey water footprints are three types of water footprints that products have. Fresh surface water and groundwater resources are used to produce blue water. Green water is water that is consumed directly from the rain. Grey water is the amount of water required to incorporate wastes back in the ecosystem while maintaining acceptable environmental standards. Our scope of study was restricted to blue water only. The water foot print was taken from the (calculation of water footprints of Pakistani crops) by (Muhammad Muzammil and Lutz Beruer)(Muzammil, Zahid, & Breuer, 2020). Table 3.1 show water required to produce one tonne (1000 kg) of the respective crop in m^3.

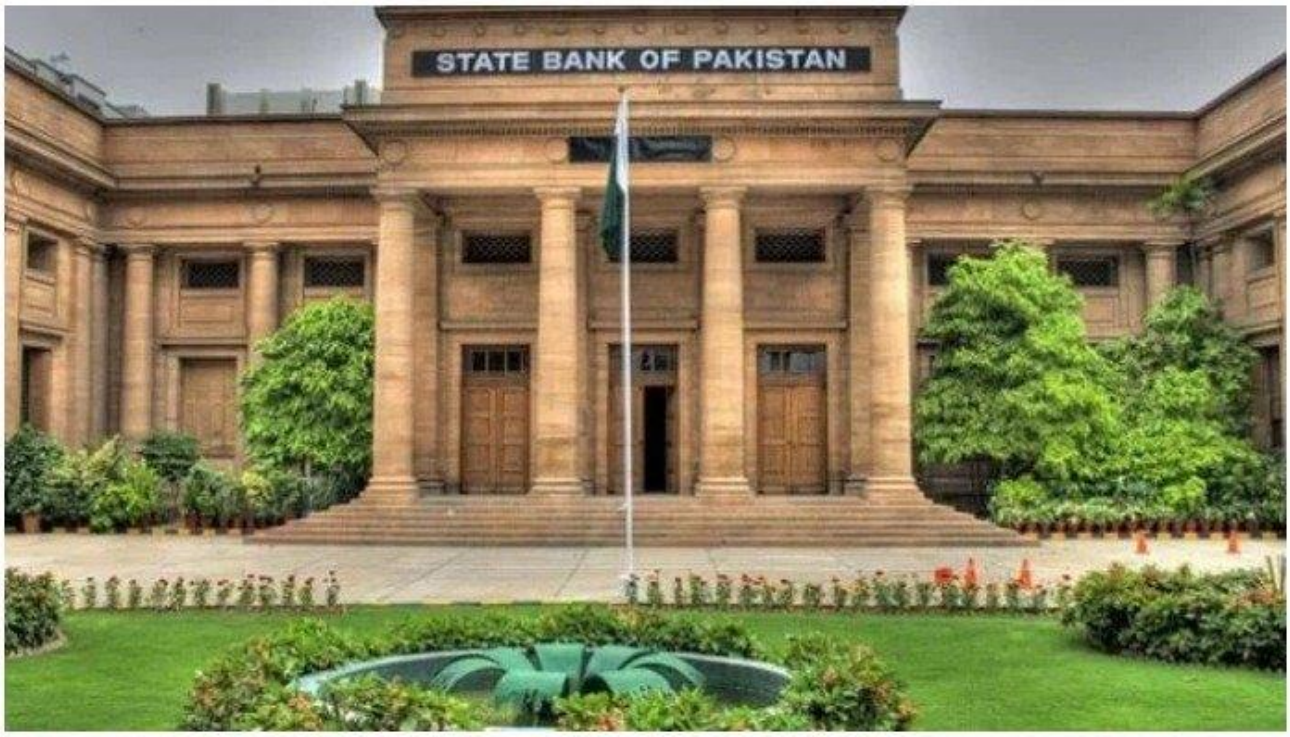
Table 3-1: Water Footprint of Major Crops

COMMODITY	Yield	**WF**(m3/t)			
	t/ha	GREEN	BLUE	GREY	TOTAL
RICE	2.1	1488	4971	542	7001
COTTON	0.53	6886	13315	489	20690
WHEAT	2.7	381	2083	100	2564

Source: (Muzammil et al., 2020)

3.1.3 Data Collection

- The export data of Pakistan by commodities was taken from the State Bank of Pakistan from March 2021 till February 2022(*Exports of Pakistan by Commodities*, 2022). The link of data is as (https://www.sbp.org.pk/publications/export/Excel/Jan-2020-Mar-2022.xlsx).
- Water footprints of 4 major crops exported (rice, wheat, cotton, sugarcane) were obtained from findings of Muhammad Muzammil(Muzammil et al., 2020) as discussed earlier (Table 3-1).



3.1.4 Methodology to Calculate Virtual Water Export

- The required data of four crops (rice, sugarcane, wheat and cotton) being exported potentially cause for virtual water export was extracted from the dataset.
- The export dataset was in term of price in dollars $. The dollar rate was taken as 1dollar=180 PKR for the price in the term of Pakistani rupee.
- The market analysis for the price of one ton of respective commodities was done.
- The volume of commodity exported in the last year was calculated by: -

Volume (mass) = Total exported gain (PKR)/ Market Rate (PKR)

- Then by multiplying water footprint with volume/mass, the net virtual water flow in term of trade of commodities (Rice, Cotton, Wheat and Sugarcane) was obtained.

3.2 Improving Water Use Efficiency by "DSSAT"

The following steps were taken for case study of water use efficiency and evapotranspiration in arid regions of Pakistan. Three datasets were imported in DSSAT V4.7.5.0 to assemble the result. Figure 3-4 depict the methodology adopted for water use efficiency of site area.

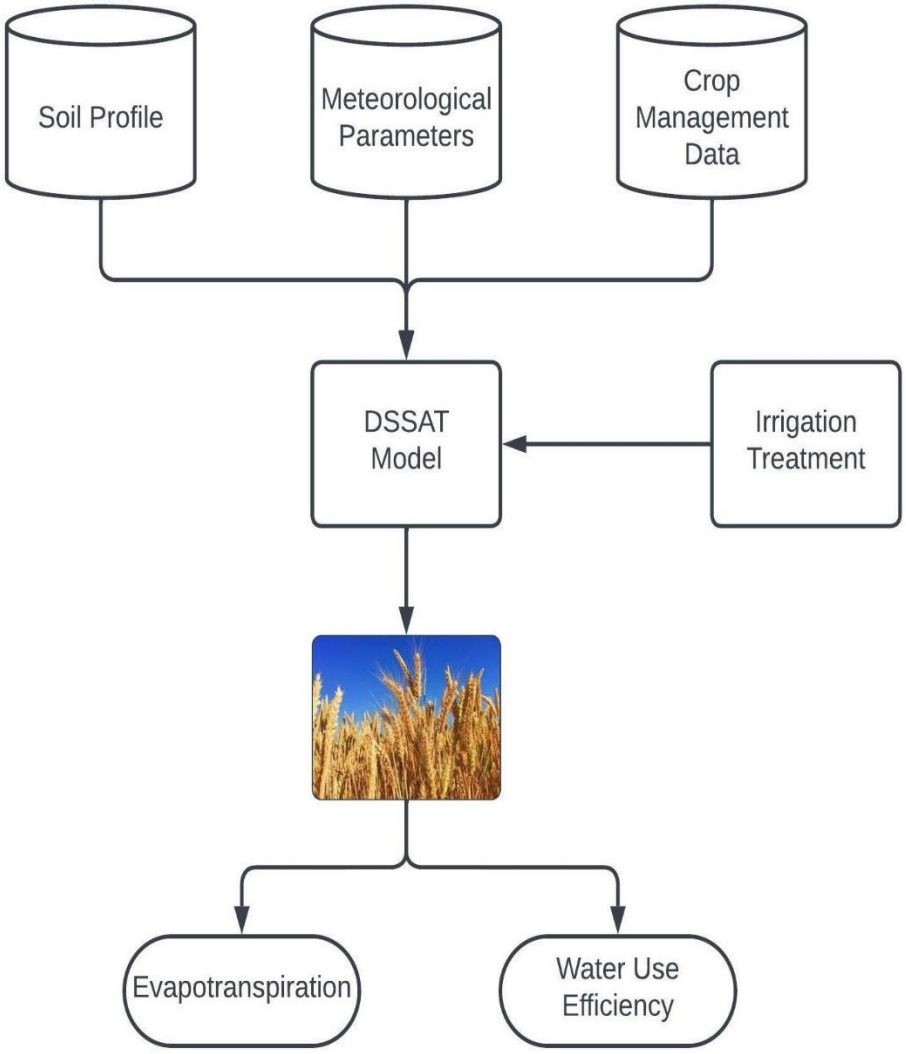


Figure 3-4: Water Use Efficiency and Evapotranspiration

3.2.1. DSSAT

The Decision Support System for Agro-technology Transfer (DSSAT) is indeed a large decision system (Hoogenboom et al., 2019). This allows creating databases for weather, soil, and experimental data as well as long-term evaluation of single-season or sequenced crop systems employing management, genetic, and climatic factors easier. (J. W. Jones et al., 2003). The DSSAT is capable of analyzing water management situations and producing improved water management suggestions. The DSSAT seasonal module was used to evaluate the best treatment for increasing wheat output while using efficient irrigation measures. Crop development and growth are significant characteristics in the DSSAT model since it simulates crop growth and yield. (Galindo et al., 2018). The interface of DSSAT Version 4.7.5.0 is shown in Figure 3-5.

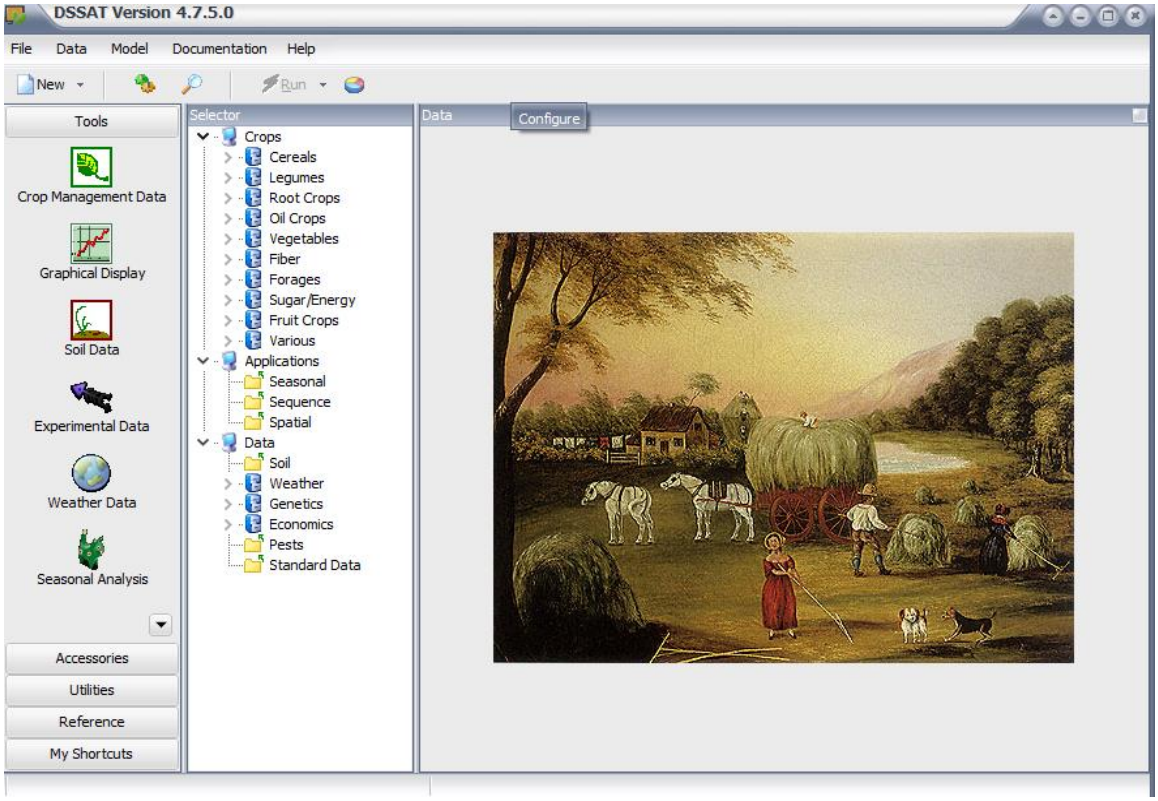


Figure 3-5: DSSAT Version 4.7.5.0

3.2.2Material and Methods

3.2.2.1 Study Site

In the canal command area of Faisalabad, the study was performed using the baseline (1981-2010). Figure 3-6 shows the study site. The main source of irrigation is LCC (Lower Chenab Canal).

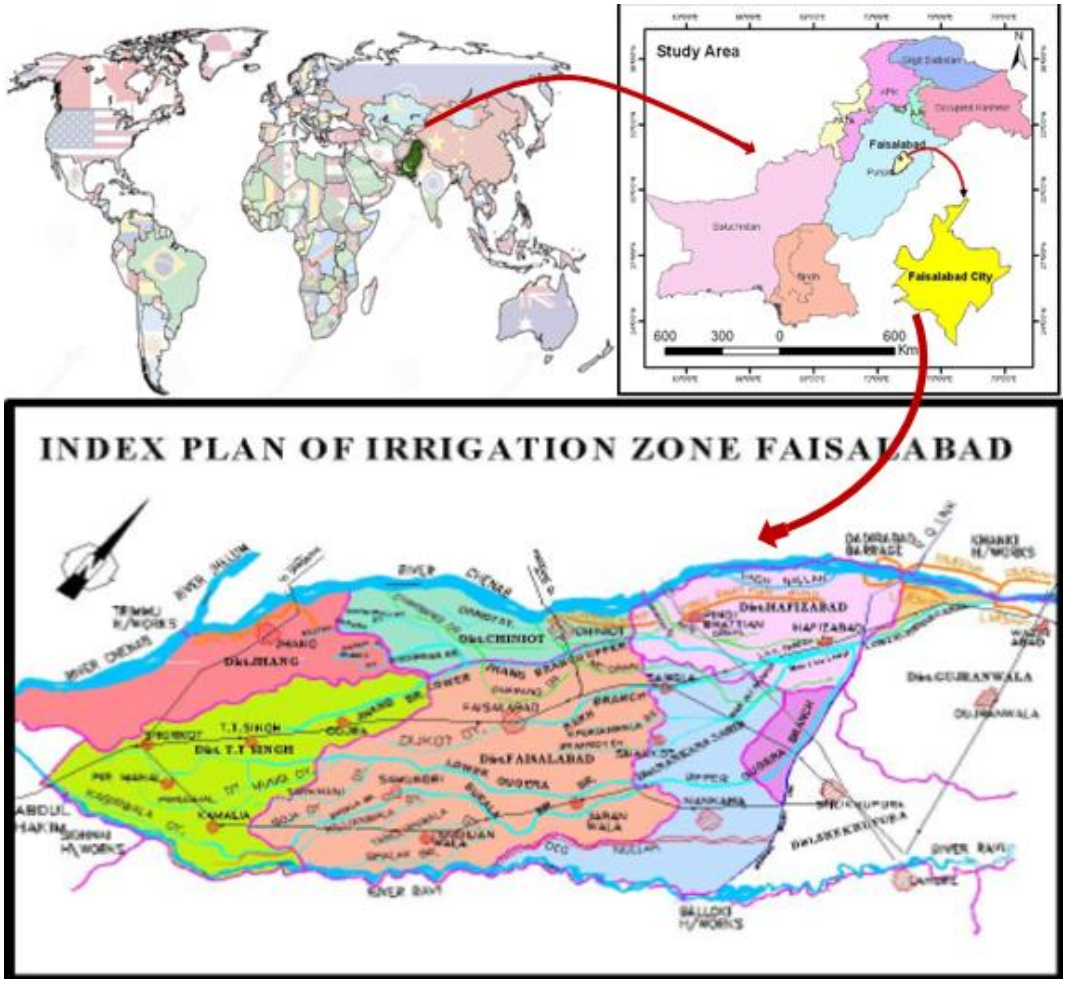


Figure 3-6: Site Area Description

3.2.2.2. Wheat Crop Summary

Normally the wheat crop takes 130-150 days to get fully mature. The crop is cultivated in the start of November. To examine the water, usage efficiency, and irrigation requirements of wheat, as well as their impact on yield, in relation to soil factors and various climatic parameters. The summary of wheat from sowing to harvesting is in table 3-2.

Table 3-2: Summary of Wheat Crop

Sr. No	Operation	Data
1	Field Size	4 kanal (2024m2)
2	Crop Variety	Markaz-2019
3	Date of Sowing	04-Nov-2020
4	Row Spacing	30 cm
5	Quantity of Seed	125kg/ha
6	Schedule of Fertilizer	• 250 kg/ha DAP at Sowing • 120kg/ha Potash at Sowing • Urea after 1st and 2nd irrigation
7	Type Of Irrigation	Flood Irrigation
8	Schedule of Fertilizer	• First irrigation on 27 DAP • Second irrigation on 48 DAP • Third irrigation on 78 DAP • Fourth irrigation on 100 DAP • Fifth irrigation on 120 DAP
9	Date of Harvesting	07-Apr-2021
10	Actual Yield	850kg

Source: Field data

3.2.2.3. Model Input

• The Pakistan Meteorological Department provided long-term observation data, including minimum and maximum temperatures, for research locations from 1981 to 2010, daily rainfall as shown in figure 3-7. (PMD). The Global Land Data Assimilation System, a public domain online source, was used to obtain solar radiation data for the research region (GLDAS). The DSSAT model is based on daily rainfall (mm), solar radiation (MJ/m2), and the study area's maximum and minimum temperatures (°C).

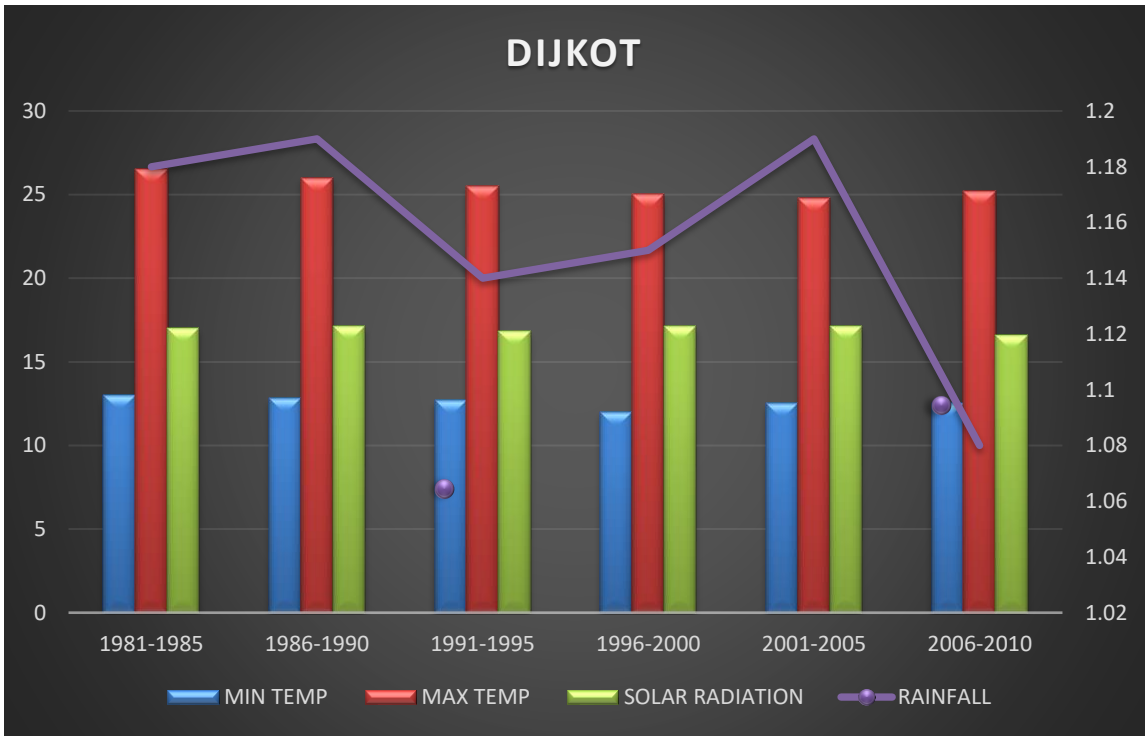


Figure 3-7: Meteorological Parameters

- The Punjab Soil Survey provided data on soil profiles as shown in table 3-3. The type of soil is Sandy Clayey Loam. The DSSAT model, which was used to give each treatment, was fed with actual field practices, crop management data, and irrigation water as inputs.

Table 3-3: Soil Characteristics Acquired From SOP

Depth(cm)	SLCL(%	SLCI (%	SLOC (%	SLHW	SCEC	SLNI (%	SLLL	SDUL	SSAT	SBDM	SSKS	SRGF
					(cmol(+) kg-1)		(cm3 cm-3)	(cm3cm-3)	(cm3cm-3)	(g cm3)	(cm h-1)	
DIJKOT												
10	35	12	0.3	8.5	12.1	0.03	0.066	0.184	0.43	1.42	7.14	1
45	31	8	0.22	8.5	12.3	0.02	0.089	0.213	0.426	1.43	4.13	0.58
75	15	6	0.09	8.8	13.9	0.01	0.034	0.133	0.388	1.54	14.08	0.3
100	33	10	0.09	8.9	13.9	0.01	0.109	0.219	0.414	1.47	3.36	0.17
130	30	18	0.3	7.6	13.9	0.03	0.137	0.29	0.43	1.47	1.09	0.25

Source: (Survey of Pakistan)

SLCL = clay percentage; SLCI = silt percentage; SLOC = organic carbon; SLHW = pH by water extraction; SCEC = cation exchange capacity; SLNI = total nitrogen concentration; SLLL = plant extractable soil water lower limit; SDUL = drained upper limit; SSAT = saturated upper limit; SBDM = bulk density; SSKS = saturated hydraulic conductivity; SRGF = root growth factor.

- For the crop base period, actual irrigation was 427mm. 12 irrigation scenarios (T1-T12), which represent different irrigation levels, were created by decreasing irrigation water application amounts while maintaining irrigation timings for each irrigation event. The trend in wheat grain yield was assessed for each scenario, and it was established that whether yield had achieved its stable maximum value before declining. For these 12 treatments, actual irrigation was reduced, as indicated in table 3-4.

Table 3-4: Treatment Description Table

TREATMENT NAME	TREATMENT DESCRIPTION	TREATMENT NAME	TREATMENT DESCRIPTION
T1	ACTUAL IRRIGATION (427 mm)	T7	30% less (299 mm)
T2	5% less (406 mm)	T8	35% less (278mm)
T3	10% less (384 mm)	T9	40% less (256mm)
T4	15% less (363mm)	T10	45% less (235mm)
T5	20% less (342mm)	T11	50% less (213mm)
T6	25% less (320mm)	T12	55% less (192mm)

- **Creating Weather Profile**

Weather parameters collected from PMD and GLDAS (Global Land Data Assimilation System) were imported into the DSSAT into the weatherman version. The weather profile was available the baseline (1981-2010). Figure 3-8 and 3-9 shows the import of the raw data file.

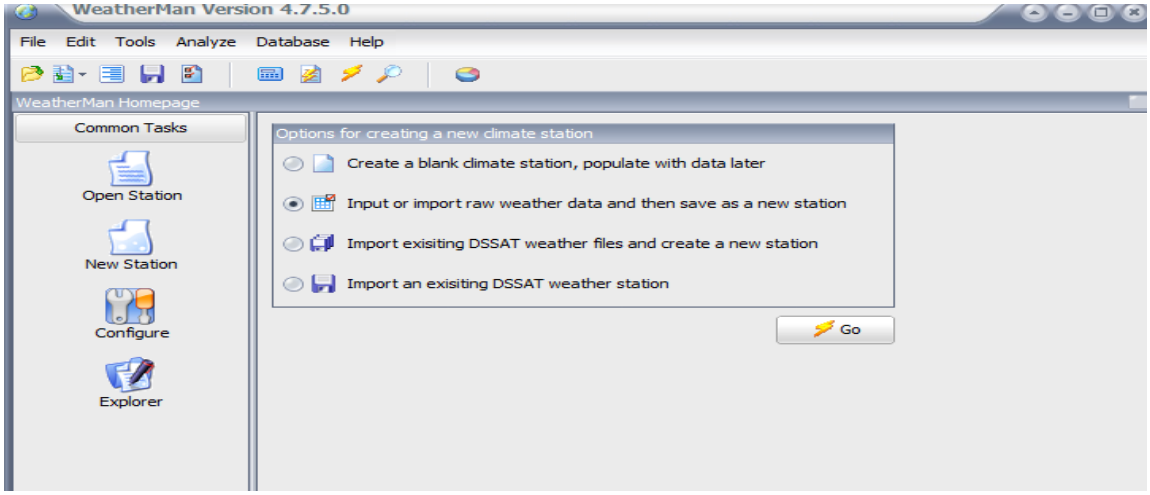


Figure 3-8: Weatherman Version 4.7.5.0

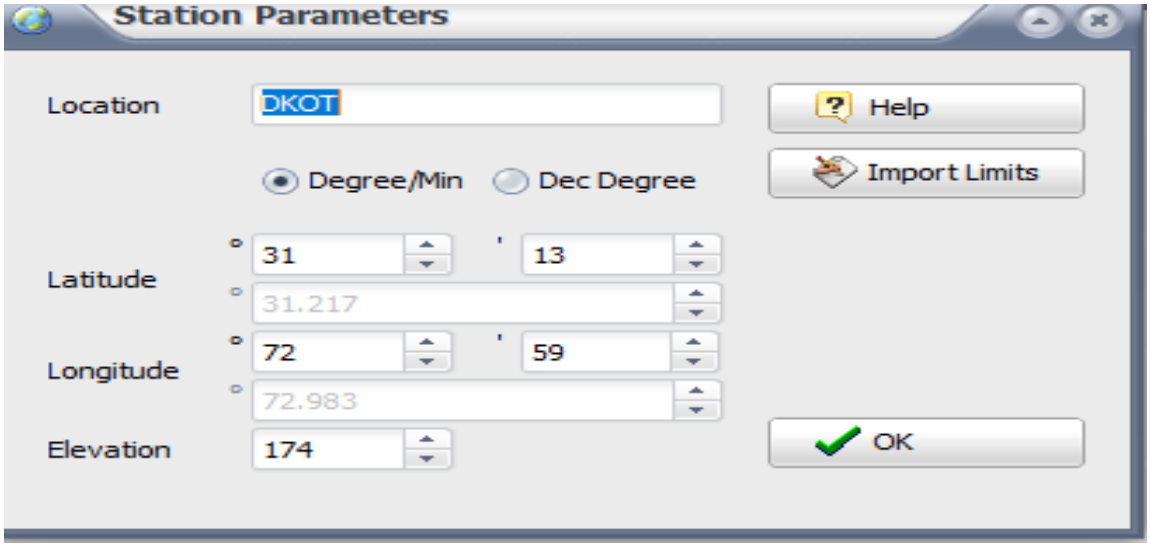


Figure 3-9: Importing Station Parameters

- **Creating Soil Profile**

The Pakistan Soil Survey provided information on soil profiles. Soil profile was created using this information. Figure 3-10 and 3-11 showing the creation of soil profile in SBuild (V3.7.5.0).

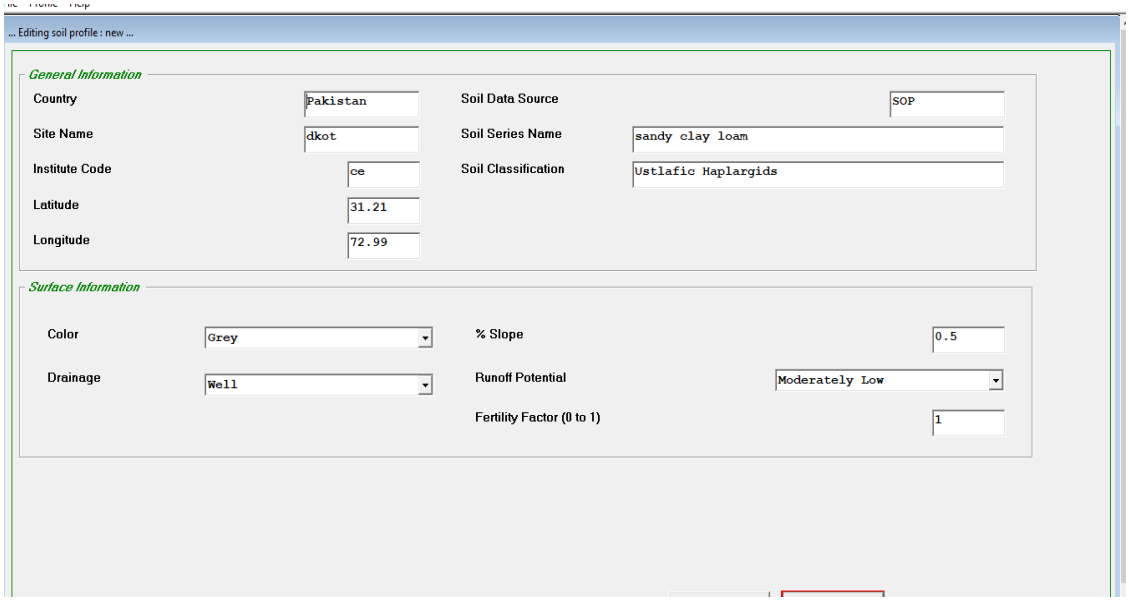


Figure 3-10: SBuild Version 4.7.5.0

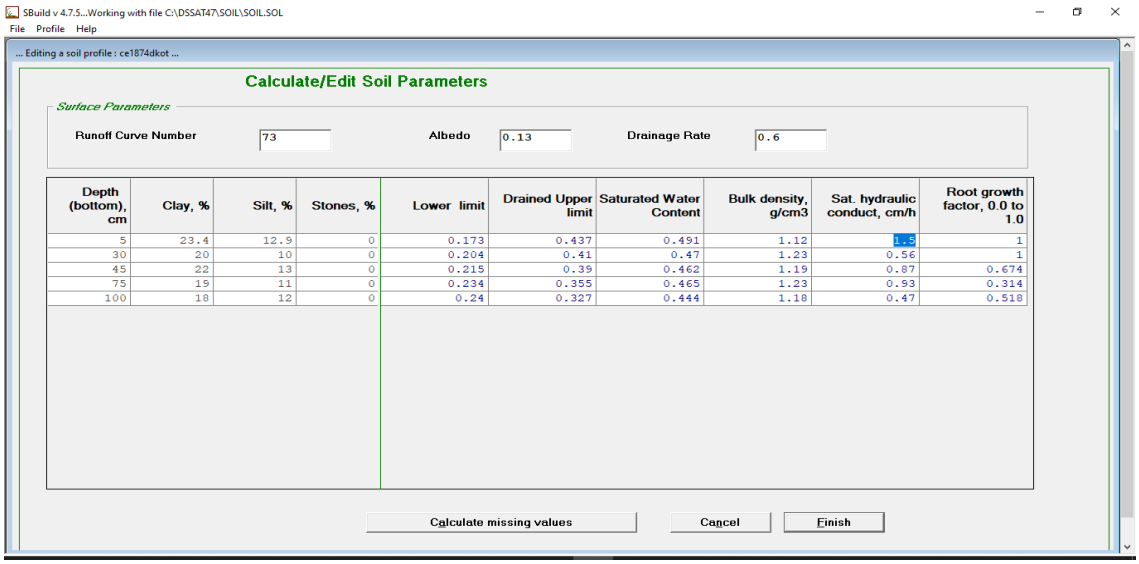


Figure 3-11: Importing Soil Parameters

- **Creating Crop Management Data file**

The DSSAT model employed actual field techniques, crop management data, and "irrigation water" as inputs to generate outcomes for each treatment. Figure 3-12 showing the creation of the crop management data file in Xbuild.

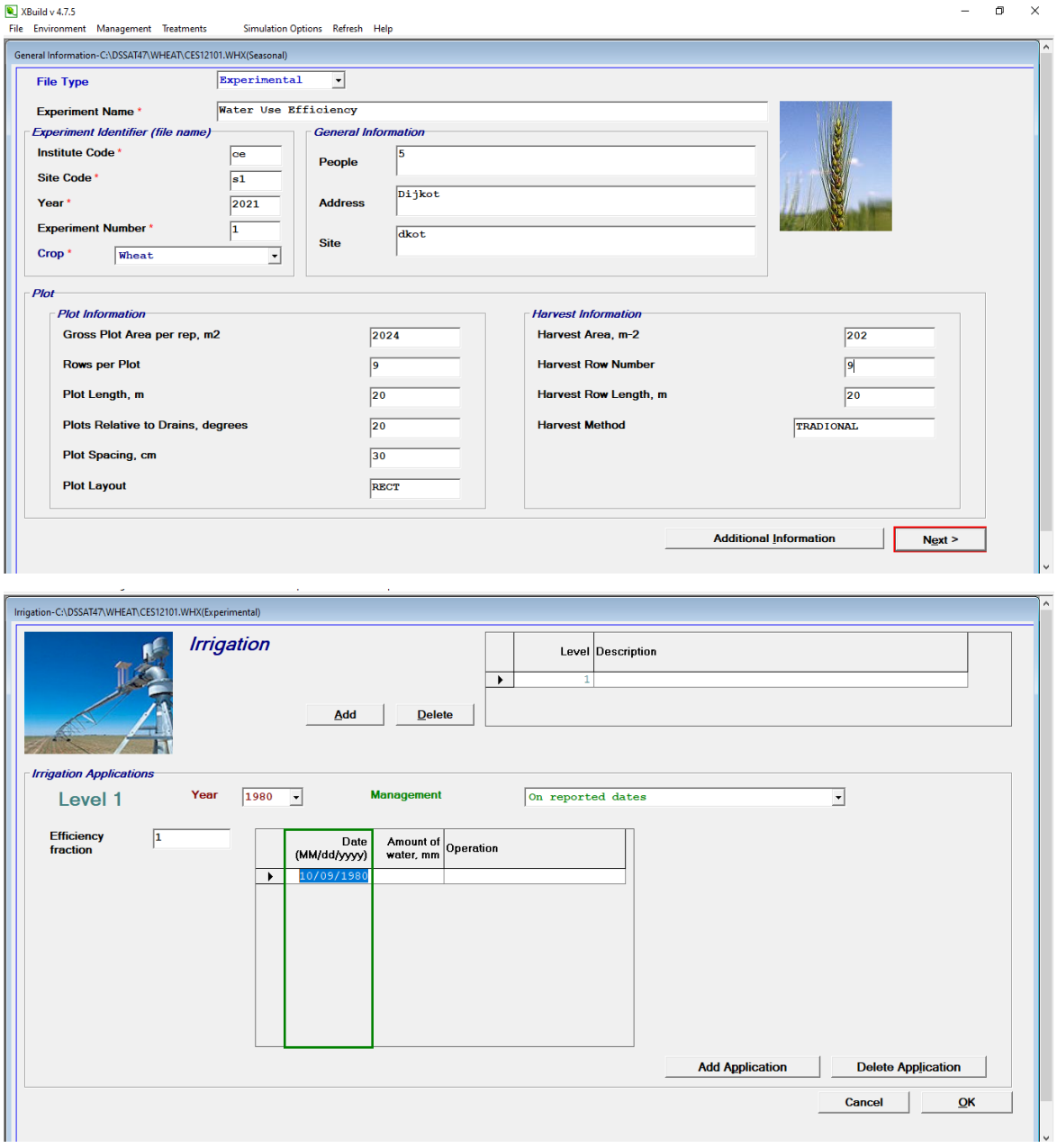


Figure 3-12: XBuild Version 4.7.5.0

3.2.2.4 Model Description

The DSSAT v4.75 soil water balance design was adopted in this investigation. This one-dimensional model evaluates changes in soil water content due to irrigation and rainfall penetration on a regular basis. The model used the "Tipping Bucket" technique to quantify soil water drainage when the contents of the subsoil exceeded the drained upper limit. The upward unsaturated flow was computed using soil water diffusivity in combination with changes in the water storage capacity of the surrounding strata. (Ritchie, 1998). Daytime infiltration of soil water was measured after eliminating surface runoff from rainfall that happened on the same day. The soil conservation technique, which is based on a 'curve number' that factors for slope, tillage, and soil texture, is used to separate infiltration and run-off from precipitation. Following rains, the modified approach used soil layers and soil water. (Saxton, Rawls, Romberger, & Papendick, 1986).

The quantity of water processed through any soil layer is related to saturated hydraulic conductivity. This feature allows the model to replicate poorly drained soils as well as water tables. Daily water inflows are subtracted or added to modify overall soil water of every stratum.

Following is an equation of the DSSAT water module:

$\Delta S = P + I - T - R - D - E$ ……...3.1

Precipitation is represented by P, irrigation by I, plant transpiration by T, soil evaporation by E, runoff by R, and drainage by D.

3.2.2.5 Agronomic and Crop Management

At the beginning of November, the local wheat variety (Markaz – 2019) was sown. Seeds were sown in plots with nine rows of 20m length and 0.5cm furrows at a depth of 0.07 m. At the beginning of April, the wheat crop was harvested. The plot received 120 kg/ha phosphorus and 250 kg/ha DAP as a single super phosphate at the recommended rate before planting. Soil fertilization is an important aspect of crop management for providing proper nutrient levels for plant growth (soil investigation). 70% of urea was sprayed to sites around 27 days of planting (DAP), with the remainder treated around 49 days of planting (DAP). There were 5 irrigation applications in the research area: 27, 48, 78, 100, and 116 DAP.

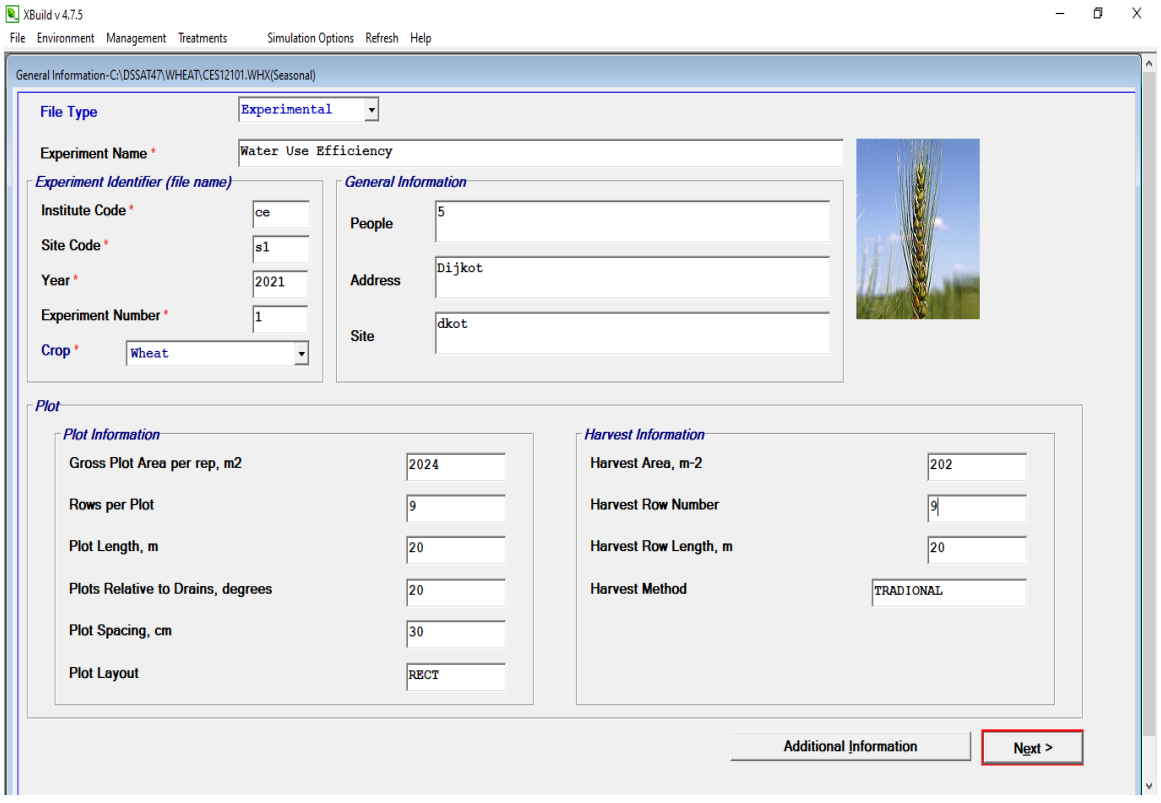


Figure 3-13: XBuild Version 4.7.5.0

3.2.2.6 Model Calibration

The DSSAT adjustment process involves changing functions and limits so that the predicted values are identical to or extremely similar to data acquired from field research. A holdout cross-validation was used to validate the DSSAT model. The simulated findings show that the wheat crop yield recorded in the field is accurate enough. The actual yield was 4200 kg/ha, while the DSSAT simulation predicted a yield of 4231 kg/ha. The real and hypothetical yields were nearly identical.

CHAPTER NO 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter lay out the crux of the whole analysis performed for calculating virtual water export, as well as possible mitigation steps that can be adopted to reduce the country's virtual water export.

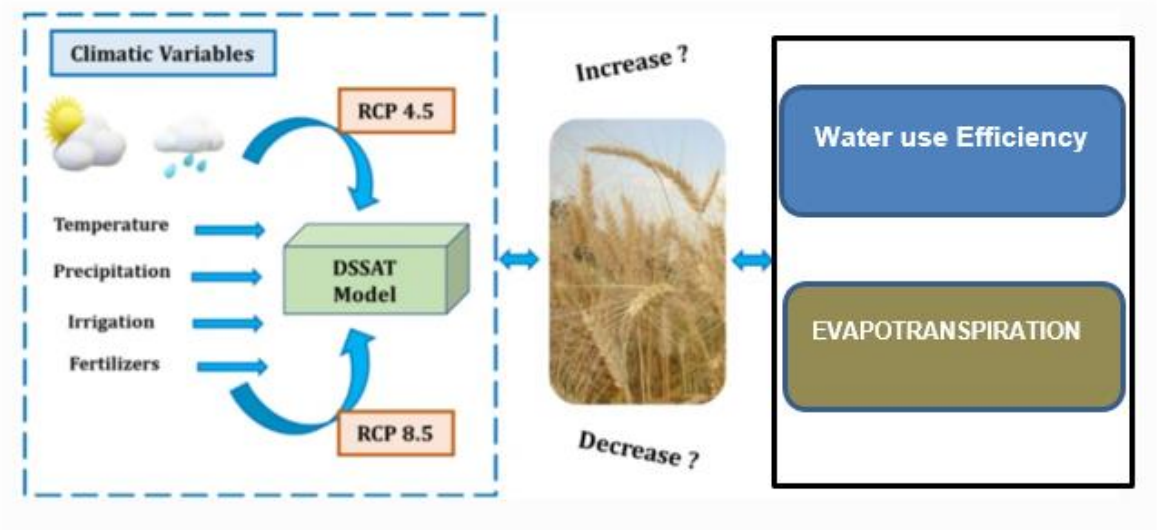


Figure 4-1: Results from DSSAT

4.2 Results

The results of the analysis performed are discussed below:

4.2.1 Virtual Water Export

Table 4.1 shows Pakistan's calculated virtual water export to the top 18 “basmati” rice importers.

Table 4-1: Virtual Water Export

Sr No	Country	Quantity (Kg)	Virtual Water (MAF)
1	China	74860	0.12138016
2	Afghanistan	66928	0.108518987
3	Kenya	46591	0.075543989
4	U.K.	431938	0.700356714
5	U.A.E.	335726	0.544355806
6	Saudi Arabia	32084	0.052021922
7	Mozambique	28040	0.045464864
8	Oman	27572	0.044706035
9	Italy	266578	0.432237247
10	Malaysia	264362	0.428644161
11	Benin	23749	0.038507313
12	USA	21904	0.035515777
13	Belgium	21543	0.034930441
14	Netherland	19332	0.031345462
15	Somalia	171291	0.277736161
16	Niger	146239	0.237116127
17	Indonesia	125102	0.202843986
18	Tanzania	116972	0.18966177

Source: “Author Calculations”

Pakistan exported 3.6 MAF ground water to these 18 countries along with rice. The visual representation of the virtual water flowing out of the country in the term of rice exported by using Circos is shown in figure 4-2.

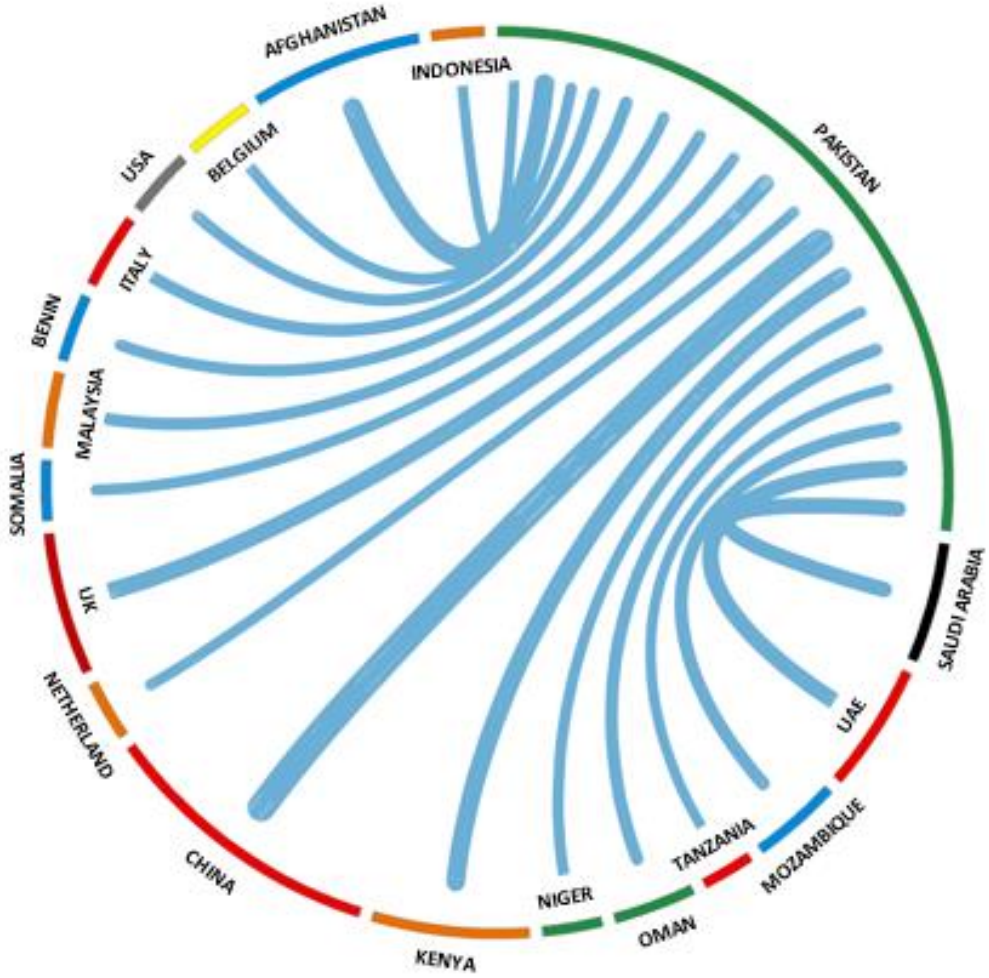


Figure 4-2: Virtual Water Export Visual Representation

4.2.2 Water Use Efficiency

Increased water usage efficiency can reduce virtual water export by lowering irrigation water requirements and, as a result, improving agricultural output. Deficit irrigation and evapotranspiration effect on wheat crop yield is shown in table 4.2.

Table 4-2: Irrigation Level Effecting Yield

Site Treatment	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}
	427	406	384	363	342	320	299	278	256	235	213	192
Yield (kg/ha)	4199	4286	4365	4465	4557	4693	4804	4866	4940	4829	4767	4705
ET (mm)	400.6	423.4	423	422.7	422.3	422.1	421.6	421.3	420.8	419.2	408.2	400.3
WUE (kg m^{-3})	5.043	5.132	5.285	5.365	5.501	5.61	5.719	5.84	5.975	5.856	5.789	5.648

4.2.2.1 Deficit Irrigation's Effects on the Wheat Grain Yield

Farmers' actual irrigation dates and levels were obtained from Pakistan's Irrigation Department then compared to an optimum irrigation scenario in order to get the best WUE. Water used in the research area was excess of wheat crop requirements. By altering irrigation strategies, the ideal irrigation situation was obtained for producing the highest yield. Figure 4-3 shows the production of wheat being affected by deficit irrigation.

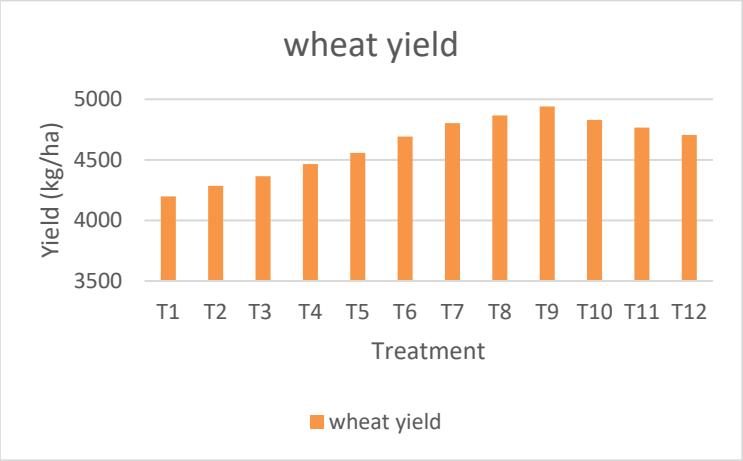


Figure 4-3: Deficit Irrigation's Effects on Wheat Grain Yield

4.2.2.2 Evapotranspiration (ETo) Effects on Wheat Grain Yield

The effect of evapotranspiration changes the yield with changing temperature and other biophysical factors as shown in figure 4-4.

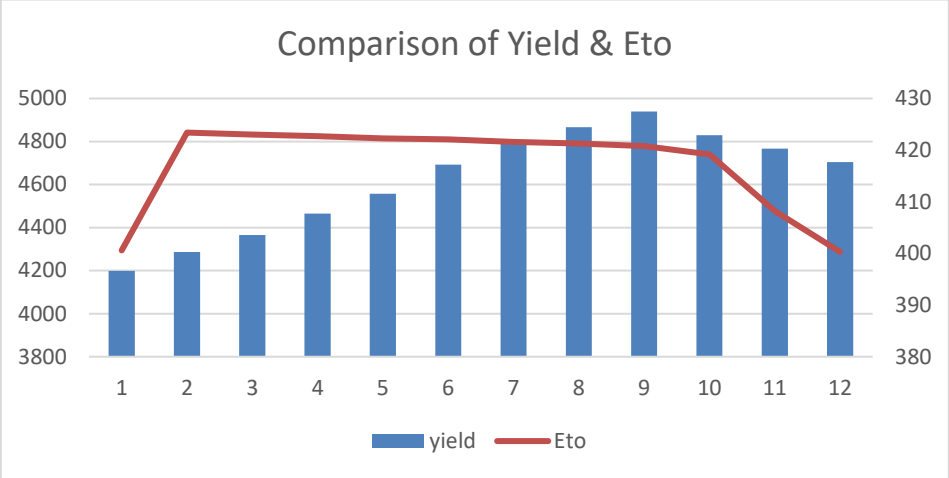


Figure 4-4: Evapotranspiration (ETo) Effects on Wheat Grain Yield

4.2.2.3 Wheat Grain Yield Impacted by Water Use Efficiency

According to figure 4-5, as the irrigation interval and amount of irrigation were changed, both the wheat grain yield and the WUE increased.

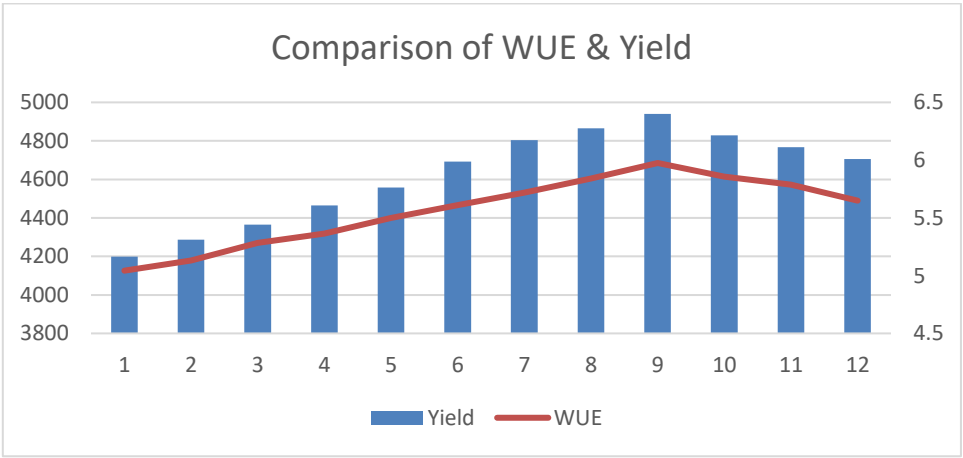


Figure 4-5: Wheat Grain Yield Impacted by Water Use Efficiency

4.2.3 Saving Water by Balancing "Trade"

Another solution to virtual water export is analysis of import and export of the country. Maintaining the trade balance by decreasing the export of "water" extensive crop and producing crops requiring less water in the country. Water is the most undervalued factors of production; it is not appropriately accounted for in the assessment of a product's comparative advantage. This could lead to unintended trade flows, with water-intensive crops being exported in huge quantities from locations where water is scarce and overused. Under these circumstances, trade is unlikely to contribute to optimal production and trade results from a water-resource's perspective as long as markets for valuing water resources remains unknown(Hoekstra & Hung, 2003).

The following tables prove our point about saving water by trade balance. So, the country should not suffer and saves blue water (blue gold) as well. In following table the value of ground water is PKR 1 per m^3. Water use efficiency, crop yield and blue water percentage being used in crop production in Pakistan's agriculture is taken from the report by Muzammil Hameed (Muzammil et al., 2020). The volume and value of trade was taken from OEC (Observatory of Economics Complexity) https://oec.world/.

- **Rice vs. Edible Oil**

The table 4-3 represents the virtual water saving by producing edible oil instead of importing and not exporting water intensive rice crop to international market.

Table 4-3: Saving Virtual Water by Maintaining Balance in Trade

	Export (Rice)	Import (Edible oil)	Difference
Volume (million ton)	3.5	2.96	0.54
Average Yield (t/ha)	2.1	2	0.1
Area Required (Million hectare)	1.66	1.48	0.18
Water Use Efficiency (kg/m3)	0.5	5	-4.5
Total Water Required (MAF)	5.675	0.567	5.108
Blue Water %	70%	71%	-0.01
Blue Water Volume (MAF)	3.98	0.41	3.57
Amount (billion $)	2.14	2.15	-0.01
Virtual Water Price (million$)	27.78	2.77	25.01

4.3 Discussion:

- Agricultural production is dependent on land and water availability and access. Population expansion, economic growth, and climate change are all putting strain on the world's scarce freshwater resources.
- Countries with limited water sources for agriculture are unable to meet demand domestically and should balance their trade to be net virtual water importer.
- The irrigation application rate has a significant impact on water use efficiency and crop production in Punjab's semi-arid districts. Excessive irrigation, on the other hand, reduced wheat crop production while simultaneously lowering WUE.
- To better understand water consumption and water stress on Pakistan's freshwater resources, the current study examines the VWT and the national WF. In 2021, Pakistan exported rice and exported 3.98 MAF of ground water. But only 0.411 MAF of groundwater sources was traded with other countries while importing a water - stressed palm oil.
- This research shows that VWT analysis give useful insights on a country's agriculture and water resources, which can be used to assist trade, economic, and diplomatic policy.

CHAPTER NO 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter includes the conclusion of this research and recommendations to offer regarding this chapter.

5.2 Conclusion

Inadvertently, agricultural exports are coupled by the trade of virtual water. According to estimate, just exporting the water intensive crops like rice can affect the water sustainability of Pakistan. Rice is the main staple food in Pakistan and around the world. It requires a lot of water and is exported worldwide. Pakistan is one of the most water-scarce countries, and exporting such massive amounts of water could exacerbate the problem. Furthermore, there is evidence of a probable impact of climate changes on water supply, quality, and availability, which could affect water sustainability. The purpose of this research is to bring virtual water trade policy to the attention of policymakers. In terms of rice exports, Pakistan is the world's fourth greatest virtual water exporter, according to our data. In 2020-2021, it exported 5.67MAF of virtual water with rice. On the other hand, Pakistan's virtual water imports are negligible. In the year 2020-2021, Pakistan imported 0.41 MAF of virtual water in terms of cooking oil imports. As a result, rice export alone could lead to permanent water sustainability loss. Better and more efficient water management can help to postpone the inevitable. Irrigation volume has a substantial impact on crop grain production and WUE, while limiting irrigation has a substantial impact on crop “grain” output and WUE. Irrigation demand is 40-60% less in a semi-arid region of common practice.

5.3 Recommendations

Keeping above results and conclusions, following recommendations/suggestions are given to the government of Pakistan and agricultural department to lessen the virtual water export and increase the crop yield by bettering water use efficiency of Pakistan.

5.3.1 Crop Zoning

The Punjab crop zoning prepared by the Food and Agriculture Organization (FAO) in collaboration with the University of Agriculture Faisalabad (personal conversation with Dr. Iqrar A. Khan, former Vice Chancellor, UAF) should be authorized and implemented as soon as possible (Qureshi & Ashraf, 2019). Sugar cane and rice do not have a comparative or competitive advantage in the international market due to the high value of water needed per kg. Instead, edible oil crops should be introduced to alleviate water scarcity and import costs.

Edible oil crops should be introduced in the system which has greater water use efficiency (10 times of rice). Foreign earning will not be affected as we are earning the same size of foreign exchange by the export of rice as is being spent on the import of edible oil.

5.3.2 Modern Irrigation Techniques

Using advanced irrigation (i.e., drip and sprinkler) systems to efficiently use natural water supplies. In comparison to standard irrigation techniques, the sprinkler system saves 35-percent "irrigation" water and increases wheat output by 24 percent. Table 5.1 demonstrates how much water is saved and how much more production is increased when sprinkle irrigation is used instead of conventional irrigation.

Table 5-1: Response to sprinkler Irrigation

Crop	Water Saving	Yield Increase
Barley	56%	16%
Cotton	36%	50%
Maize	41%	36%
Wheat	35%	24%

Source (use of drip and sprinkler irrigation)

Sprinkler irrigation systems spray water over the fields to distribute it. The water is pumped to the fields under pressure. The water is forced through sprinklers or perforations in pipelines and then generates a spray as a result of the pressure. Figure 5-1 shows a sprinkler system in action in the field.

Figure 5-1: Sprinkle Irrigation

5.3.3 Water Metering

Another option is to make water metering mandatory for all users, whether they are home, agricultural, or industrial. Users have no incentive to conserve water under the existing price system. Pricing can be tied to income levels as well as a variety of other factors. An increase in the cost of using water would not only motivate individuals to reduce their water use but will also generate sufficient revenue to pay for the upkeep of water-conserving devices and other necessary infrastructure.

5.3.4 Water Resources Management

According to the World Bank, the most pressing demands are increasing water consumption efficiency and production, providing water services in cities and irrigation, and ensuring environmental sustainability. Irrigation accounts for the vast majority of water use in the nation; rice, wheat, sugarcane, and cotton consume 80 percent of the nation's available water yet provide just 5 percent to the country's gross domestic product. The report continued by stating that on a conservative basis, inadequate water management was anticipated to cost 4 percent of GDP, which is equivalent to $12 billion each year (Report, 2019).

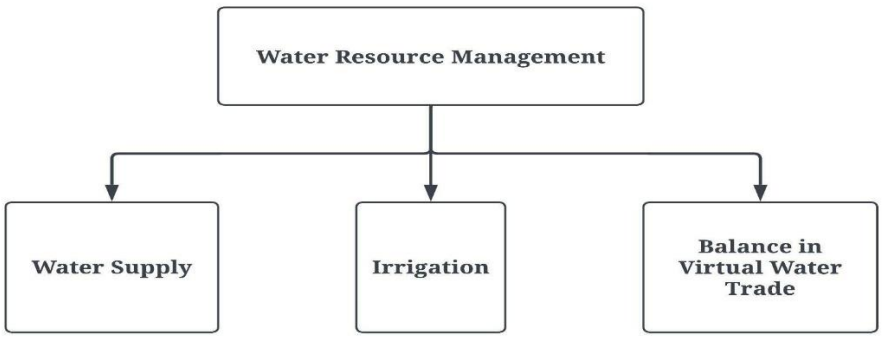


Figure 5-2: Water Resources Management

5.3.5 Further Recommendations

- It is necessary to make sure that water discharge data obtained for concerned strategic locations must have real-time accuracy. A telemetry system for irrigation must be installed in areas that contribute to larger consumption and wastage of water.
- There must be availability of the system that can accurately measure the water required for the irrigation needs. This developed system must be checked for the efficacy and implemented in concerned areas.
- There is dire need to supplant the conventional working irrigation system of Pancho with modern systems of irrigation to save water consumed in the flooding of rice.
- The conventional irrigation system has become old and obsolete and posing threats like water wastage due to conveyance. It either to be replaced with modern systems or rehabilitated to achieve an optimum level of water efficiency.
- Different methods can be combined for effective irrigation during cultivation and irrigation of crops. For example, it is recommended to use the trickle method of irrigation if the cultivation is done with the method of furrow system.
- There is a communication gap between irrigation departments and scholars carrying research on the subject matter. All these departments must be placed under the authority of Pakistan Council Research for Water Resources (PCRWR) Department. This will aid in implementation of water policies that can contribute to the efficient use of water resources.

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APPENDIX A-METEOROLOGICAL DATA

DATE	Min Temperature	Max Temperature	Solar Radiation	Precipitation
	C	C	MJ/m2/d	mm
01/01/1980	4.75	19.15	10.4	0
01/02/1980	5.12	19.52	10.39	2
01/03/1980	4.81	19.21	10.38	0
01/04/1980	4.42	18.82	10.37	0
01/05/1980	3.72	18.12	10.36	0
01/06/1980	5.21	19.61	10.35	0
01/07/1980	4.51	18.91	10.34	0
01/08/1980	4.73	19.13	10.33	0
01/09/1980	4.83	19.23	10.32	0
01/10/1980	5.92	20.32	10.31	3
01/11/1980	5.65	20.05	10.3	0
01/12/1980	5.33	19.73	10.29	0
01/13/1980	4.95	19.35	10.3	0
01/14/1980	4.37	18.77	10.31	0
01/15/1980	3.26	17.66	10.32	0
01/16/1980	4.67	19.07	10.33	0
01/17/1980	5.65	20.05	10.34	0
01/18/1980	6.57	20.97	10.35	4.5
01/19/1980	6.43	20.83	10.36	0
01/20/1980	5.63	20.03	10.37	0
01/21/1980	5.93	20.33	10.38	0
01/22/1980	6.76	21.16	10.39	3
01/23/1980	7.61	22.01	11	0
01/24/1980	5.54	19.94	10.2	0
01/25/1980	5.45	19.85	10.2	0
01/26/1980	4.95	19.35	10.3	0
01/27/1980	6.75	21.15	10.5	0
01/28/1980	5.45	19.85	10.3	0
01/29/1980	5.95	20.35	12	0
01/30/1980	5.5	19.9	13	4.1

01/31/1980	4.45	18.85	13	0
02/01/1980	7.3	22.6	13.5	0
02/02/1980	7.31	22.61	13.51	0
02/03/1980	7.65	22.95	13.85	0
02/04/1980	6.5	21.8	12.7	0
02/05/1980	5.98	21.28	12.18	0
02/06/1980	6.76	22.06	12.96	0
02/07/1980	4.78	20.08	10.98	4
02/08/1980	4.58	19.88	10.78	1
02/09/1980	6.9	22.2	13.1	1
02/10/1980	8.5	23.8	14.7	0
02/11/1980	7.88	23.18	14.08	0
02/12/1980	9	24.3	15.2	0
02/13/1980	8.7	24	14.9	4
02/14/1980	8.9	24.2	15.1	1
02/15/1980	9.5	24.8	15.7	4
02/16/1980	9.67	24.97	15.87	0
02/17/1980	9.69	24.99	15.89	0
02/18/1980	10.3	25.6	16.5	0
02/19/1980	10.93	26.23	17.13	0
02/20/1980	9.75	25.05	15.95	0
02/21/1980	9.76	25.06	15.96	0
02/22/1980	9.5	24.8	15.7	0
02/23/1980	10.5	25.8	16.7	2
02/24/1980	12.3	27.6	18.5	2
02/25/1980	10.9	26.2	17.1	1
02/26/1980	11.2	26.5	17.4	0
02/27/1980	11.34	26.64	17.54	0
02/28/1980	12.23	27.53	18.43	0
02/29/1980	12.55	27.15	17.1	3
03/01/1980	12.67	27.27	17.22	2
03/02/1980	12.34	26.94	16.89	0
03/03/1980	13.67	28.27	18.22	0
03/04/1980	14.45	29.05	19	0
03/05/1980	13.67	28.27	18.22	0

03/06/1980	15.34	29.94	19.89	0
03/07/1980	12.45	27.05	17	0
03/08/1980	12.11	26.71	16.66	4
03/09/1980	10.74	25.34	15.29	3
03/10/1980	12.21	26.81	16.76	4
03/11/1980	14.3	28.9	18.85	0
03/12/1980	16.75	31.35	21.3	0
03/13/1980	16.44	31.04	20.99	0
03/14/1980	15.67	30.27	20.22	0
03/15/1980	15.87	30.47	20.42	0
03/16/1980	13.45	28.05	18	0
03/17/1980	13.78	28.38	18.33	1
03/18/1980	15.87	30.47	20.42	2
03/19/1980	15.9	30.5	20.45	0
03/20/1980	16.45	31.05	21	1
03/21/1980	16.65	31.25	21.2	0
03/22/1980	14.55	29.15	19.1	0
03/23/1980	15.87	30.47	20.42	0
03/24/1980	14.67	29.27	19.22	0
03/25/1980	16.45	31.05	21	0
03/26/1980	13.45	28.05	18	0
03/27/1980	17.45	32.05	22	0
03/28/1980	16.8	31.4	21.35	2
03/29/1980	17.5	32.1	22.05	0
03/30/1980	16.75	31.35	21.3	0
03/31/1980	17.95	33.7	20.6	2

Source: Pakistan Meteorological Department

APPENDIX B-EXPORT DATASET

Country / HS4 Code-Commodity Description	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22 (R)	Feb-22 (P)
AFGHANISTAN	116,541	82,399	66,653	87,915	38,613	57,058	31,975	31,074	48,686	33,097	17,140	38,222
0105-Live Chickens, Ducks, Geese, Turkeys, and Quinoa fowls	544	135	194	171	130	46	175	0	28	148	0	90
0106-Live Animals NES	0	21	13	0	0	0	0	0	0	0	0	0
0201-Meat of Bovine Animals, Fresh or Chilled	4,139	1,988	1,999	1,355	0	0	0	0	0	0	0	0
0202-Meat of Bovine Animals, Frozen	0	0	0	0	0	0	0	0	0	0	0	0
0204-Meat of Sheep or Goats, Fresh, Chilled or Frozen	0	0	0	0	0	0	0	0	0	0	0	0
0207-Meat and Edible Offal of Poultry, Fresh, Chilled or Frozen	57	0	0	0	0	121	0	0	0	0	0	0
0210-Meat and Edible Offal Salted, Dried etc. and Flour & Meal	0	0	0	19	0	0	0	0	0	0	0	0
0302-Fish, Fresh or Chilled (Not Fish Fillets & other Fish Meat)	100	0	0	0	0	535	0	0	0	303	0	0
0306-Crustaceans; Live, Fresh etc, and Cooked etc.	0	0	0	0	0	0	0	0	0	0	0	104
0401-Milk and Cream, Not Concentrated or Sweetened	1,289	192	0	90	0	241	0	0	0	0	0	0
0402-Milk and Cream, Concentrated or Sweetened	93	0	113	180	34	69	39	79	0	0	0	0
0404-Whey and Milk Products NES, Flavored etc. or Not	0	0	0	0	0	0	0	0	0	0	0	0
0405-Butter and other Fats and Oils Derived from Milk, Spread	0	0	0	0	0	181	0	0	0	0	0	0
0406-Cheese and Curd	0	0	0	0	0	0	0	0	0	0	0	9
0407-Birds' Eggs in Shell, Fresh, Preserved or Cooked	1,000	140	355	0	0	0	0	0	448	102	120	318
0409-Natural Honey	0	0	0	0	0	0	0	0	0	0	0	0
0410-Edible Products of Animal Origin, NES	0	0	0	0	0	0	0	0	0	0	0	0
0501-Human Hair, Unworked and Waste of Human Hair	0	40	0	0	0	0	0	0	0	0	0	0
0504-Guts, Bladders, Stomachs of Animals (Not Fish) Fre/Ch/Fro	0	2,493	0	0	0	0	0	0	0	0	0	0
0505-Bird Skins and other Feathered Parts and Down	0	0	0	0	0	0	0	0	0	0	0	0
0603-Cut Flowers and Flower Buds for Bouquet or for Ornaments	0	0	0	0	0	0	0	0	0	0	0	0
0701-Potatoes, Fresh or Chilled	2,450	250	0	0	0	11	0	0	0	0	0	59
0702-Tomatoes, Fresh or Chilled	0	0	6	10	0	0	0	0	0	0	0	0
0703-Onions, Shallots, Garlic, Leeks etc, Fresh or Chilled	0	0	0	0	0	0	0	20	0	0	0	0
0704-Cabbages, Cauliflower, Kohlrabi, Kale etc. Fresh or Chilled	1,720	1,715	1,116	10	0	5	0	0	0	0	0	0
0709-Other Vegetables NES Fresh or Chilled	3,318	1,271	2,420	377	0	0	0	0	0	0	0	0
0710-Vegetables Frozen	879	666	663	224	50	95	41	23	0	0	130	290
0712-Vegetables, Dried, Whole, Cut etc. not further Prepared	300	200	0	40	0	0	0	0	0	0	0	0

0801-Coconuts, Brazil Nuts & Cashew Nuts, Fresh or Dry	0	100	0	0	0	0	0	0	0	0	0	0
0803-Bananas, including Plantains, Fresh or Dried	6,004	3,171	2,103	2,480	318	742	30	71	86	117	0	0
0804-Dates, Figs, Pineapples, Avocados etc, Fr or Dried	0	10	412	1,226	300	1,029	0	0	0	0	0	0
0805-Citrus Fruit, Fresh or Dried	7,447	3,859	1,887	503	0	2	0	0	0	25	0	101
0806-Grapes, Fresh or Dried	571	229	33	58	4	0	41	0	0	0	0	0
0809-Apricots, Cherries, Peaches, Plums and Sloes, Fresh	0	0	0	0	0	0	0	0	0	0	0	0
0810-Fruit NES Fresh	1,673	1,518	689	182	81	13	0	64	0	0	0	23
0902-Tea Whether or not Flavored	1,173	1,054	640	747	98	1,622	22	59	94	132	0	0
0904-Pepper, Genus Piper; Genus Capsicum or Pimento	0	0	0	0	0	0	0	0	0	0	0	0
0910-Ginger, Saffron, Turmeric, Thyme, Bay Leaves, Curry etc,	70	87	0	0	0	25	0	0	0	19	0	0
1003-Barley	54	0	0	0	0	0	0	0	0	0	0	0
1004-Oats	0	0	0	0	0	0	0	0	0	0	0	0
1005-Maize (Corn)	0	0	0	0	0	0	0	0	0	0	0	0
1006-Rice	24,694	8,395	9,351	24,419	3,608	13,885	2,883	1,458	11,909	7,066	963	9,192
1101-Wheat or Meslin Flour	0	0	0	0	0	0	0	13	0	0	0	0
1102-Cereal Flours, Except of Wheat or of Meslin	0	0	0	0	7	0	0	0	0	0	0	0
1103-Cereal Groats, Meal and Pellets	1,814	53	30	128	0	95	14	0	92	0	364	906

1104-Cereal Grains, Worked Like Hulled, Rolled, Flaked etc.	264	285	0	0	0	0	0	0	0	0	0	0
1108-Starches; Inulin	335	354	166	310	245	31	150	103	883	264	0	0
1201-Soya beans, Whether or Not Broken	126	0	89	0	0	0	0	0	0	0	0	0
1207-Other Oil Seeds and Oleaginous Fruits NES	357	0	0	0	0	0	0	70	0	0	0	334
1208-Flour and Meals of Oil Seeds or Oleaginous Fruits	0	0	89	0	0	0	0	0	0	0	0	0
1302-Vegetable Saps and Extracts: Pectates, Agar-Agar etc.	0	0	0	0	0	0	0	0	0	0	0	0
1401-Vegetable Plaiting Materials Like Bamboos, Reeds etc.	4	12	0	0	0	0	0	0	0	0	0	0
1505-Wool Grease Fatty Substances Derived there from	0	0	0	0	0	0	0	0	0	0	0	0
1507-Soybean Oil and Its Fractions	0	0	0	41	395	0	19	0	0	0	0	0
1514-Rape, Colza or Mustard Oil and Fractions thereof	78	0	0	1,123	0	103	0	0	0	0	49	0
1515-Other Fixed Vegetable Fats and Oils NES, Not Chem. Mod.	0	0	0	235	194	0	0	0	0	0	0	0
1516-Animal or Vegetable Fats and Oils	2,920	4,748	4,495	8,414	3,353	7,397	10,052	6,781	9,069	5,410	1,887	3,638
1517-Margarine; Edible Mixtures of Animals or Vegetable Fats	273	89	0	0	140	46	0	0	0	0	0	0
1602-Prepared or Preserved Meat, Meat Offal and Blood NES	0	0	0	0	0	0	0	0	0	0	0	0
1701-Cane or Beet Sugar and Sucrose in Solid Form	0	0	0	0	0	0	0	0	0	0	0	0
1702-Other Sugar NES	121	209	105	316	141	80	32	0	1	0	0	0
1703-Molasses Extracted from Sugar	0	0	0	0	1	0	0	0	0	0	0	0

1704-Sugar Confectionery including White Chocolate not Cocoa	1,263	950	1,325	836	998	1,066	622	135	557	619	0	160
1806-Chocolate and other Food Products Containing Cocoa	193	0	35	0	0	0	0	0	0	0	100	0
1901-Malt Extracts; Food Prep. of Flour etc. Under 50% Cocoa etc.	29	1,128	563	64	520	989	60	0	82	318	0	0
1902-Pasta and Couscous, Prepared or Not	756	233	208	104	300	0	197	0	388	16	69	0
1904-Foods Prep. by Swelling Cereal; Cereal NES, Grain Form	70	50	34	0	0	0	0	0	0	0	0	0
1905-Bread, Pastry, Cakes etc	334	283	174	894	723	556	165	31	389	84	24	0
2001-Vegetable, Fruit, Nuts Etc, Prep Or Pres By Vinegar Etc	0	0	0	0	0	0	0	0	0	0	0	0
2004-Vegetables Prepared or Preserved NES Frozen	0	0	0	0	0	0	0	0	0	0	0	0
2005-Vegetables Prepared or Preserved NES not Frozen	201	266	0	72	308	34	37	0	0	53	11	0
2006-Fruit, Nuts, Fruit-Peel etc, Preserved by Sugar	20	2,456	307	403	320	206	0	0	0	0	0	0
2007-Jams, Fruit Jellies, Marmalades etc. Cooked	38	6	0	68	5	0	0	0	115	53	0	0
2008-Fruit, Nuts etc. Prepared or Preserved NES	169	38	318	128	6	22	0	0	925	15	0	0
2009-Fruit Juices including Grape Must and Vegetable Juices	31	1,000	130	64	0	0	0	0	0	0	0	627
2103-Sauces and Preparations thereof	0	32	0	0	0	0	0	0	0	0	0	0
2105-Ice Cream and other Edible Ice	0	0	109	0	0	67	0	0	0	0	0	93
2106-Food Preparations NES	2,886	1,856	1,229	2,403	374	199	0	6,493	0	1,731	5,862	3,763
2201-Waters, Natural etc. Not Sweetened, Ice and Snow	0	0	0	0	0	0	0	0	0	0	0	0
2202-Waters, Sweetened etc and other Non-alcoholic Beverage NES,	0	11	0	0	0	0	0	0	0	0	0	0
2207-Ethyl Alcohol, Strength: more than 80% Alcohol	1	0	3	0	13	0	0	0	0	0	0	0
2302-Bran, Sharps and other Residue	25	0	0	3	0	0	0	0	0	0	0	0
2304-Soybean Oilcake and other Solid Residues	1,827	2,090	1,789	894	646	671	441	111	393	900	451	1,658
2306-Other Oilcakes NES From Vegetable Fats and Oils NES	285	38	53	96	0	95	0	0	49	26	0	0
2308-Vegetable Material, Waste etc For Feeding Animals NES,	50	210	1,310	278	0	450	0	0	48	0	0	0
2309-Preparations Used in Animal Feeding	545	0	0	0	0	0	0	0	0	0	0	0
2403-Tobacco and Tobacco Substitutes Manufactured NES	0	0	0	0	0	0	0	0	0	0	0	0
2501-Salt, Pure Sodium Chloride, Sea Water	50	0	0	3	0	41	0	0	71	0	0	0
2508-Clays NES	0	0	0	0	0	0	0	0	0	0	0	0
2515-Marble, Travertine etc. and Alabaster, Crude etc.	0	0	0	0	0	0	0	0	0	0	0	0
2517-Pebbles, Gravel etc. Macadam of Slag, Dross etc.	0	0	0	0	0	0	0	0	0	0	0	0
2520-Gypsum; Anhydrite; Plasters etc.	10	0	11	0	0	10	0	0	0	0	0	0
2523-Portland Cement, Aluminous Cement and Slag Cement	9,146	8,968	7,055	7,277	5,477	5,032	4,212	2,381	2,266	803	314	1,998
2526-Natural Steatite Roughly Trimmed etc.	0	345	0	0	0	0	0	0	0	0	0	0
2710-Oil from Petrol and Bituminous Mineral etc.	22	0	89	100	0	0	0	0	0	0	0	0

Country / HS4 Code-Commodity Description	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22 (R)	Feb-22 (P)

2807-Sulfuric Acid; Oleum	4	0	0	0	0	0	12	0	0	0	0	0
2808-Nitric Acid, Sophomoric Acids	16	14	16	15	16	14	14	0	19	0	0	32
2811-Inorganic Acids and Inorganic Oxygen Compounds NES	0	53	0	0	0	0	0	0	0	0	0	0
2815-Sodium Hydroxide and Potassium Hydroxide etc.	0	0	0	0	0	0	0	0	0	18	0	0
2829-Chlorates etc. Bromates etc and Iodates etc.	22	7	21	25	0	30	0	37	0	0	0	0
2836-Carbonates; Tetracarbonates etc.	108	81	34	84	103	96	97	207	252	129	0	0
2839-Silicates; Commercial Alkali Metal Silicates	0	0	0	0	0	0	0	0	0	26	0	0
2849-Carbides	26	21	0	0	0	0	0	0	0	0	0	0
2905-Acyclic Alcohols and Halogenated Derivatives	0	1	0	0	0	0	0	16	0	81	0	0
2917-Polycarboxylic Acids and Anhydrides etc.	635	633	0	558	0	216	598	43	151	163	132	445
2918-Carboxylic Acid, Added Oxygen & Anny Etc, Hal Etc	0	0	0	0	0	0	0	0	0	0	0	0
2921-Amine-Function Compounds	0	0	0	0	0	0	0	0	0	0	0	0
2922-Oxygen-Function Amino-Compounds	0	0	0	12	0	0	0	0	0	0	0	0
2924-Carboxyamide-Function Compounds etc.	0	0	0	0	0	0	0	0	0	0	0	0
2926-Nitrile-Function Compounds	0	0	0	0	0	0	0	0	0	0	0	0
2933-Heterocyclic Compounds with Nitrogen Hetero-Atom(s) Only	0	0	0	0	0	0	0	0	0	0	0	0
2934-Heterocyclic Compounds NES	0	0	0	0	0	0	0	0	0	0	0	0
2941-Antibiotics	31	0	0	0	0	0	0	0	0	0	0	0
3002-Human Blood or Animal Blood Prepared for Therapeutic	46	0	0	0	0	0	0	0	0	0	0	0
3003-Medicaments Mixtures for Therapeutic Use	340	871	598	354	739	154	278	263	43	700	0	40
3004-Medicaments NES	7,461	5,775	6,480	7,809	4,773	4,306	2,518	2,757	4,159	2,245	32	52
3005-Wading, Gauze, Bandages etc.	0	0	0	0	24	8	0	0	0	0	0	0
3201-Tanning Extracts of Vegetable Origin	0	0	0	0	0	0	0	0	0	0	0	0
3204-Synthetic Organic Colouring Matter	129	60	159	0	113	20	0	62	19	0	0	0
3206-Other Color Matters	132	550	202	0	0	0	0	0	0	0	0	136
3208-Paints and Varnishes of Synthetic Polymers	1,497	1,851	1,041	472	440	311	0	0	0	0	0	0
3209-Paints and Varnish of Synthetic Polymers Dissolved	162	526	390	430	178	113	0	0	0	0	0	8
3214-Glaziers Putty, Resin Cements, Caulking Comps etc	111	79	70	250	40	0	0	0	0	0	0	0
3215-Ink, Printing, Writing, Drawing etc.	0	0	36	0	50	0	0	0	0	0	0	0
3302-Odoriferous Mixtures as Raw Materials for Industry	151	850	1,243	833	659	100	0	0	166	70	0	413
3304-Beauty and Make-Up Preparations	78	0	0	0	0	0	0	0	0	0	0	0
3305-Preparations for Use on Hair	0	370	287	25	379	185	0	0	0	203	0	0
3306-Preparations for Oral or Dental Hygiene	0	26	0	0	0	0	0	0	0	0	0	0
3307-Personal Toilet etc Prep NES	0	0	196	0	0	0	0	31	0	40	0	0
3401-Soap, Organic Surf-Act Products used for Soap	546	32	606	0	32	712	229	18	0	0	0	559
3402-Organic Surf-Act Agents and Products other than Soap	1,743	718	573	1,149	240	1,398	201	158	462	756	72	354

3403-Lubricating Preparations, Antirust and Treating Textile etc.	0	0	0	0	0	0	0	0	0	0	0	0
3405-Polishes and Creams for Leather, Wood etc.	61	63	0	69	0	0	57	97	27	60	0	0
3503-Gelatin and Derivatives	0	0	0	0	0	0	0	0	0	0	0	0
3505-Dextrin and Glues Based on Starches etc.	0	0	0	0	0	0	0	0	0	0	0	0
3506-Prepared Glues and Adhesives NES	0	27	0	0	0	0	0	0	0	0	0	0
3507-Enzymes; Prepared Enzymes NES	0	0	0	0	0	0	0	0	0	0	0	0
3603-Safety Fuses, Detonating Fuse and Percussion etc.	0	0	0	0	0	0	0	0	89	0	0	0
3605-Matches and Except Pyrotechnic Articles	247	165	94	267	131	271	452	370	371	210	132	137
3808-Insecticides, Rodenticides and Fungicides etc. Retail	0	16	0	0	0	0	42	0	0	0	0	0
3812-Prepared Rubber Accelerators etc.	0	0	0	0	0	0	0	0	0	0	0	0
3814-Organic Composite Solvents and Thinners NES	0	0	0	1,273	260	1,951	2,100	472	89	310	0	0
3822-Composite Diagnostic Laboratory Reagents	0	0	0	0	0	0	0	0	0	0	0	0
3824-Prepared binders for foundry moulds or cores	0	51	30	30	22	6	12	0	0	33	0	0
3901-Polymers of Ethylene, in Primary Forms	18	0	22	34	0	0	41	0	0	24	0	0

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3902-Polymers of Propylene or other Olefins, Primary Forms	0	0	0	0	0	0	0	0	100	50	0	0
3903-Polymers of Styrene in Primary Forms	0	73	0	0	0	0	0	0	0	0	0	0
3904-Polymers of Vinyl Chloride etc. in Primary Forms	0	0	0	673	137	49	49	124	0	0	50	0
3905-Polymers of Vinyl Acetate and other Vinyl Polymers: Primary	0	0	25	50	0	0	0	0	0	0	0	0
3906-Acrylic Polymers in Primary Forms	0	0	0	0	28	0	0	0	0	0	0	0
3907-Polyesters, Epoxides and Polyesters, Primary Forms	719	45	1,211	744	515	833	0	1,051	1,004	930	0	1,715
3909-Amino-Resins, Phenolic and Polyurethane, Primary Form	0	0	18	0	0	19	0	0	0	0	0	0
3912-Cellulose and Chemical Derivatives NES Primary Forms	0	0	0	0	0	205	0	0	0	0	0	0
3915-Waste, Parings and Scrap, of Plastics	0	0	0	0	21	0	0	0	0	0	0	0
3917-Tubes, Pipes and Hoses and their Fittings, of Plastics	0	0	0	0	0	0	0	0	0	0	0	0
3918-Floor Cover: Rolls and Tiles, Wall Cover, Plastics	21	50	0	0	0	0	0	0	0	0	0	0
3920-Plates, Sheets, Film etc.	315	280	330	260	152	128	20	0	78	100	0	57
3921-Plates, Sheets, Film, Foil and Strip NES Plastics	0	0	28	0	0	64	0	0	0	26	0	0
3922-Baths, Washbasins, Lavatory Seats etc. of Plastics	0	0	0	93	0	0	0	0	0	0	0	0
3923-Containers: Boxes, Bags, Closures etc, Plastic	17	2	23	55	25	0	0	28	0	0	0	0
3924-Tableware and other Household Articles etc, Plastics	3,217	4,301	2,473	3,679	1,930	2,309	1,029	247	4,242	2,680	1,651	6,703
3925-Builders' Ware of Plastics, NES	29	0	0	0	0	0	0	0	0	0	0	0
3926-Articles of Plastics Including Polymers and Resins NES	95	129	27	200	100	33	0	0	0	0	0	100
4001-Natural Rubber, Balata, Chicle etc, Primary Form etc.	200	0	0	0	0	0	0	0	0	0	0	0

4002-Synthetic Rubber and Factice Derived from Oil	0	0	15	0	14	0	0	0	0	0	0	0
4010-Conveyor or Transmission Belts of Vulcanized Rubber	0	0	0	0	0	0	20	0	0	0	0	0
4011-New Pneumatic Tires of Rubber	436	617	351	612	259	284	415	0	383	260	140	92
4013-Inner Rubber Tubes for Tires	0	0	0	0	0	0	0	0	0	0	0	0
4113-Leather further prepared after tanning (another animal)	0	0	0	0	0	0	0	0	0	0	0	0
4202-Travel Goods, Handbags, Wallets, Jewelry Cases etc.	0	0	0	0	0	0	0	0	0	0	0	0
4203-Articles of Apparel and Accessories of Leather	0	0	0	0	0	0	0	0	0	0	0	0
4401-Fuel Wood, In Logs etc. Wood in Chips etc.	240	0	100	0	0	0	0	0	0	0	0	0
4409-Wood, Continuously Shaped, grooved and rebated etc.	0	0	0	0	0	0	0	0	0	0	0	0
4410-Particle Board and Similar Board of Wood etc.	7	100	0	40	0	0	0	0	0	0	0	0
4411-Fiberboard of Wood or Other Ligneous Materials	3,200	2,754	2,282	2,360	1,014	1,064	1,631	2,467	1,789	1,275	0	0
4412-Plywood, Veneered Panels and Laminated Wood	0	0	46	0	0	63	0	0	0	0	0	0
4601-Plaits etc and Products of Plaiting Materials	0	0	0	0	0	7	0	0	0	0	0	0
4802-Paper Uncoated For Writing etc, Rolls; Handmade Paper	0	0	0	0	0	0	0	0	0	0	0	0
4803-Toilet or Facial Tissues Stock, Towel or Napkin	0	12	10	0	0	10	0	0	0	0	0	0
4804-Kraft Paper and Paperboard Uncoated NES	0	0	0	0	0	0	0	0	0	0	0	0
4805-Paper and Paperboard Uncoated NES, Rolls or Sheets	6	10	10	0	7	0	0	11	13	0	0	0
4810-Paper and Paperboard, Coated With Kaolin etc	291	0	0	198	0	0	0	0	0	0	0	0
4811-Paper, Paperboard, Wading etc. Coated etc NES	0	33	0	0	0	0	0	0	0	0	0	501
4818-Toilet Paper, Paper Tissues, Towels, Napkins etc.	0	14	18	5	18	14	32	79	31	20	35	0
4819-Cartons, Boxes, Cases, Bags and other Packing Containers	16	0	35	0	1	46	239	0	106	0	0	0
4901-Printed Books, Brochures and Similar Printed Matter	0	0	0	0	0	0	10	0	0	0	0	0
5109-Yarn of Wool or Fine Animal Hair, For Retail Sale	0	0	100	0	0	0	0	0	0	0	0	0
5202-Cotton Waste Including Yarn Waste etc.	0	0	0	0	0	0	0	0	0	0	0	0
5208-Woven Cotton Fabrics, Cotton more than 85% Wt < 200 g/m2	0	0	0	0	0	0	0	29	0	0	0	0
5209-Woven Cotton Fabrics, Cotton more than 85% Wt > 200 g/m2	0	0	0	4	0	0	0	0	0	0	0	0
5210-Woven Cotton Fabrics, Cotton less than 85% Wt < 200 g/m2	0	0	0	0	0	0	0	0	0	0	0	25
5513-Woven Fabrics of Synthetic Staple Fibres Containing <85% Fib	0	0	0	0	0	0	0	0	0	0	0	149
5603-Nonwovens Impregnated, Coated, Covered or Lamented	10	0	0	0	0	0	0	0	28	0	0	0
5605-Metallised Yarn and Textile Yarn	0	0	0	0	0	0	0	0	0	0	0	0
5608-Knotted Netting of Twine, Cordage or rope of Textile material	0	0	0	0	0	0	0	0	185	0	0	0

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5701-Carpets and other Textile Floor Coverings, Knotted	0	147	0	71	10	134	0	85	0	10	25	0
5702-Carpets and other Textile Floor Coverings, Woven	60	0	0	0	0	0	0	0	0	0	0	0

5703-Carpets and other Textile Floor Coverings, Tufted	17	0	0	15	0	0	0	0	0	0	0	0
5901-Gum Covered Fabric; Tracing Cloth; Paint Canvas	6	299	0	118	0	0	0	0	0	0	0	0
6101-Gents Overcoats, Car-Coats, Caps, Cloaks and Anoraks etc.	0	12	0	0	0	0	0	0	0	0	0	0
6103-Gents Suits, Ensembles, Jackets etc. Kn/Cr	0	0	0	0	0	0	0	0	0	0	0	118
6105-Gents Shirts, Knitted or Crocheted	0	0	0	52	0	0	0	0	0	0	0	0
6109-T-Shirts, Singlets and other Vests Kn/Cr	0	0	0	0	0	0	0	0	0	0	0	0
6113-Garments, Made-ups Kn/Cr etc. of Rubber or Plastic	0	0	0	0	0	0	0	0	0	0	0	0
6114-Garments NES Knitted or Crocheted	0	0	0	0	0	0	0	0	0	0	0	0
6115-Panty hose, Socks and other Hosiery Kn/Cr	0	0	0	0	24	0	0	0	0	0	0	0
6201-Men's or Boys' Overcoats, Cloaks etc. Not Knitted etc	234	33	0	158	0	0	0	0	0	0	0	0
6203-Men's or Boys' Suits, Ensembles etc, Not Knitted etc.	13	0	0	0	0	0	0	0	0	0	0	40
6210-Garments, of Felt etc, or Fabric Impregnated etc	0	0	0	111	0	0	0	0	0	0	0	0
6301-Blankets and Traveling Rugs	0	0	0	0	0	0	0	27	970	0	3,432	0
6302-Bed and Table Linen, Toilet and Kitchen Linen	0	0	43	0	0	0	27	15	0	0	0	0
6303-Curtains and Interior Blinds, Curtain or Bed Valances	0	0	0	0	0	0	0	0	0	0	0	1
6305-Sacks and Bags of Textile Material for Packing Goods	205	235	129	0	70	0	20	20	0	0	0	0
6306-Tarpaulins, Sails, Awnings and Tents etc.	0	0	0	0	300	0	28	0	604	801	82	234
6307-Made-Up Articles of Textile Materials NES	10	0	0	0	0	65	0	0	0	0	0	0
6308-Needlecraft Sets of Woven Fabrics and Yarn, Retail	0	0	0	0	0	0	0	0	0	0	0	0
6309-Worn Clothing and other Worn Textile Articles	0	0	0	0	0	0	0	0	0	0	0	0
6402-Footwear, Outer Sole and Upper Rubber or Plastic NES	0	0	0	0	0	0	0	0	0	0	0	0
6403-Footwear, Outer Sole Rubber, Plastic or Leather	295	11	250	433	0	483	958	983	189	110	0	0
6802-Worked Monumental or Building Stone and Articles NES	63	30	0	10	0	0	0	0	0	0	0	0
6806-Mineral Wools, Expanded Mineral Material and Mixture	0	0	0	0	0	0	0	0	0	0	0	0
6809-Articles of Plaster or Items Based on Plaster	10	20	0	0	0	0	0	0	0	0	0	0
6815-Articles of Stone or Other Mineral Substance NES	0	0	0	70	0	0	0	0	0	0	0	0
6910-Ceramic Sinks, Washbasins, Water Closet Bowls etc.	21	21	10	21	0	21	0	21	21	11	0	0
6914-Ceramic Articles NES	0	0	0	0	0	0	0	0	0	0	0	0
7005-Float Glass and Surface Ground or Polished Sheets etc.	22	12	0	20	9	59	16	0	0	0	0	0
7010-Glass Containers for Packing etc and Glass Closures	0	40	0	0	12	0	0	0	0	0	0	0
7013-Glassware for Table, Kitchen, Toilet etc. NES	52	98	56	38	0	14	0	0	0	0	0	0
7103-Precious and Semi-Precious Stones NES	0	0	0	0	0	0	0	0	0	0	0	0
7109-Base Metal or Silver, Clad with Gold Semi-Manufactured	0	0	0	0	0	0	0	0	0	0	0	0
7204-Ferrous Waste and Scrap	0	129	0	0	0	0	0	0	0	0	0	0
7208-Flat-Roll Products Iron or Non-Alloy Steel	0	97	40	0	41	40	121	0	40	0	0	0
7209-Flat-Roll Iron and Non-Alloy Steel Non-Clad	755	826	458	0	806	80	0	145	318	0	0	0

7210-Flat-Roll Iron and Non-Alloy >600mm, Clad, Plated or Coated	576	119	0	89	0	0	73	1,364	478	0	0	0
7211-Flat-Roll Iron and Non-Alloy Steel <600mm, Not Clad, Coated	0	0	0	0	0	0	0	0	0	0	0	0
7217-Wire of Iron and Non-Alloy Steel	28	30	10	0	0	0	0	0	0	0	0	0
7225-Flat-Rolled Products of other Alloy Steel, more than 600mm	0	0	0	455	175	479	0	100	460	207	0	0
7229-Wire of other Alloy Steel	54	0	52	33	10	947	0	0	0	0	0	0
7306-Tubes, Pipes and Hollow Profiles NES of Iron and Steel	332	187	150	80	47	121	129	0	54	0	0	0
7308-Structures NES and Parts Thereof of Iron or Steel	18	0	0	0	0	0	0	0	0	0	0	0
7310-Tanks etc Less than 300 Liter Capacity of Iron or Steel	302	55	0	0	0	0	25	42	22	27	0	0
7312-Stranded Wire, Rope etc, Not Electrically Insulated	0	0	0	0	0	0	0	0	0	0	0	0
7323-Table, Kitchen or Household Articles & Parts of Iron /Steel	27	31	32	206	0	47	78	0	0	0	0	0
7403-Refined Copper and Copper Alloys, Unwrought	163	65	128	152	0	44	0	0	100	0	0	0
7407-Copper Bars, Rods and Profiles	0	0	0	0	0	0	0	0	0	0	0	0

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7410-Copper Foil Thickness above 0.15mm	0	0	0	0	0	0	0	0	0	0	0	0
7415-Nails, Tacks etc. of Copper	0	300	0	0	0	0	0	0	0	0	0	0
7418-Household Articles and Parts	0	0	0	0	0	0	0	0	0	0	0	0
7601-Aluminum, Unwrought	0	0	0	0	0	0	0	0	0	0	0	0
7612-Aluminum Casks, Cans, Boxes, and Similar Containers	2,138	353	936	1,202	3,006	755	0	0	749	2,022	756	2,511
7615-Table, Kitchen or other Household Articles and Parts	12	0	0	0	0	0	162	0	0	0	0	0
7903-Zinc Dust, Powders and Flakes	0	0	0	0	0	0	0	0	0	0	0	49
8007-Articles of Tin NES	0	0	0	134	0	0	0	0	0	0	0	0
8205-Hand tools NES Like Blow, Torches, Anvils etc.	2,381	297	157	1,417	1,340	1,190	0	0	135	0	0	175
8212-Razors and Razor Blades	0	0	0	0	0	0	0	33	27	0	0	0
8215-Tableware etc. of Base Metal and Parts of Base Metal	0	0	0	0	0	0	0	0	0	0	0	0
8311-Wire, Rods etc. ror Soldering etc.	0	0	0	0	0	0	0	79	0	0	0	0
8413-Pumps for Liquids; Liquid Elevators; Parts Thereof	0	0	0	0	0	0	0	0	0	0	0	0
8414-Air or Vacuum Pump, Compressors and Fans	181	330	156	189	0	0	0	34	0	0	0	0
8415-Air Conditioning Machines and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8418-Refrigerators, Freezers, Heat Pumps NES and Parts	402	340	45	129	116	50	0	0	0	0	0	0
8422-Machines, Dishwashing Machines for Cleaning etc.	28	21	11	0	0	0	0	0	0	0	0	0
8429-Self-Propelled Bulldozers, Graders, Scrapers etc.	0	0	0	0	22	0	0	0	0	0	0	0
8432-Agriculture Machinery for Soil, Lawn Preparations	0	0	0	0	0	0	0	0	0	0	0	0
8433-Harvesting or Threshing machinery	200	0	140	100	0	0	0	0	0	0	0	0
8434-Milking and Dairy Machinery and Parts thereof	42	0	0	0	0	0	0	0	0	0	0	0

8438-Machinery NES used for Food and Drink and Parts thereof	0	0	207	0	74	0	0	0	152	39	0	0
8450-Washing Machines and Parts	81	26	0	39	0	0	0	0	0	12	0	0
8451-Machinery not for Laundry for Cleaning, Drying etc	0	0	9	0	0	0	0	0	0	0	0	14
8473-Parts for Typewriters and other Office Machines	0	0	0	0	0	0	0	0	0	0	0	0
8477-Machinery for Working Rubber or Plastic etc. NES and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8479-Machines and Mechanical Appliances NES	0	0	17	85	0	0	0	0	0	0	0	0
8481-Taps, Cocks, Valves and Similar Appliances for Pipes, Boiler	0	0	0	0	0	0	0	0	0	0	0	0
8483-Transmission Shafts, Bearings, Gears etc. and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8504-Electrical Transformers, Static Converters and Inductors	0	0	0	0	0	0	0	0	0	0	0	0
8505-Electromagnets, Permanent Magnets etc and Parts	307	0	0	0	0	0	0	0	0	0	0	0
8506-Primary Cells and Batteries Parts thereof	0	0	0	0	0	0	0	0	0	0	0	0
8507-Electrical Storage Batteries, Including Separators Parts	1,688	1,905	1,416	1,855	701	1,569	817	1,607	2,402	1,173	256	197
8509-Electromechanical Domestic Appliances and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8514-Industrial or Laboratory Electric Furnaces etc and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8516-Electrical Water Heater and Soil Heaters,	0	0	0	0	0	0	0	0	0	0	0	0
8537-Boards, Panels etc With Electrical Switch Apparatus etc.	0	0	0	0	0	0	0	0	0	0	0	0
8538-Parts for Electrical Apparatus etc of Switching, panels etc.	0	0	0	0	0	0	0	0	0	0	0	0
8541-Semiconductor Devices, Light-Emit Diodes etc and Parts	0	0	0	0	0	0	0	0	0	0	0	0
8542-Electronic Integrated Circuits and Micro assemblies and Parts	0	13	0	0	0	0	0	0	0	0	0	0
8544-Insulated Wire, Cable etc. Optical Sheath Fibres Cables	106	0	0	248	0	114	0	0	0	0	0	0
8545-Carbon Electrodes and Brushes, Lamp Carbons etc	0	0	0	105	0	0	0	0	0	0	0	0
8546-Electrical Insulators of Any Material	0	0	0	0	0	0	0	0	0	0	0	0
8701-Tractors Other Than Work Trucks used for Short Distance	550	1,216	328	478	136	0	91	0	92	45	0	0
8703-Motor Cars and Vehicles for Transporting Persons	60	0	0	32	0	0	0	0	0	0	0	0
8708-Parts and Accessories for Motor Vehicles	0	0	0	0	0	0	0	7	0	0	0	0
8711-Motorcycles and Cycles with Auxiliary Motor	755	446	949	763	489	0	0	50	174	0	0	0
8714-Parts and Accessories of Cycles and Invalid Carriages	12	0	0	0	0	0	0	0	0	0	0	0
9018-Medical, Surgical and Dental Instruments etc.	0	0	0	0	16	0	16	0	0	0	0	0
9022-X-Ray etc Apparatus, Tubes, Panels, Screen and Parts	0	0	0	0	0	0	0	0	0	0	0	0

Country / HS4 Code-Commodity Description	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22 (R)	Feb-22 (P)
9406-Prefabricated Buildings	0	0	0	0	0	0	0	0	0	0	0	0
9506-Articles and Equipment’s for Sports etc NES	0	38	0	0	0	0	0	0	0	0	0	0
9608-Pens, Ball Points, Soft Tip and Mechanical Pencils etc.	39	0	0	0	0	0	0	0	0	0	0	0
9617-Vacuum Flask and Vessel with Cases	0	0	0	0	0	0	0	0	0	0	0	0

ALBANIA	455	391	176	323	440	361	353	258	698	451	752	509
0303-Fish Frozen (Not Fish Fillets & other Fish Meat)	20	60	0	0	0	0	0	0	0	0	0	0
0307-Molluscs & Aquatic Invertebrates NES Live etc. Fre/Chl etc.	0	100	0	0	0	0	0	0	20	109	100	20
0504-Guts, Bladders, Stomachs of Animals (Not Fish) Fre/Ch/Fro	0	0	0	0	0	0	0	0	0	0	0	0
0701-Potatoes, Fresh or Chilled	0	0	25	0	0	0	0	0	0	0	0	0
0804-Dates, Figs, Pineapples, Avocados etc, Fr or Dried	0	0	0	0	0	0	0	0	0	0	0	0
1006-Rice	185	63	36	36	166	118	201	173	362	108	204	11
1302-Vegetable Saps and Extracts: Pectates, Agar-Agar etc.	0	0	0	0	0	0	0	0	0	0	0	0
1516-Animal or Vegetable Fats and Oils	0	0	0	0	0	0	0	0	0	0	0	0
1704-Sugar Confectionery including White Chocolate not Cocoa	0	0	0	0	0	0	0	0	0	0	0	0
2207-Ethyl Alcohol, Strength: more than 80% Alcohol	0	0	0	0	0	0	0	0	0	0	0	0
2501-Salt, Pure Sodium Chloride, Sea Water	9	9	0	0	0	0	0	0	0	0	0	0
2526-Natural Steatite Roughly Trimmed etc.	0	0	0	0	0	0	0	0	0	0	0	0
3004-Medicaments NES	0	0	0	0	0	0	0	0	0	0	0	0
3307-Personal Toilet etc Prep NES	0	0	0	0	0	0	0	0	0	0	0	0
3605-Matches and Except Pyrotechnic Articles	27	0	0	0	0	0	0	0	0	0	0	0
3903-Polymers of Styrene in Primary Forms	0	0	0	0	0	0	0	0	11	0	0	0
3920-Plates, Sheets, Film etc.	0	0	0	0	0	0	0	0	0	0	24	0
4104-Bovine or Equine Leather, No Hair NES	0	0	0	0	0	0	0	0	0	0	0	0
4107-Leather of Animals NES, No Hair NES	0	0	3	0	0	4	0	16	4	0	2	0
4113-Leather further prepared after tanning (other animal)	0	0	0	0	0	39	0	0	13	0	0	0
4203-Articles of Apparel and Accessories of Leather	3	8	0	0	1	7	0	0	0	3	0	1
5208-Woven Cotton Fabrics, Cotton more than 85% Wt < 200 g/m2	41	0	0	0	0	0	34	0	15	0	89	44
5209-Woven Cotton Fabrics, Cotton more than 85% Wt > 200 g/m2	0	73	34	117	0	166	0	0	109	0	125	81
5210-Woven Cotton Fabrics, Cotton less than 85% Wt < 200 g/m2	0	59	0	32	0	26	63	0	0	0	0	71
5212-Woven Cotton Fabrics NES	0	0	0	0	0	0	6	16	40	0	0	93
5513-Woven Fabrics of Synthetic Staple Fibres Containing <85% Fib	100	0	0	0	0	0	0	0	0	0	0	0
5802-Woven Terry Fabrics and Tufted Textile Fabric NES	0	0	0	0	0	0	0	0	0	0	0	0
5807-Labels, Badges and Similar Type of Textiles Material	0	0	0	0	0	0	0	0	0	0	0	0
5810-Embroidery in the Piece, In Strips or in Motifs	0	0	0	0	0	0	0	0	0	0	0	0
6112-Track Suits, Ski Suits and Swimwear Kn/Cr	0	0	0	0	0	0	0	0	0	0	0	0
6113-Garments, Made-ups Kn/Cr etc. of Rubber or Plastic	0	0	2	0	8	0	0	0	0	0	0	0
6116-Gloves, Mittens and Mitts, Knitted or Crocheted	0	0	0	0	0	0	5	0	0	0	0	0
6203-Men's or Boys' Suits, Ensembles etc, Not Knitted etc.	0	0	0	0	0	0	0	0	0	0	0	9
6207-Men's or Boys' Undershirts etc Not Kn/Cr	0	0	0	0	0	0	0	0	0	0	0	0
6302-Bed and Table Linen, Toilet and Kitchen Linen	46	0	75	132	161	0	19	50	121	220	152	145

6304-Furnishing Articles of Textile Materials NES	0	0	0	0	0	0	0	0	0	0	0	0
6306-Tarpaulins, Sails, Awnings and Tents etc.	0	0	0	0	97	0	0	0	0	0	0	0
6307-Made-Up Articles of Textile Materials NES	0	0	0	0	0	0	0	0	0	7	0	0
7013-Glassware for Table, Kitchen, Toilet etc. NES	0	0	0	0	0	0	0	0	0	0	0	11
8214-Articles of Cutlery NES and Manicure Sets etc.	0	2	0	0	0	0	0	0	0	0	0	0
8701-Tractors Other Than Work Trucks used for Short Distance	0	12	0	0	0	0	0	0	0	0	0	0
9018-Medical, Surgical and Dental Instruments etc.	0	0	0	0	7	0	7	3	0	3	0	24
9506-Articles and Equipments for Sports etc NES	24	5	0	6	0	0	17	0	4	0	56	0
ALGERIA	472	503	990	1,644	1,268	1,577	1,236	1,687	2,760	1,288	1,422	586
0303-Fish Frozen (Not Fish Fillets & other Fish Meat)	0	0	0	0	0	0	0	0	0	0	0	0

Country / HS4 Code-Commodity Description	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22 (R)	Feb-22 (P)
1006-Rice	93	0	0	0	226	393	113	740	1,898	524	0	0
1211-Plants etc. for Pharmacy, Perfume, Insecticides etc.	38	0	0	26	0	55	0	0	0	0	0	0
1301-Lac; Natural Gums, Resins, Gum-Resins and Balsams	0	0	0	0	0	0	0	0	0	0	0	0
1404-Vegetable Products NES	0	0	0	0	0	0	0	42	0	0	0	51
2106-Food Preparations NES	0	0	0	0	0	0	0	0	0	0	0	0
2201-Waters, Natural etc. Not Sweetened, Ice and Snow	18	0	0	0	0	0	0	0	0	0	0	0
2207-Ethyl Alcohol, Strength: more than 80% Alcohol	0	0	0	0	0	0	0	78	39	39	0	0
2501-Salt, Pure Sodium Chloride, Sea Water	7	0	0	5	0	0	10	0	0	0	0	0
2526-Natural Steatite Roughly Trimmed etc.	0	0	0	0	0	0	0	0	0	0	0	0
3212-Pigments Dispersed in Non-aqueous Liquid	0	0	0	0	19	0	0	0	0	0	0	0
3301-Essential Oils, Resinoids and Terpene	0	0	0	0	0	0	28	0	0	0	0	0
3304-Beauty and Make-Up Preparations	0	0	62	0	0	0	0	0	0	48	0	0
3307-Personal Toilet etc Prep NES	0	0	5	0	0	0	0	0	0	0	0	0
3505-Dextrin and Glues Based on Starches etc.	0	0	0	16	0	0	0	0	0	0	0	0
3605-Matches and Except Pyrotechnic Articles	0	0	34	0	0	0	0	0	0	0	0	0
3824-Prepared binders for foundry moulds or cores	0	86	0	0	86	0	0	0	0	0	0	0
3901-Polymers of Ethylene, in Primary Forms	0	0	0	0	0	0	0	0	0	43	0	0
3903-Polymers of Styrene in Primary Forms	0	0	0	0	0	0	0	0	18	0	304	80
3926-Articles of Plastics Including Polymers and Resins NES	0	0	0	0	0	0	0	0	0	0	0	0
4011-New Pneumatic Tires of Rubber	0	34	0	0	0	0	0	0	0	0	0	0
4013-Inner Rubber Tubes for Tires	0	0	0	0	0	0	40	0	39	0	72	0
4015-Articles of Apparel and Clothing Acc. of Rubber	0	0	0	0	0	0	0	0	0	0	0	0
4107-Leather of Animals NES, No Hair NES	0	0	0	0	0	0	0	0	0	0	0	0

4112-Leather further prepared after tanning (sheep, lamb)	0	0	0	0	0	0	0	0	0	1	0	0
4202-Travel Goods, Handbags, Wallets, Jewelry Cases etc.	0	0	0	0	0	0	0	0	2	0	0	0
4203-Articles of Apparel and Accessories of Leather	0	0	0	35	0	7	0	0	0	17	0	0
4819-Cartons, Boxes, Cases, Bags and other Packing Containers	0	0	0	0	0	0	0	0	81	0	0	0
5202-Cotton Waste Including Yarn Waste etc.	0	0	85	20	129	0	130	0	49	87	0	143
5208-Woven Cotton Fabrics, Cotton more than 85% Wt < 200 g/m2	0	69	0	0	20	0	0	0	0	0	0	0
5210-Woven Cotton Fabrics, Cotton less than 85% Wt < 200 g/m2	0	0	0	0	5	15	113	0	0	0	0	0
5211-Woven Cotton Fabrics, Cotton less than 85% Wt > 200 g/m2	92	127	0	0	71	52	0	93	0	67	67	0
5212-Woven Cotton Fabrics NES	0	0	0	0	0	0	102	0	0	0	0	0
5402-Synthetic Filament Yarn Not Sewing Thread, Not Retail	0	0	0	0	0	0	0	0	0	0	0	0
5512-Woven Fabrics of Synthetic Staple Fibres Containing >85% Fib	0	0	0	0	84	0	0	0	0	0	0	0
5513-Woven Fabrics of Synthetic Staple Fibres Containing <85% Fib	0	0	0	0	0	0	0	0	0	0	0	0
5802-Woven Terry Fabrics and Tufted Textile Fabric NES	0	0	0	0	0	0	0	0	0	0	0	0
5807-Labels, Badges and Similar Type of Textiles Material	9	0	0	0	0	0	0	0	0	13	0	0
5808-Braids, Ornamental Trim in Pieces Not Knitted, or Crocheted	16	0	16	0	0	0	0	0	9	0	22	16
5810-Embroidery in the Piece, In Strips or in Motifs	0	0	0	0	0	0	15	0	0	0	0	0
6102-Ladies Overcoats, Car-Coats, Caps, Cloaks and Anoraks etc.	0	0	0	0	0	0	0	0	0	0	0	0
6103-Gents Suits, Ensembles, Jackets etc. Kn/Cr	0	0	0	66	0	0	0	0	0	162	77	69
6104-Ladies Suits, Ensembles etc. Kn/Cr	0	0	0	6	0	0	0	0	0	0	0	0
6105-Gents Shirts, Knitted or Crocheted	0	0	92	137	139	0	0	0	0	0	0	0
6106-Gents Blouses and Shirts Kn/Cr	0	0	0	0	0	0	0	0	0	0	0	0
6107-Gents Underpants, Briefs, Nightshirts etc. Kn/Cr	0	0	0	108	0	0	0	0	0	0	0	0
6109-T-Shirts, Singlets and other Vests Kn/Cr	0	0	0	166	118	8	0	0	0	0	0	0
6110-Sweaters, Pullovers, Vests etc. Kn/Cr	0	0	0	0	0	150	81	155	71	0	0	0
6111-Babies' Garments and Accessories Kn/Cr	0	0	0	108	0	0	0	0	0	0	0	0
6116-Gloves, Mittens and Mitts, Knitted or Crocheted	0	14	0	0	0	0	0	0	0	0	0	0
6203-Men's or Boys' Suits, Ensembles etc, Not Knitted etc.	0	0	45	446	0	149	65	2	104	0	0	0

Country / HS4 Code-Commodity Description	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22 (R)	Feb-22 (P)
6204-Women's or Girls' Suits, Ensembles etc. Not Kn/Cr.	0	0	0	0	0	0	0	0	0	0	2	0
6207-Men's or Boys' Undershirts etc Not Kn/Cr	0	0	0	0	0	0	0	0	3	0	0	0
6211-Track Suits, Ski-Suits and Swimwear, Not Knitted etc	0	0	0	245	0	0	0	0	0	0	0	0
6216-Gloves, Mittens and Mitts, Not Knitted or Crocheted	0	0	0	0	0	0	0	0	54	0	56	2
6217-Made-Up Clothing Accessories NES	0	0	0	0	0	0	0	0	0	0	0	5
6302-Bed and Table Linen, Toilet and Kitchen Linen	0	0	155	0	150	86	336	178	66	0	86	74
6306-Tarpaulins, Sails, Awnings and Tents etc.	0	0	267	0	0	527	0	0	0	0	0	0
6307-Made-Up Articles of Textile Materials NES	0	0	0	19	0	0	0	0	0	0	0	0
6309-Worn Clothing and other Worn Textile Articles	0	0	0	0	0	0	0	95	85	0	0	0
6310-Used or New Rags, Scrap Twine etc of Text Material	0	0	0	0	0	0	44	0	0	0	0	0
7013-Glassware for Table, Kitchen, Toilet etc. NES	0	0	0	0	0	0	0	0	0	0	0	0
7615-Table, Kitchen or other Household Articles and Parts	0	0	0	25	0	67	0	50	0	146	60	94
8413-Pumps for Liquids; Liquid Elevators; Parts Thereof	0	0	0	0	0	0	0	0	143	0	0	0
8542-Electronic Integrated Circuits and Micro assemblies and Parts	0	0	0	0	0	0	5	0	0	0	0	0
8708-Parts and Accessories for Motor Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
9018-Medical, Surgical and Dental Instruments etc.	49	9	149	85	64	67	106	148	52	97	598	36
9404-Mattress Supports, Articles of Bedding etc	0	0	0	0	0	0	0	57	0	0	0	0
9506-Articles and Equipments for Sports etc NES	150	163	82	131	157	0	48	49	46	47	78	18
AMERICAN SAMOA	44	0	0	405	31	33	0	90	0	77	0	0
0303-Fish Frozen (Not Fish Fillets & other Fish Meat)	0	0	0	0	0	0	0	0	0	0	0	0
0504-Guts, Bladders, Stomachs of Animals (Not Fish) Fre/Ch/Fro	0	0	0	0	0	0	0	0	0	0	0	0
0904-Pepper, Genus Piper; Genus Capsicum or Pimento	0	0	0	0	0	0	0	4	0	0	0	0
2207-Ethyl Alcohol, Strength: more than 80% Alcohol	0	0	0	0	0	0	0	0	0	0	0	0
2501-Salt, Pure Sodium Chloride, Sea Water	0	0	0	0	8	0	0	0	0	0	0	0
4015-Articles of Apparel and Clothing Acc. of Rubber	0	0	0	0	0	0	0	0	0	0	0	0
4113-Leather further prepared after tanning (other animal)	0	0	0	15	0	0	0	0	0	0	0	0
4201-Saddlery, Harness, Traces and Leads etc.	0	0	0	0	0	0	0	1	0	0	0	0
4203-Articles of Apparel and Accessories of Leather	0	0	0	0	0	0	0	0	0	0	0	0
4411-Fiberboard of Wood or Other Ligneous Materials	0	0	0	0	0	0	0	0	0	0	0	0
5210-Woven Cotton Fabrics, Cotton less than 85% Wt < 200 g/m2	0	0	0	0	0	0	0	0	0	0	0	0
5701-Carpets and other Textile Floor Coverings, Knotted	0	0	0	0	0	0	0	8	0	0	0	0
6110-Sweaters, Pullovers, Vests etc. Kn/Cr	0	0	0	0	0	33	0	0	0	0	0	0
6114-Garments NES Knitted or Crocheted	0	0	0	0	0	0	0	0	0	0	0	0
6203-Men's or Boys' Suits, Ensembles etc, Not Knitted etc.	0	0	0	0	22	0	0	0	0	0	0	0
6217-Made-Up Clothing Accessories NES	0	0	0	0	0	0	0	22	0	0	0	0

6302-Bed and Table Linen, Toilet and Kitchen Linen	44	0	0	0	0	0	0	45	0	0	0	0
6305-Sacks and Bags of Textile Material for Packing Goods	0	0	0	0	0	0	0	0	0	0	0	0
7326-Articles of Iron or Steel, NES	0	0	0	0	0	0	0	10	0	0	0	0
7612-Aluminum Casks, Cans, Boxes, and Similar Containers	0	0	0	390	0	0	0	0	0	0	0	0
8214-Articles of Cutlery NES and Manicure Sets etc.	0	0	0	0	0	0	0	0	0	0	0	0
9018-Medical, Surgical and Dental Instruments etc.	0	0	0	0	2	0	0	0	0	0	0	0

P: Provisional, R: Revised

NOTE-1: Due to rounding off separate items, totals may show minor differences

NOTE-2: This data has been prepared after incorporating all the revisions; therefore, it may not necessarily reconcile with monthly, quarterly and annual publication data

NOTE-3: The data can be revised subject to monthly, quarterly and annual revision exercises

NOTE-3. Other exports include land borne export, export of samples, outstanding export bills and refund & rebate, goods procured on ports by carriers etc.

Contact Person: Muhammad Ali Shah

Designation: Senior Joint Director

Phone: 021-32453651

Fax: 021-99221572

Email: muhammadali@sbp.org.pk