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THE PARADOX BETWEEN VIRTUAL WATER TRADE AND WATER SUSTAINABILITY IN INDIA

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ABSTRACT

This paper aims to analyze the virtual water trade and water sustainability problems in India. Sustainable use of any resources now became a challenge for every nation, particularly water resources, which is a global concern. It is the basic resources for all living beings. India is facing water shortages in different sectors like Agriculture majorly. Recently the Virtual Water Export issue is gaining much attention, where India tops in the export of virtual water through Agricultural products. It will lead to face water shortages in the future. It is also predicted that India may lose total availability of water within 500 years, and the virtual water export will affect our economy and food security. Therefore the proper implementation of policies are need of the hour to conserve water resources and make the way to reduce water scarcity problem.

Keywords: Virtual water, Agricultural Products and Water Sustainability.

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INTRODUCTION

The water plays a significant role in every sector, domestic consumption to commercial usage. Now a days there is a huge demand for water in different sectors of the economy, there is a challenge to dispense the basic necessities to increasing growth of population and to maintain water resource in sustainable manner for the long-term. The population growth and changing consumption pattern have affected the demand, supply and trade of food (Liu & Savnije 2008; Liu et al 2009). These factors are vigorously associated with water resources management for sustainable food production and water availability for agricultural production. The fresh water availability has become major global concern, all the sectors are competing with others for the water resources. Water sustainability has become a major issue among the countries of the world due increased demand, unlimited consumption over extraction of ground water for the domestic as well as agricultural production use. It can be noted that one of the major challenges the countries are facing with climate change, which is also responsible for scarce water resources in the recent years. Due to climate change there is an imbalance in rainfall and temperature. Decline in rainfall due to high temperature because of the global warming, and drying of the water resources. These problems arises the water sustainability in India. The virtual water provides the better approach for water resource management and utilization. Virtual water also is not free with its disadvantages.

The virtual water means, the water consumed in the production process of an agriculture or industrial product is called the virtual water which is carried in the product. This concept was introduced by Tony Allen in 1990. The water rich countries export the water intensive product to other water scarce countries. In this way water is exported in virtual form. This virtual form of water export is very useful for the water-scarce nations. For example when water-scarce country imports one tons of wheat instead of producing it in its own country, it is saving 1,300 cubic meters of real indigenous water and using it for other purposes. And if the exporting country in water-scarce, however it has exported 1,300 cubic meters of virtual water. So the real water used to grow wheat will be not available for the alternative use. Water scarce country like Israel, they don't export oranges to prevent the huge quantities of water being exported to different parts of the world. India is exporting highly water-intensive due to its large variety of agricultural products and the consequence of this action will lead to water sustainability at risk. India's overall exports in August 2023 estimated at USD 60.87 Billion; Merchandise exports estimated at UDS 34.48 Billion in August 2023, despite global sluggish growth. The

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agricultural exports registered robust growth in August 2023; Oil meals (57.26%), Tobacco (20.03%), Oil seeds (17.02%), Meat, Diary & Poultry Products (16.46%), Cashew (14.25%), Fruits & Vegetables (14.19%), Cereal Preparation & Miscellaneous Processed Items (12.88%) (PIB, 2023).

LITERATURE REVIEW

Shiv Narayan Nishad and Naresh (2022), they have stated in their research paper on 'Virtual water trade and its implications on water sustainability' that limited and declining water resources from different sectors, has posed a major challenge for maintaining water sustainability for a populous and water-scarce country like India. Over extraction and changing climate have put additional pressure to maintain water sustainability. Therefore, there is a need for proper planning of utilization and management of water resources.

Shivaswamy.G.P. et.al.,(2021), their research paper on 'An assessment of India's virtual water trade in major food products' found that India was the net exporter of virtual water in food products during 1990-2013; however later it turned out to be its net importer. Their analysis shows distance between trading partners are the primary driver of virtual water trade. India prefers trading with its neighbour to reduce transportation cost. The availability of arable land and water used in crop production are limiting factors for production of food crops and thus as essential factors in deciding the virtual water trade flows.

Shiv Narayan Nishad and Naresh Kumar (2021), their paper on 'Assessment of blue and green virtual water trade: A case study of India' states that declining water resources and increasing demand of water for agricultural, industrial, and domestic sector and potential climate change has posed a major challenge to maintain water sustainability of a nation. There is a need to adopt long-term perspective for assessment and policy design for sustainability of primary resource like water. It is also argued that virtual water trade has raised the issues of water sustainability as even small but continuous net virtual water may influence the water sustainability through irreversible losses.

K.S.SreeVidhya and L.Elango (2019), in their paper on 'Temporal variation in export and import of virtual water through popular crop and livestock products by India' stated that their study carried out using the data of export and import of food and livestock products of India as

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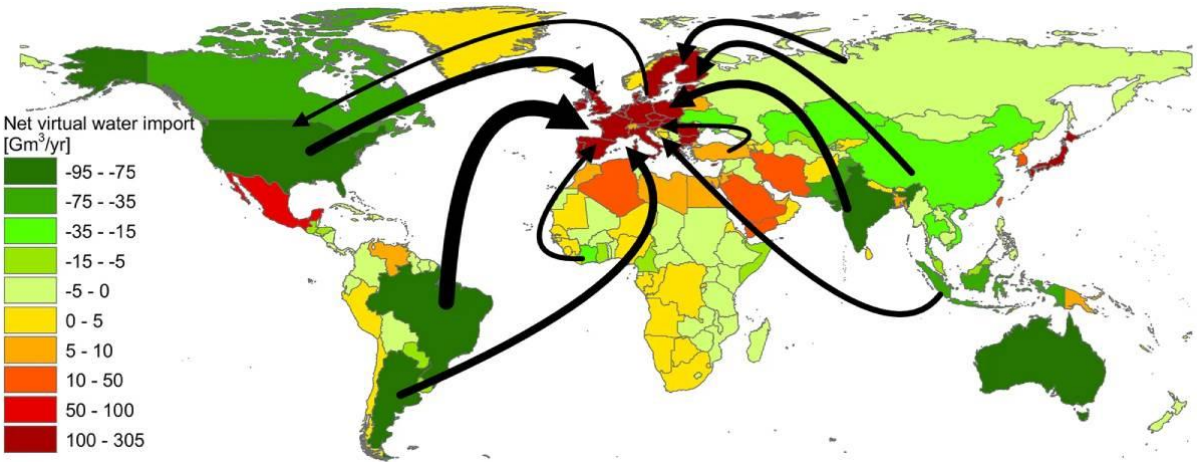
well as their VW consumption. Through the products considered in the study 496.9 Gm^3 and 237.2 Gm3 of water is traded virtually in the form of export and import respectively during the period 2006 to 2016. The maximum export of VW were mainly through rice, maize and buffalo meat, while the imports were through cashews, pulses and wheat; rest of the food items contributing negligible amounts.

Map. 1 Net Virtual Water Import into Europe



Source: Virtual Water Trade, Water Footprint Network, https://www.cropin.com/blogs/virtual-water-trade-in-the-context-of-agricultural-production.

It is revealed from map.1, Net Virtual water import into Europe, among the larger importers of Europe are Brazil, United States of America, Argentina, India and then second larger importers are China. Globally Europe imports these much of Virtual Waters from other nations.

Agricultural Products: Virtual Water Trade

India plays a major role in agricultural production and it is the primary sources of 55 percent of India's population. According to the report of IBEF (India Brand Equity Foundation) on August, 2023 the India has the world's largest cattle herd (buffaloes), the largest area planted for wheat, rice and cotton, and is the largest producer of milk, pulses and spices in the world. It is the second-largest producer of fruit, vegetables, tea, farmed fish, cotton, sugarcane, wheat, rice, cotton and sugar. The agriculture sector in India holds the record for second-largest agricultural land in the world generating employment for about half of the country's population. Below Table.1 shows the net export of virtual water in billion litres by produce during 2006-2016 in India.

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Table.1 Net Exports of Virtual Water in Billion litres by Produce during 2006-2016 (India)

Commodities	Net Export Virtual Water %
Buffalo Meat	22.1
Sugar	3.8
Onion	1.2
Sheep/Goat Meat	0.5
Groundnut	3.2
Maize	11.1
Cashew	3.7
Pulses	0.8
Wheat	5.7
Tea	3.1
Coffee	3.6
Rice	40.8

Figure.1 Net Export of Virtual Water in (%)

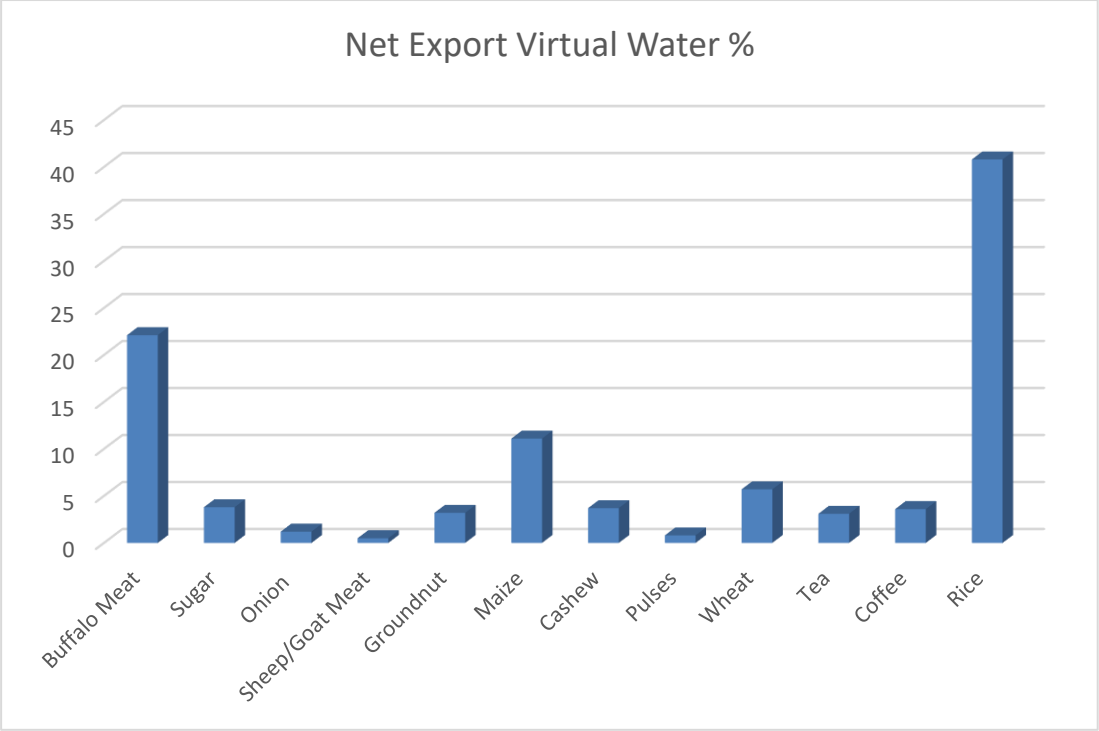

Table.1 reveals the net export of virtual water by India from the period of 2006 -2016, Rice contains the largest amounts of virtual water, followed by Buffalo meat, Maize, wheat, sugar,

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Cashew, Coffee, Groundnut, Tea, onion, pulses and sheep/Goat meat.

IMPACT OF VIRTUAL WATER TRADE

It is revealed from several studies that export of virtual water is much higher than import of virtual water in India. India has become a major water exporter since 1990. Such an Increasing trend may have remarkable effect on water resources. It is also revealed that per-capita availability of water is less than the minimum water requirement standard. Since 1990 onwards the import of virtual water in India was trivial. The net export of virtual water through rice only can lead to irreparable loss of water sustainability. If the pattern goes like this it will have a high impact on the water resources in India, sustainability will be question mark, whereas the future generations are the sufferers. It is important to take certain measures like practicing effective irrigation techniques, and find the way to reduce ground water consumption. It is also important to conserve the soil moisture, promoting locally-practiced conservation agriculture, maintaining the soil fertility, producing suitable crops according to the climate, type of soil it requires and based on the availability of water. We can adopt the techniques which supports water conservation and climate based agricultural production.

CONCLUSION

India is one of the largest exporter of virtual water due its specialty in producing larger quantity of agricultural goods production and exporting it to worldwide. Rice is considered as one of the major crop which had larger quantity of virtual water which is 40 percent. India is exporting highly and lowers the imports, due to which the hidden water which is called as virtual water is getting exported at larger quantity compare to other nations. As we know that India is also facing the problem of climate change along with other nations. This climate change causes declining trends in rainfall, shrinking of rainfall over all rainfall pattern had been changed in the recent years. This climate changes and shortage of rainfall may affect the production food and will affect the food sustainability. Thus, the virtual water export may affect the overall water sustainability of India. We can adopt the techniques which supports water conservation and climate based agricultural production.

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