

Chapter 15

Water Footprint and Virtual Water Trade of Cash Crops

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ABSTRACT

Virtual water flows (VWF) among states or countries have been proposed as a viable solution to mitigate water scarcity. The aim of this study is to assess the virtual water content and flows from India, for six cash crops, coffee, cotton, jute, sugarcane, tea, and tobacco, and their derived products over a period 1980-2013. The virtual water trade (VWT) estimates across three time periods show India to be a net exporter of virtual water for all the cash crops, except jute. The quantity of virtual water traded has increased over the decades with the increase in the quantum of crops traded. With free trade policies and the opening up of the economy, export quantities increased during the 1990s and the period thereafter, leading to larger virtual water exports. Sustainable agricultural practices for all crops, and in all countries, can help in reducing the water flow of these crops and help in controlling the water scarcity solution.

INTRODUCTION

Freshwater sustains life on earth, facilitating the functioning of the society, environment and the economy. With increasing population and undisciplined lifestyle, coupled with finite resources, countries across the globe are increasingly facing water shortage and water scarcity. Although India receives ample rainfall, groundwater resources are being depleted at a very fast rate to fulfill domestic and agricultural needs. Being traditionally an agriculture-based country and contributing to more than 60% employment and

DOI: 10.4018/978-1-7998-4990-2.ch015

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23% of GDP of the economy, the agricultural sector in India consumes more than 65-70% of freshwater and thus calls for ensuring sustainable use of water in this sector, to ensure food and livelihood security (Katyaini, 2016).

India produces a large number of food crops such as rice, maize, wheat, etc. as well as cash crops such as cotton, coffee, tea, sugarcane, jute, tobacco, etc. (Jain et al., 2007; Kumar & Jain, 2011).

However, such a large volume of production means the consumption of resources in large volumes too. But the supply of water is finite and is not uniformly distributed across regions. Water-rich countries could choose to trade real water with water-scarce countries. But this involves huge transportation costs due to large distances, making direct water transfers impossible. However, water could be traded indirectly, in the form of trade in water-intensive goods, where the water-rich countries could export water-intensive goods to the water-scarce regions and thus reap profits with their 'water wealth'. The water-scarce countries, on the other hand, could import such water-intensive goods instead of producing them, and achieve water security (Hoekstra, 2003).

This trade of 'embodied water' is known as *virtual water trade*. Professor Allan, in the early nineties, researched about the impending water crunch in the Middle-East region and witnessed import of water-intensive agricultural commodities taking place in the semi-arid regions and came up with the concept of 'virtual water', which refers to the water embedded in a product, or the volume of water required to produce a product. It follows the basic economic concept of comparative advantage, where a country with relative abundance in a resource is said to gain from trade in goods in which it has relative abundance. In this case, the water-rich countries are said to have relative abundance in the water resources (Hoekstra, 2003).

Closely associated with the concept of virtual water is the concept of water footprint (WF). The concept, coined by Arjen Hoekstra in 2002, is defined as "the measure of humanity's appropriation of fresh water in volumes of water consumed and/or polluted".

There have been various studies (Singh et al., 2004, Kumar et al., 2005, Kumar and Jain, 2007), that have focused on the VWT of India concerning agricultural commodities and livestock commodities. However, none of them have explicitly focused on the cash crops grown in India. With a growing inclination of farmers towards these cash crops, it becomes imperative to analyze the volume of water consumed in growing these crops and the quantum of virtual water traded through these cash crops. The current study considers six cash crops, namely coffee, cotton, jute, sugarcane, tea and tobacco for observing the trend of VWT during the pre-liberalization and post-liberalization phases of the Indian economy.

Literature Review

The concept of VWT has been of interest not only to economists but also to researchers of various fields such as engineering, ecology, geography, water sciences and the like. It can be looked at from a producer perspective or a user perspective. In the first case, virtual water is described as the volume of water that is used in producing a product, while the user perspective considers virtual water as the volume of water that would have been required had the product been produced at the same place where it has to be consumed (Hoekstra, 2003).

Over the years, various studies have been done to analyze the VWT patterns for different goods and at different scales and scopes. The Middle East and North Africa (MENA) region has been suffering from water insufficiency since the 1970s, making the production of food for domestic consumption difficult. According to Allan (2002), by 2000, 50 million tons of grain were being imported annually,

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