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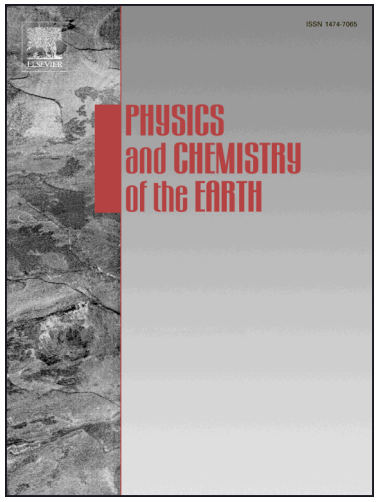

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An Input-Output table based analysis on the virtual water by sectors with the five northwest provinces in China

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Abstract: Virtual water refers to the volumes of water required to produce a commodity or service. It reflects human's actual consumption of water resources and therefore has certain significance in water resources management. Over the years, the concept of virtual water has caught the attentions of water manager and decision maker. In order to utilize this concept, the accounting and estimation of virtual water is the foundation that lies in this issue. Till now, the accounting methods mainly include the method provided by Food and Agriculture Organization of the United Nations (FAO), water footprint and Input-output analysis method. In this paper, we chose Northwest China, which is a typical arid region that is facing with rapid economic development, as the study area and built an Input-output (IO) analysis method to estimate virtual water among different industry sectors in the northwest China. The accounting and estimation results could be used to give suggestions to increase water use efficiency and promote virtual water trade in the study area. Comparison of the proposed method with other prevailing method was also analyzed. The introduced method could be utilized for accounting and estimation of virtual water by sectors, with its superiority in characterizing industrial water consumption and the accounting results could lend certain credence to the water resource management and industrial transformation for the future economic development of northwest China.

Key words: Virtual water accounting; Input-output analysis; Water resource management; Northwest China

1. Introduction

Virtual water and the related concepts reveal human's actual occupancy of water and are helpful for the water resources management. In the 1990s, Allen (1996) first brought about the concept of virtual water to be the water embedded in commodity. The concept of virtual water helps us realize how much water is needed to produce different goods and services (Guan and Hubacek, 2007; Velázquez, 2007).In semi-arid and arid areas, knowing the virtual water value of a good or service can be useful towards determining how best to use the scarce water available (Allan, 1998; 2003).One important term related to virtual water is the virtual water trade (Hoekstra and Hung, 2002). It refers to the hidden flow of water if food or other commodities are traded from one place to another (Hoekstra and Chapagain, 2007).Virtual water trade allows a new, amplified perspective on water problems: In the framework of recent developments from a supply-oriented to a demand-oriented management of water resources it opens up new fields of governance and facilitates a differentiation and balancing of different perspectives, basic conditions and interests

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