The impacts of technological improvements on water uses and virtual water trade in Uzbekistan

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Technological improvements and virtual water trade are two main options for enhancing water management in water scarce environments. The combined analysis of their effects on economic systems and water allocation have not been addressed. Furthermore, the diverse understanding of the virtual water concept and differing assessment techniques further complicate the debates surrounding the policy relevance of virtual water trade. This study applied Computable General Equilibrium (CGE) modeling approach to analyze the impacts of technological change on production, water uses and virtual water trade. Through this way, non-water determinants (labor, capital, fertilizer) of production and trade are included in virtual water assessment. Additionally, a novel method was developed to evaluating virtual water content and flows using the advantages of Input-Output methods within CGE framework. The quantification of the method is exemplified in the case of Uzbekistan (Central Asia) where water is a limited yet essential resource for sustainable economy and environmental systems. Data to build the Social Accounting Matrix and sector-specific water use accounts were obtained from statistical bulletins and reports of water and agricultural ministries in Uzbekistan. The findings reveal a high sensitivity of virtual water flows to technological changes. The study also shows that enhancing productivity in livestock and fodder crops production are advisable to reduce net virtual water exports and improve economic growth in Uzbekistan.