Authors:	KOKILA JAYARAM (/browse?type=author&value=KOKILA+JAYARAM)
Advisor:	Amit Kar (/browse?type=author&value=Amit+Kar)
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Abstract: The ‘water footprint’ of a product is the volume of freshwater used to produce it measured at the place where it was actually produced. The water footprint of a country is defined as the volume of water needed for the production of goods and services consumed by the inhabitants of the country. The concept was developed to provide an indicator of water use in relation to consumption, both from domestic production and imports. ‘Virtual water’ is water used in the production process but is not physically contained within the product. The two concepts are analogous and are quantified using similar metrics but provide distinct perspectives to understanding water use. The virtual water content of an agriculture product consists of ‘Green’ virtual water - rainwater that evaporated during production; ‘Blue’ virtual water - surface water or ground water that evaporated during production and ‘Grey’ virtual water - water polluted during production. The study attempts to estimate the water footprint for agriculture in India and the virtual water traded through cereals, pulses, oilseeds, cash crops, fruits and vegetables using secondary published data on production and trade. Estimates of virtual water were obtained using a modification of the method given by Hoekstra and Hung while the blue and green water components of virtual water were estimated following the method proposed by Chapagain and Orr. Total water used for agriculture production in India in the year 2007-08 was estimated at 962.17 billion cubic metres (bcm). The water footprint for consumption from domestic production was estimated to be 911.25 bcm, accounting for 95 per cent of the total agricultural water footprint. India was a net exporter of virtual water (50.91 bcm). Cereals leave a large water footprint, both in terms of domestic consumption and virtual water imports. One tonne of rice was produced using an average of 3571.91 m3 of water in India. The kharif season average was 3650.62 m3 and the rabi season average was 3279.20 m3 . Among the States, Maharashtra left the largest agriculture water footprint estimated at 80.95 bcm, accounting for 8.88 per cent of the country’s agriculture water footprint. Per capita water footprint in the country was estimated to be 76,547 litres. The Gini coefficient for State-wise per capita water footprint was 0.388 indicating inequity in distribution of water used for crop production. Virtual water, which establishes the ‘invisible link’ between the consumers and the producers, was positive for cereals, pulses, oilseeds and vegetables, indicating a net outflow of water. It was negative for fruits and cash crops. Certain crops and their products that are traded in large quantities and also had large water footprints are critical in terms of virtual water flows. Estimates indicated that India was inefficient in using water in the production of key products that it exports thereby leading to a loss in global water resources. Rice and products contributed the largest share to virtual water trade and India was an inefficient user of water in rice production. The total water demand for domestic consumption of agriculture produces was estimated at 911.25 bcm. Total annual utilizable water resource was estimated at 1123 bcm. Only 80 per cent of this was available for use in agriculture and the quantity is decreasing fast. The water scarcity index showed that with 80 per cent of water availability, the index was 1.01 and it increased to 1.35 if the water availability declined to 60 per cent of the total annual utilizable water resources, clearly reflecting the increasing water shortages faced in the country. The net virtual water flow was estimated at 24.93 bcm. The dependency index was a small positive value of 0.03, indicating very little dependence on virtual water inflows. The country is an exporter of virtual water, in absolute terms. Even with virtual water inflows not being available, India was still self sufficient to meet domestic demand for crop production. Gujarat, Rajasthan, Maharashtra, Madhya Pradesh, Punjab and Haryana show high dependence on blue water using it to meet more than 75 per cent of the crop water requirement in more than 50 per cent of crops. Majority of States show moderate dependence and three show low dependence on blue water. It was also observed that a kharif crop grown in rabi such as rabi rice, rabi maize, and rabi sunflower required more water, mostly blue water. Thus there is a tradeoff between producing a crop with more water in kharif or less water in rabi but most of it being blue water. The economic value of water was the highest when used for production of onion and lowest for sugarcane. Water was valued ten times higher in onion production relative to any of the cereals, pulses or oilseeds. The opportun

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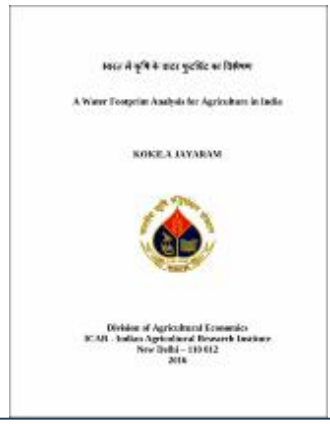

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