# Estimation of Water Footprint of Black Tea Production: A Case Study in Madulsima Plantations PLC, Badulla, Sri Lanka

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# ABSTRACT

Water is an economic commodity as the availability of clean fresh water in short supply. Most water resource experts now agree that inadequate water management, rather water shortage, is the primary cause of water conflicts. Meanwhile the virtual water concept has become popular in estimating the amount of water used in the production of goods or services, linking framework to find potential solutions and contributing to improved water resource management. Water footprint is a tool to calculate the amount of water that is consumed and polluted in all stages of a production process. Generally, three types of water are considered in water footprint calculations; green water, blue water and grey water. The present study was conducted to estimate the water footprint of black tea production at two tea estates of Madulsima Plantations PLC. Green water footprint of tea was calculated using CROPWAT 8.0 model. Blue and grey water footprint of black tea were calculated following the guidelines in the Water Footprint Assessment Manual. The results revealed that, the virtual water content of black tea production of Madulsima Plantations PLC was 4270.69 $m^3$ / ton / year. Further the green water footprint for evapotranspiration of tea was 1090.7 mm / year. The total green water content in black tea of the studied two estates was 3227.68 $m^3$ / ton and it is three times less than that of the average value of Sri Lanka while much less than those of China, India, and Kenya as available in the scientific literature. Further the blue water footprint of black tea production of these estates was 1.23 $m^3$ / ton and it is negligible when compared with China and India. The grey water footprint of tea cultivation practices in these estates was 1041.78 $m^3$ / ton and it is also less than those average values of the Sri Lanka and China. However, the grey water footprint of the studied two estates can be potentially reduced by incorporating organic cultivation concept in the long run.

**Keywords:** Black tea production process, CROPWAT 8.0 model, Cultivation practices, Virtual water content, Water Footprint Assessment Manual