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A preliminary estimation of green water footprint of rice using MODIS data

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Water Footprint (WFP) is a recently developed indicator to identify the usage and distribution of the fresh water resource. Among Green, Blue and Gray WFPs, Green WFP is referred to total rainwater evapotranspiration plus the amount of water incorporating in a product, and is the main indicator of contribution of water usage introduced in agricultural and forestry product. Rice is the main crop in Taiwan, and the irrigation water withdrawn from ground or surface water (i.e. Blue water) to the rice paddle is the most significant consumption part of fresh water. In order to comprehensively understand the total amount of water used during rice growing stage, in addition to Blue water, it is critical to further identify the amount of Green water.

However, to measure the crop evapotranspiration (i.e. Green water) is critical due to redundant and costive field measurement. To achieve this, firstly, it is proposed to develop an integrated hardware system to collect rainfall and also to acquire evapotranspiration on the test paddy site. Therefore the blue and green WFPs can be determined and treated as ground truth. Secondly, this study would like to apply remote sensing technique incorporating moderate-resolution imaging spectroradiometer (MODIS) image data to facilitate the measurement of crop evapotranspiration, and eventually to estimate the green WFP of rice. The green WFP derived from two methods are evaluated to obtain a robust estimated evapotranspiration. The results are expected to quantity the visual water of the rice and for reference in water resource, agricultural management and land use planning.