

## EVAPOTRANSPIRATION AND WATER DEMAND ANALYSIS FOR COFFEE FARMS IN THE UPPER SANTA MARÍA RIVER

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The Santa María River watershed is considered a priority watershed for its high economic and environmental importance in Panama. Coffee cultivation is one of the main productive systems that guarantees food security in the upper basin; however, the production of this crop has faced various challenges in the past years. Although water availability is considered to be enough at the watershed level, the water availability and precipitation patterns at field level present a notable spatial and temporal variability, without a certain understanding on specific water requirements. Irrigation systems are not commonly used in agricultural lands in this region, but its application is considered to potentially optimize agricultural production.

Evapotranspiration is a factor of great importance to understand water deficit and the necessity of an irrigation system. In this research, the evapotranspiration of coffee was analyzed to calculate the water demand in three coffee farms. Reference evapotranspiration (ET<sub>o</sub>) was estimated and compared using two methods: the Penman-Monteith method and ET<sub>o</sub> models from satellite images. Then crop evapotranspiration (ET<sub>c</sub>) was obtained to estimate the water requirements. ET<sub>o</sub> was obtained by analyzing data from meteorological stations and satellite images of the METRIC EEFLUX model, the comparison the data presented a coefficient of determination (R<sup>2</sup>) of 0.38. In calculating the irrigation requirements of the coffee plant, InfoStat was used for statistical analysis with data from the ETESA station at a probability of occurrence of 90% of ET<sub>o</sub> and precipitation, where lower values were found in December and higher in March (0.48 and 0.71 l / s / ha). These results suggest that in order to establish an optimal production of coffee in the dry season, it will be necessary to apply irrigation systems, since effective precipitation is not enough to supply water requirements.

**PRESENTER BIO:** Mgtr. De Leon is the Principal Investigator in the “Guaranteeing Water Security in the Mountain Forests and Wetlands of the Santa Maria River Basin” a 2.5-year research project on water allocation analysis. He holds a master’s degree in Agricultural and Biological Engineering and a Bachelor of Environmental Engineering.