

# A REMOTE SENSING ANALYSIS ON CROP WATER PRODUCTIVITY OF PADDY FARMING: A CASE STUDY OF KALA OYA BASIN

W.M.S.S. Dias<sup>1\*#</sup>, W.B.M.R.S. Basnayaka<sup>2</sup>, and D.M.L. Dissanayake<sup>2</sup>

<sup>1</sup>Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

<sup>2</sup>Faculty of Arts, University of Peradeniya, Peradeniya, Sri Lanka

\*Correspondence E-mail: mihirdias@gmail.com, Phone: +94779414936

#Presenting Author

**Abstract:** Sri Lanka is an agrarian country that relies on paddy cultivation in the Dry zone. Yala season determined on tank water and cascade systems have been impacted by recent drought conditions highlighting the importance of water resource management and food security. Crop Water Productivity (CWP) plays a crucial role in ensuring the equilibrium between crop yield and water consumption. This research employed Remote Sensing (RS) and Geographic Information System (GIS) to analyse the CWP of paddy in 2022-Yala season in Kala Oya basin, covering 2,873 km<sup>2</sup>, with approximately 560 km<sup>2</sup> paddy land. The study mainly used Net Primary Production (NPP) data, Actual Evapo-Transpiration and Interception (ETIa), and land use data obtained from the Wapor Portal and ESA World Cover, and occupied mapping analysis, buffer analysis, and zonal statistical analysis with the Model Builder within ArcGIS. The mapping analysis revealed that eastern, central, and western regions of the catchment in proximity to Kala Wewa, exhibited high paddy yields while the southeastern part of the basin, closer to Dewahuwa and Ibbankatuwa Wewa, demonstrated a higher CWP. Notably, central and western parts of the basin, in the vicinity of Rajangana and Angamuwa Wewa, showed optimal conditions characterised by low CWP and high yields. Moreover, a declining trend of average CWP and yield was displayed with the distance from irrigation canals and streams. Paddy yield within the canal buffer ranges from 0.166 kg m<sup>-2</sup> (100 m) to 0.159 kg m<sup>-2</sup> (500 m), while the stream buffer exhibits yield from 0.160 kg m<sup>-2</sup> (100 m) to 0.152 kg m<sup>-2</sup> (500 m). Similarly, CWP for the canal buffer varies from 0.442 kg m<sup>-3</sup> (100 m) to 0.428 kg m<sup>-3</sup> (500 m) and for the streams from 0.424 kg m<sup>-3</sup> (100 m) to 0.409 kg m<sup>-3</sup> (500 m). In conclusion, the study emphasises the significance of water source proximity, specifically tank water and cascade systems, influencing CWP and paddy yield within the Kala Oya basin. To optimise CWP in the basin necessitates an expansion of the irrigation network within cascade systems and continuous monitoring of the CWP and yield. Further, to gain a comprehensive understanding on paddy CWP within the tank cascade systems, an extended long-term spatial analysis is necessary.

**Keywords:** Crop water productivity (CWP); Kala oya basin; Paddy cultivation; Remote sensing; Yield