

Master Thesis

Precipitation, Yields and Irrigation Water Demand in Dry Season Paddy Rice Cultivation:

A 30-Year Case Study of the Prast Pram Irrigation System, Cambodia (1990-2020)

Author:

Jennifer Danneck

jennifer.danneck@gmx.de

Abstract

This study investigates dry-season paddy rice cultivation from 1990 to 2020 in the Prasat Pram Irrigation System, a representative irrigation-dependent farming area in northwest Cambodia. Paddy rice is among the most water-intensive crops, and its dry-season cultivation is particularly prone to yield losses due to water scarcity. This poses significant challenges for local farming communities that rely on rice as a primary source of livelihood and food security. Against the backdrop of existing water scarcity and limited empirical data for the region, the study aims to assess trends in precipitation, irrigation water demand (*IWD*), reservoir water availability, and paddy yields to inform climate-resilient agricultural planning. Using *CHIRPS* precipitation data and the *SWAT+ Paddy Rice Module* — implemented via *SWATbuildR* script in *R* — the study models hydrological dynamics and yields at a local scale. The results reveal low paddy yields (average 0.4 t/ha), high *IWD* with peak values in November and December, and a critical shortage of reservoir water throughout the dry season. No statistically significant long-term trends were identified in precipitation, *IWD*, or yields, partly due to high interannual variability. The findings also underscore the importance of improving model resolution, data quality, and statistical methods in future research and planning efforts.