

**Month: JULY-DECEMBER / Year: 2023**

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| **Task No.** | **Description** | **Due/ Duration** | **Status** |
| **PART 1** | **Dataset**   * Acquisition of required data for the study. * Data cleaning, subset dataset, filter between 2018 to 2022 * Masking based on cropland cover for the years of study. * Cloud masking and performing atmospheric corrections etc. * And Data fusion between sentinel and Modis dataset to be used in crop phenology determination. | |  | | --- | |  | |  | |  | |  | | |  | | --- | | **In progress** | |  | |  | |  | |
| **PART 2** | **Plant Phenology determination**   * Extract plant phenology from vegetation indices and generate an EVI curve depicting days of the year for maize growing. Including start of season, mid-season and end of season; throughout the year. * Use this period to further subset the dataset in part1. * Compare the periods with existing ground information, and literature.   (Output: EVI curves for the years 2018 to 2022, and a mean curve) | |  | | --- | |  | |  | |  | | |  | | --- | |  | |  | |  | |
| **PART 3** | **Yield Estimation/Calculation (RS Methods)**   * Generation of NDVI at 10,20m resolution from sentinel dataset to be used in this section. * Determination of Harvest index from NDVI values pre- and post-harvest for each season. * Determination of APAR for the study area and for the study period. * Calculations related to Light use Efficiency. * Biomass estimation - for each season and each year. * Yield calculation – seasonal and yearly averages.   (Major Output: Before and After Harvest NDVI for 2018-2022, yield seasonal and yearly statistics, map showing yield distribution of maize per phenological period) | |  | | --- | |  | |  | |  | |  | |  | |  | | |  | | --- | |  | |  | |  | |  | |  | |  | |
| **PART 4** | **Evapotranspiration Estimations**  **D**etermination of plant water requirement values including reference evapotranspiration ETo, and Etc.  (Major output: ET Statistics for reported ET values and estimated values, (Graphs and Maps showing spatial distribution) | |  | | --- | |  | |  | |  | | |  | | --- | |  | |  | |  | |
| **PART 5** | **Crop Water Productivity Estimation**   * Using ET values/statistics and Yield estimates to calculate CWP per season, and annual average for the years 2018 to 2022. * Compare RS based CWP estimates and Actual CWP values. Actual CWP to be measured from actual ET and yield average for the whole scheme.   (Major Output: CWP spatial distribution maps, and CWP statistics) | |  | | --- | |  | |  | |  | |  | | |  | | --- | |  | |  | |  | |  | |
| **PART 6** | **Machine Learning Estimation:**   * **P**reparation of necessary indices that assess vegetation condition, soil moisture, evapotranspiration related indices and vegetation density indices. * Generation and binding of ML training and testing datasets * Model development for and training using the same dataset with filtered predictor variables. SVM, RF, and xgboost applied in this section. * **M**odel Selection and accuracy evaluation (RMSE, R2 * CWP estimation from the selected model.   **(Major Outputs:**  ML statistics including model selection, Prediction variables and accuracy assessment. Maps of estimated ET, Yield, and CWP from ML model. Comparison with actual values for 2022) | |  | | --- | |  | |  | |  | |  | |  | |  | | |  | | --- | |  | |  | |  | |  | |  | |  | |
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