VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANA SANGAMA CAMPUS, BELGAVI - 590018

MINI-PROJECT
REPORT

"MONTHLY MODELING GROUNDWATER DYNAMICS IN COASTAL AQUIFERS OF DAKSHINA KANNADA WITH A PYTHON FRAMEWORK"

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD DEGREE OF

BACHELOR OF ENGINEERING

IN

AGRICULTURE ENGINEERING

SUBMITTED BY

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DEPARTMENT OF AGRICULTURE ENGINEERING

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CERTIFICATE

This is to certify that the Mini-project work entitled "MONTHLY MODELING GROUNDWATER DYNAMICS IN COASTAL AQUIFERS OF DAKSHINA KANNADA WITH A PYTHON FRAMEWORK" is the Bonafede work carried out by

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In partial fulfilment for the award of the Bachelor of Engineering in Agriculture Engineering of **Visvesvaraya Technological University, Belagavi** during the Academic year 2023-24. It is certified that all correction and suggestions indicated for internal assessment have been incorporated in report deposited in the department library. The project report has been approved as it satisfies the academic requirement in respect of project work prescribed for the said degree.

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ABSTRACT

Groundwater resources are a critical component of the hydrological cycle, especially in coastal regions where they serve as the primary source of fresh water for agricultural, domestic, and industrial purposes. The dynamic nature of coastal aquifers in Dakshina Kannada, a district in Karnataka, India, presents unique challenges due to factors such as seasonal variability, anthropogenic activities, and climate changeimpacts. This project aims to model the monthly groundwater dynamics in the coastal aquifers ofDakshina Kannada using a robust Python-based framework, with a specific emphasis on the application of Pastas (Python package for the Analysis of Spatio-Temporal Aquifer Systems). The primary objective of this study is to develop a comprehensive understanding of the temporal fluctuations in groundwater levels and to identify the key drivers influencing these changes. To achieve this, we utilize an extensive dataset comprising monthly groundwater level measurements, meteorological data (including precipitation and evapotranspiration), and land use patterns spanning several years. The Pastas software is employed to create time series models that simulate the groundwater level dynamics, allowing for the evaluation of various hydrological processes and their interactions. The modeling approach involves the calibration of Pastas models to fit the observed groundwater level data, followed byvalidation to ensure the accuracy and reliability of the predictions. Key technical components include the selection of appropriate model structures, parameter estimation techniques, and the incorporation of stressors such as pumping rates and recharge events. Sensitivity analysis is performed to determine the influence of different parameters on model outputs, providing insights into the most significant factors affecting groundwater levels.