DECLARATION

I, hereby declare that this thesis entitled **"Hydrological Approach for Conservation and Management of Water for Sustainable Rice Production in Kole Lands of Thrissur**" is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

Place: Tavanur

Date**:**

CHETHAN B J

(2019-28-003)

CERTIFICATE

Certified that this thesis entitled **"Hydrological Approach for Conservation and Management of Water for Sustainable Rice Production in Kole Lands of Thrissur"** is a bonafide record of research work done independently by **Mr. Chethan B J (2019-28-003)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.

Place: Tavanur

Date:

Dr. Shyla Joseph
(Major Advisor, Advisory Committee)
Professor, ARS Chalakudy

CERTIFICATE

We the undersigned members of the Advisory Committee of **Er. Chethan B J (2019-28-003**) a candidate for the degree of **Doctor of Philosophy** in Agriculture Engineering with major in Soil and Water Conservation Engineering, agree that the thesis entitled "**Hydrological Approach for Conservation and Management of Water for Sustainable Rice Production in Kole Lands of Thrissur"** may be submitted by **Er. Chethan B J**, in partial fulfilment of the requirement for the degree.

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DEDICATION

This thesis is dedicated to ***Farmers of Kole Lands*** *and my beloved* ***Family,*** *who sacrificed much to bring me up to this level, with their unwavering support.*

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Chethan B J

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SYMBOLS AND ABBREVIATIONS

%	:	Percentage
°	:	Degree
/	:	Per
'	:	Minute
&	:	And
95 PPU	:	95 Percentage Prediction Uncertainty
etc	:	et cetera
et al.	:	and others
2D	:	Two dimensional
3D	:	Three dimensional
ALPHA_BF	:	Base flow alpha factor
AMC	:	Antecedent Moisture Condition
Am.	:	American
Appl.	:	Applied
ARS	:	Agricultural Research Service
ARC GIS	:	Aeronautical Reconnaissance Coverage- Geographic Information System
ASTER DEM	:	Advanced Space borne Thermal Emission and Reflection Radiometer DEM
Bio.	:	Biology/Biologica
CARTOSAT	:	Cartographic Satellite
CH_K2	:	Effective hydraulic conductivity in main channel alluvium
CPU	:	Computer Programming Unit
CN2	:	Curve Number with AMC-II
Conserv.	:	Conservation
Curr.	:	Current
DEM	:	Digital Elevation Model
Drain.	:	Drainage

Eng.	:	Engineering
Environ.	:	Environment/Environmental
Eq.	:	Equation
ERDAS	:	Earth Resources Data Analysis System
ESCO	:	Soil Evaporation Compensation Factor
ET	:	Evapotranspiration
Exp.	:	Experiment/Experimental
Fig.	:	Figure
FRL	:	Full Reservoir Level
GB	:	Giga Byte
GIS	:	Geographic Information System
GPS	:	Global Positioning System
GLUE	:	Generalized Likelihood Uncertainty Estimation
GW_Delay	:	Ground water delay time
GW_Q	:	Ground water contribution to stream
GWQMN	:	Threshold depth of water in shallow aquifer
hp		Horse Power
ha	:	Hectare
ha-m^3	:	Hecatre cubic meter
HRU	:	Hydrological response unit
Hydrol.	:	Hydrology
IDW	:	Inverse Distance Weighted
Int.	:	International
ILWIS	:	Integrated Land and Water Information System
IRS	:	Indian Remote Sensing
Irrig.	:	Irrigation
IRS LISS	:	Indian Remote Sensing Linear Imaging Self Scanning Sensor
ISRO	:	Indian Space Research Organization
KAICO	:	Kerala Agro Industries Corporation

KCAEFT	:	Kelappajji College of Agricultural Engineering and Food Technology
KLDA	:	Kole Land Development Agency
KLDC	:	Kerala Land Development Corporation
KML	:	Keyhole Markup Language
km	:	Kilometre
km^2	:	Square Kilometre
K_2O	:	Potassium oxide
KSEB	:	Kerala State Electricity Board
LANDSAT	:	Land Satellite
m	:	Meter
m^2	:	Square Meter
m^3	:	Cubic Meter
m^3h^{-1}	:	Cubic Meter per hour
$m^3\ s^{-1}$	:	Cubic Meter per second
mm day^{-1}	:	Millimetre per day
mm h^{-1}	:	Millimetre per hour
Mm^3	:	Million cubic meter
MILP	:	Mixed integer Linear Program
Parasol	:	Parameter solution
PBIAS	:	Percent bias
PERC	:	Water that Percolates below root Zone
PET	:	Potential Evapotranspiration
pH	:	Potential of hydrogen
P_2O_5	:	Diphosphorus pentoxide
PLSR	:	Partial Least Squares Regression
PSO	:	Particle Swarm Optimization
NDWI	:	Natural Difference water Index
NRSC	:	National Remote Sensing Centre
NSC	:	Nash–Sutcliffe Coefficient

RAM	:	Random Access Memory
RS	:	Remote Sensing
R^2	:	Coefficient of Determination
Res.	:	Research
Resour.	:	Resource
Rev.	:	Review
RMSE	:	Root Mean Square Error
SOI	:	Survey of India
SCS	:	Soil Conservation Service
SPSS	:	Statistical Package for The Social Sciences
SRTM	:	Shuttle Radar Topography Mission
SWAT	:	Soil and Water Assessment Tool model
Sci.	:	Science/Sciences
SOL_AWC	:	Available Water holding capacity of soil
SOL_K	:	Soil hydraulic Conductivity
SOL_Z	:	Depth from soil surface to bottom of layer
SPAW	:	Soil Plant Atmosphere Water
SUFI2	:	Sequential Uncertainty Fitting
SURQ	:	Surface Runoff
SWATCUP	:	SWAT Calibration and Uncertainty Programs
SPAW	:	Soil Plant Atmosphere Water
SWC	:	Soil Water Characteristics
SWAT-CUP	:	SWAT Calibration and Uncertainty Program
SW	:	Southwest
USDA	:	United States Department of Agriculture