SOIL WATER BALANCE MODEL OVER CHITTAR SUBBASIN, TAMILNADU.

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OUTLINE

- **1.** Background information
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- **5.** Calibration and Validation
- 6. Results and Discussions



1.INTRODUCTION

A water balance model, also called a mass balance model, is an application of conservation of mass to a particular spatial unit.





Tally the soil water balance as

 $SW_n = \Sigma_i SW_{n-1} + \Sigma_i$ (precipitation – SURQ – ET – LATQ – GWQ)

LATQ - Lateral flow contribution to reach

GWQ - Groundwater discharge into reach

SURQ - Surface runoff generated during time step

ET - Actual evapotranspiration in watershed

i - time interval and n - number of days



2.0BJECTIVES

Developing monthly water balance model for the Chittar subbasin.

The model is calibrate/validated with the Gauge Discharge.

Understanding the spatial and temporal distribution of evapotranspiration, evaporation, Infiltration, Soil moisture and groundwater level fluctuation over the catchment area.



KEY MAP





3.METHODOLOGY



4.INPUT VARIABLES

Data	Source		
Topography map Cartosat-DEM			
Landuse map	Satellite imagery		
Soil Texture map			
Gauge Discharge	india - WRIS		
Meteorological	Global weather data		
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GIS INPUT VARIABLES







5. CALIBRATION AND VALIDATION





Parameter Name	Fitted_Value	Min_value	Max_value
RCN2.mgt	-0.041	-0.1	0.1
VALPHA_BF.gw	0.355	0	1
AGW_DELAY.gw	187	0	200
AGWQMN.gw	1790	0	2000
RGW_REVAP.gw	0.0983	0.02	0.2
RSOL_AWC().sol	9.900001	-10	10
RSOL_K().sol	-0.9	-10	10
RSURLAG.bsn	49.25075	0.05	50
RCH_K2.rte	192.5061	0.01	500
RCH_N2.rte	0.05275	0.01	0.2
RREVAPMN.gw	452.5	0	500
RESCO.hru	0.965	0	1



Calibration period of 2001-2010							
p-factor	r-factor	R2	NS	bR2	PBIAS	KGE	RSR
0.24	0.45	0.68	0.62	0.32	-8	0.53	0.62

Validation period of 2011-2013							
p-factor	r-factor	R2	NS	bR2	PBIAS	KGE	RSR
0.61	1.95	0.36	0.31	0.18	-0.7	0.57	0.83



6.RESULTS & DISCUSSIONS

- 1. Precipitation, Surface runoff, Lateral runoff, Groundwater recharge, Evapotranspiration and Soil water content are used.
- 2. Surface runoff, Lateral Runoff are purely depend upon the precipitation. Where October and November are higher fluctuations.
- 3. Groundwater recharge happens after the runoff occurs, month of December usually occurs.
- 4. Evapotranspiration are interdependent on others where it happens more in summer season.
- 5. Soil water content denotes the higher after the recharge and runoff.
- 6. Precipitation will be major account of water balance model.
- 7. Surface runoff and Evapotranspiration will be major loss of water balance model.

$$M_{100}^{150} = M_{100}^{100} = M_{100}^{10} = M_{100}^{100} = M_{100}^{10} = M_{100}^{100} = M_{100}^{10} = M_{100}^{10} =$$

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Soil Water balance: 2001-2013

- From the water balance model, it varied from low as -120 and high as 210 mm/month of soil water content over the catchment.
- Almost the movement of soil water content over the catchment regular fluctuation within the month period.
- As per north west monsoon, October to December suddenly increase the soil water content due to precipitation contribution.
- Except 2001, 2008, and 2011 of soil water content is slightly upward on March to July, it combines the Summer and touch the South west monsoon.
- As totally, 846 mm/month (2001-2013) approximately is stored at the chittar catchment.







Thank you

