HYDROLOGICAL CYCLE SIMULATION OF KODAVANAR RIVER (ATHUR BLOCK) WATERSHED USING SOIL AND WATER ASSESSMENT TOOL (SWAT)

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Objectives

- Development of hydrologic response units (HRUs) based on the land use and soil distributions.
- Simulation of hydrologic model ,verification and validation.

Study Area

- The study area chosen for this study is Attur block in Dindigul district and it's traversed by Kodavanar River. This block is located in the southern side of dindugul district and bounded by Vadipatti and Nilakottai in south and south east, Dindugul block in the east, Reddiyapuram in the north and Kodaikannal in the west. The area lies between geographic co-ordinates, north latitude 10° 14'50" to 10° 20'00" and east longitude 77°37'45" to 77°46'00". The extent of area is 321.44 sq km.

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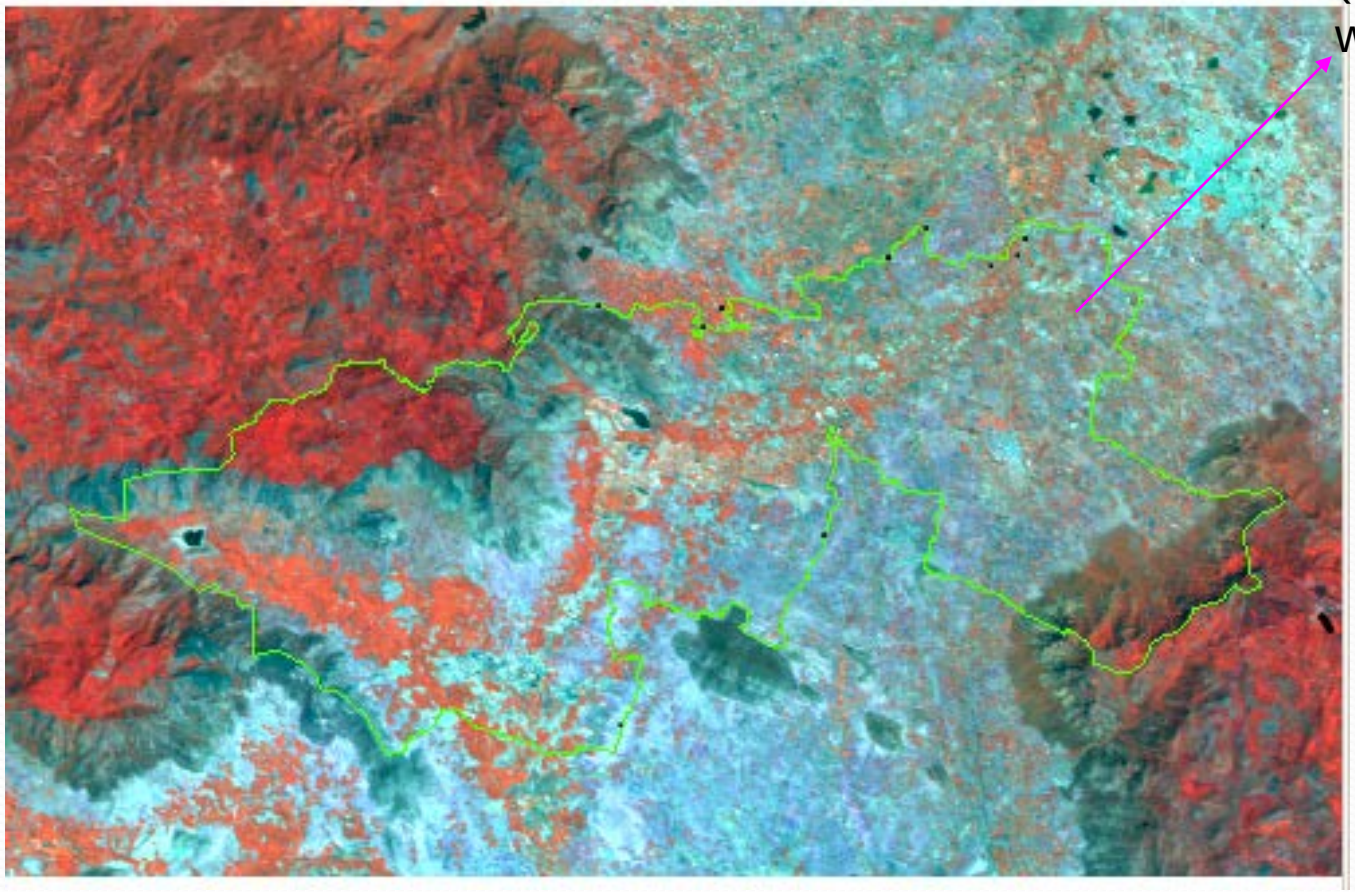
ATTUR BLOCK (Kodavanar watershed)



IRS IC -LISS 111+PAN merged data - scale1:50,000

Data Used

- Spatial data:
  - DEM(Digital Elevation Model)
  - Land use/land Cover Map
  - Soil Map
- Non-Spatial data:
  - ***Time series of certain meteorological variables***
  - ***Soil input data base***
  - ***Land cover/ Plant growth data base***

SWAT Model Description

- Soil and Water Assessment Tool
- Developed by USDA-Agriculture Research Service
- Physically based model
- Continuous time model (long term yield model)
- SWAT was developed to predict the impact of land management practices on water , sediment and agricultural chemical yields in large complex watersheds with varying soils, land use and management conditions over a long periods of time.

Methodology Flow Chart

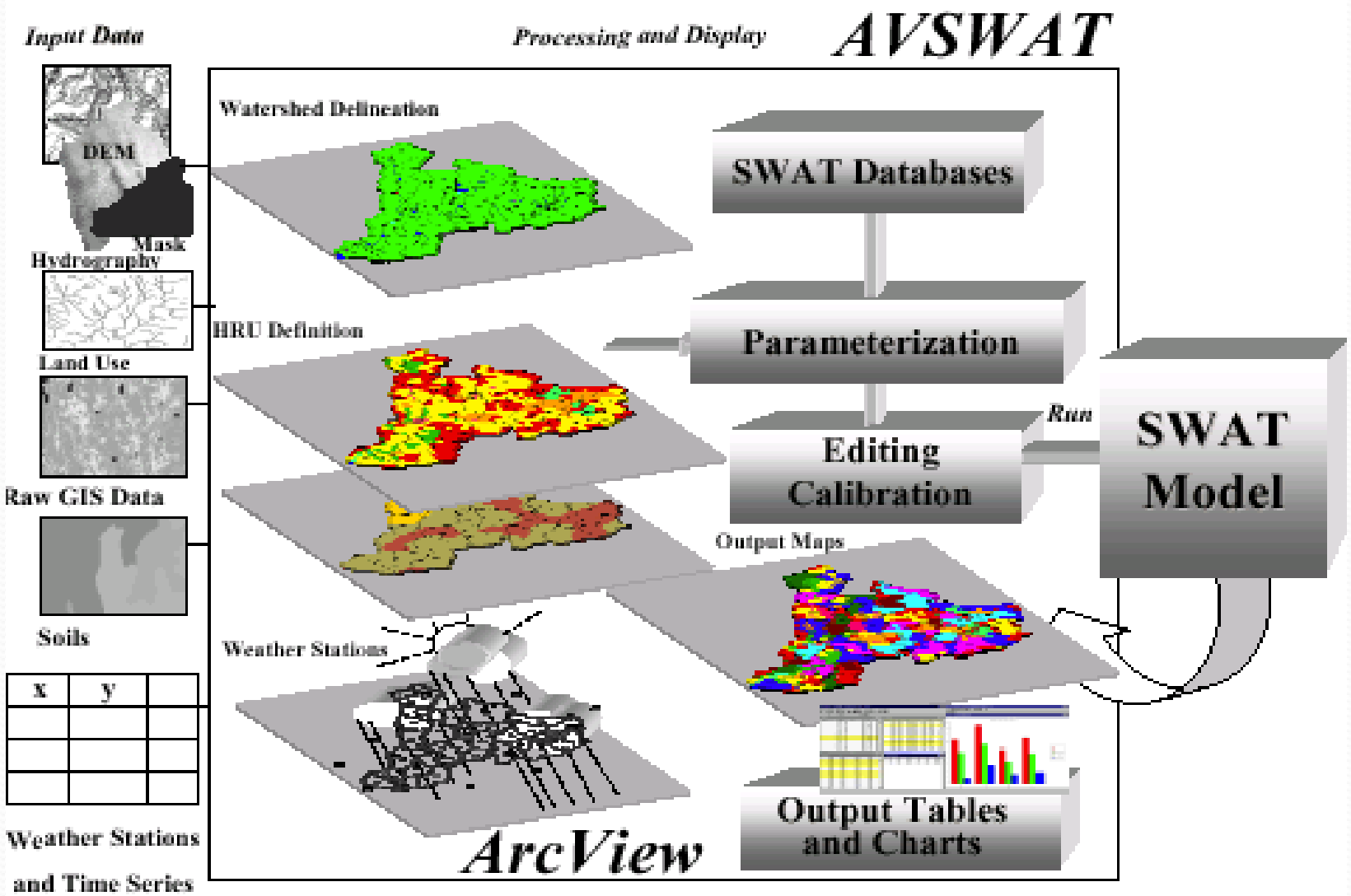
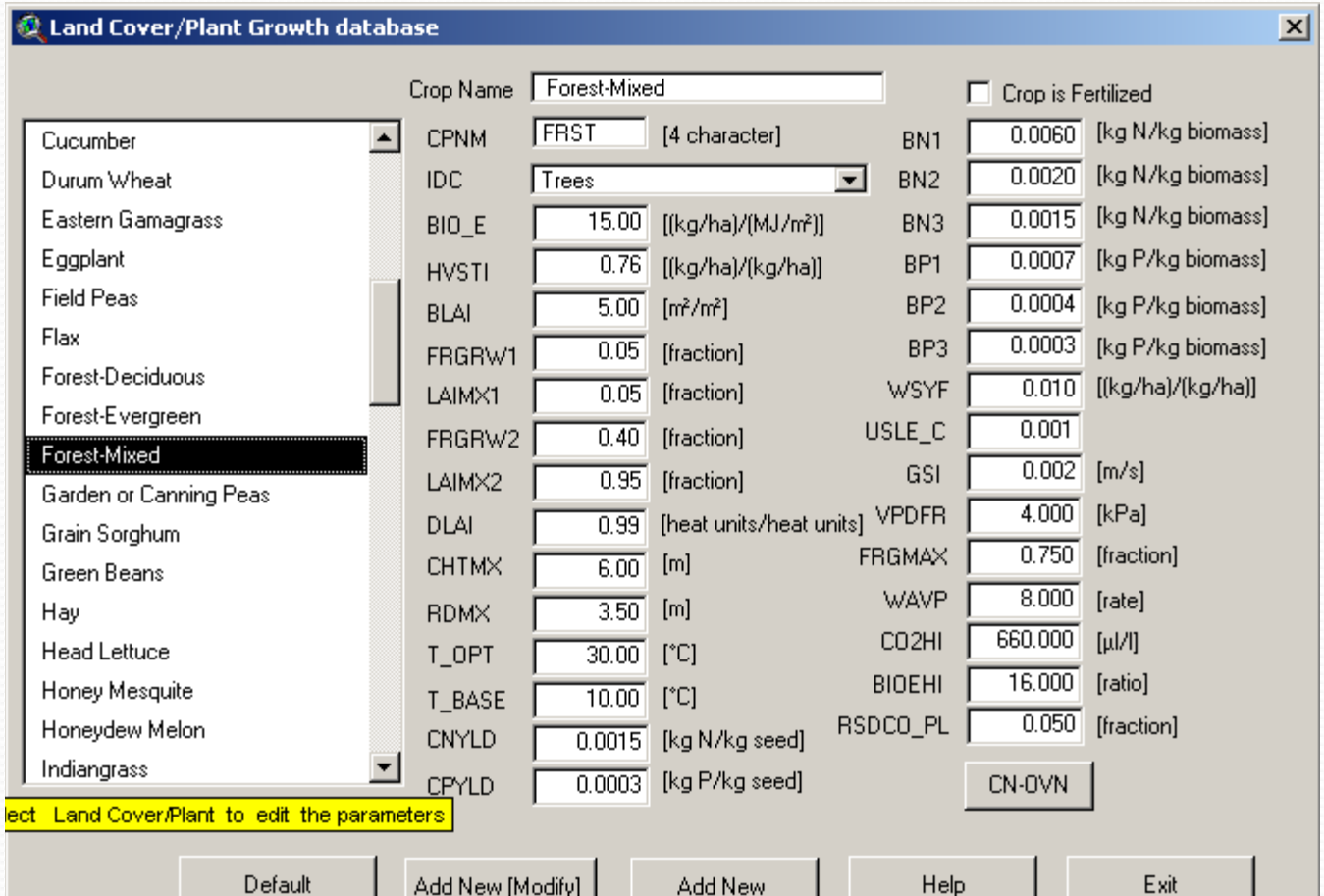


Figure 1.1

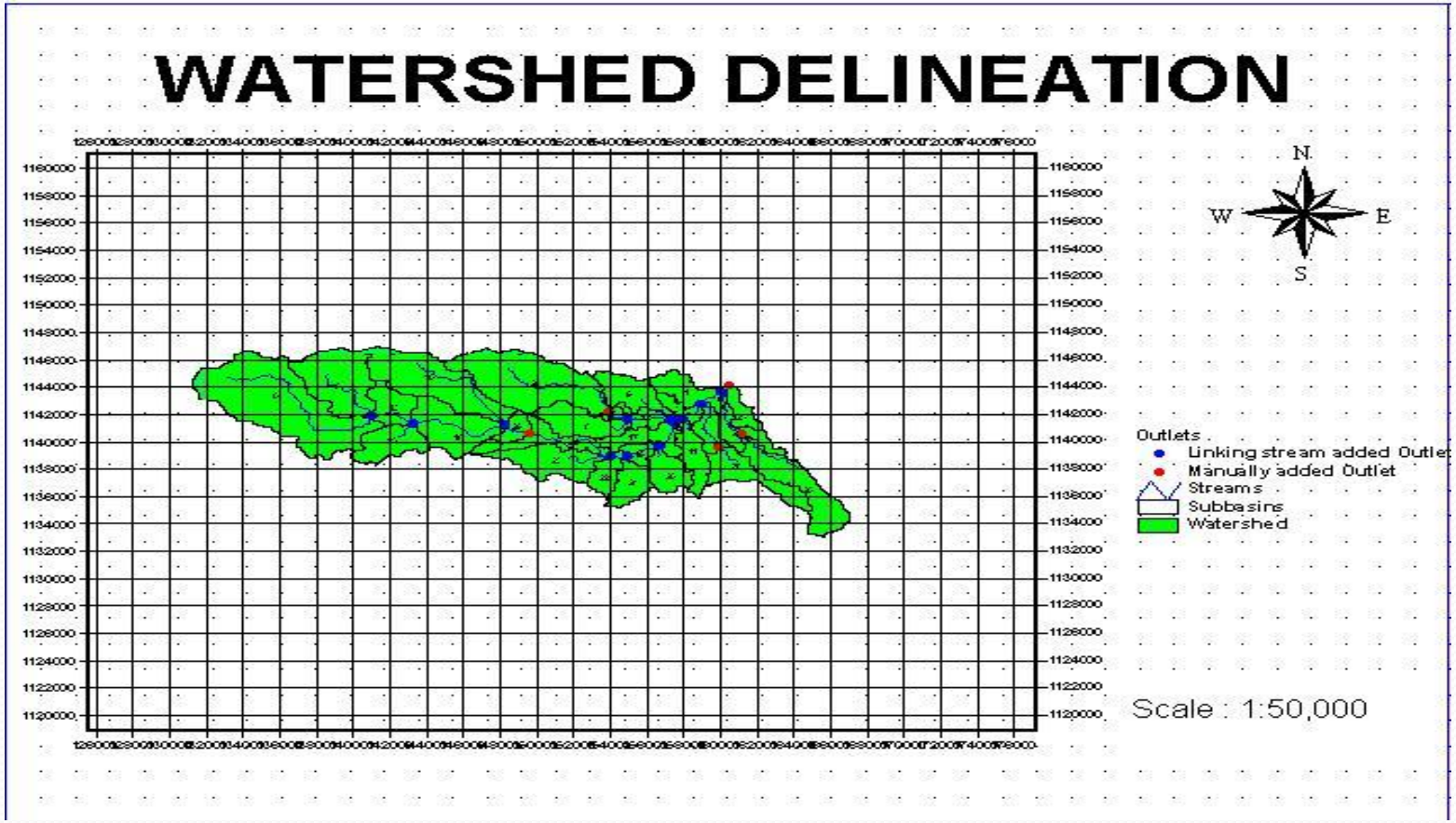
Methodology

- Step 1

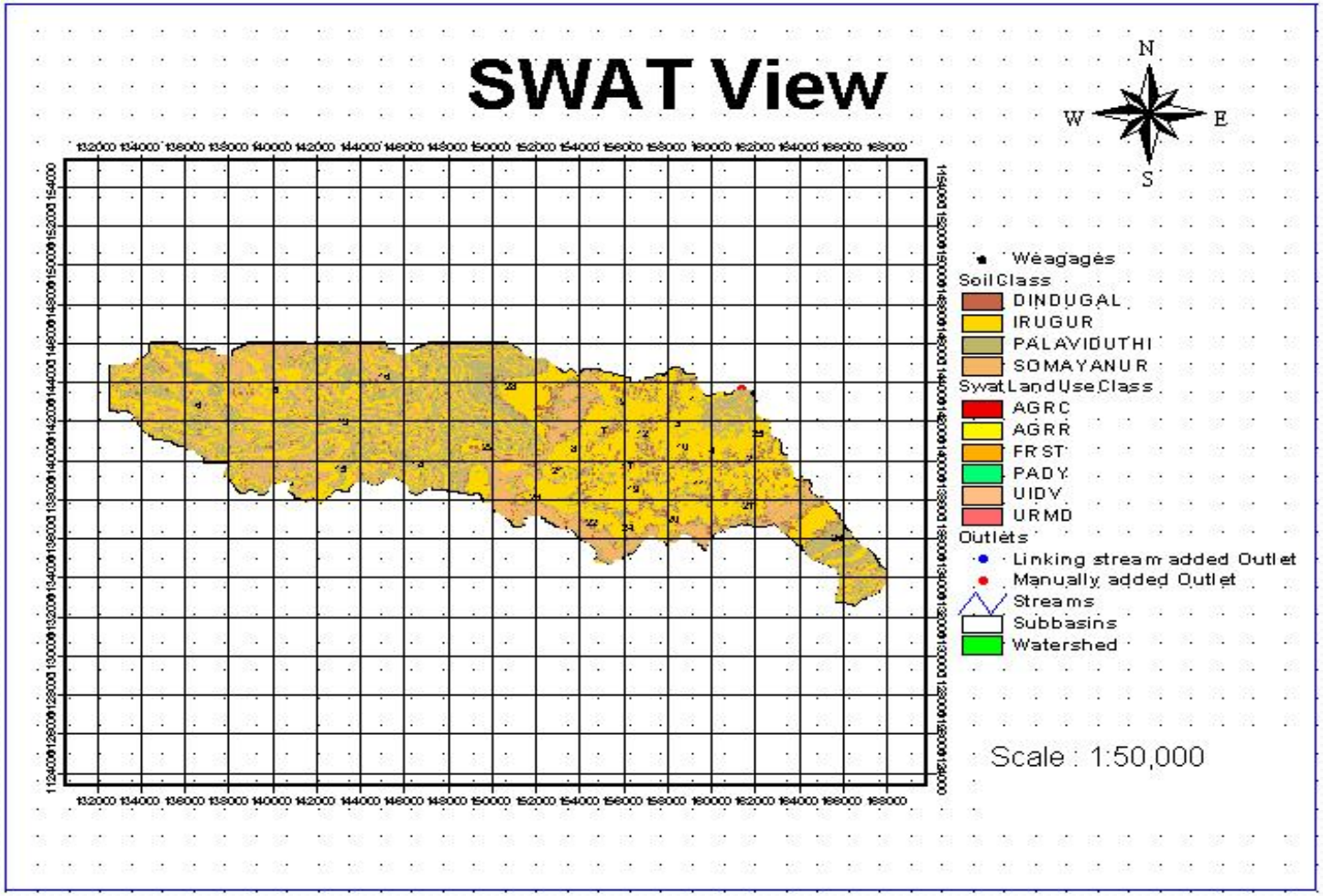
  - Data base creation



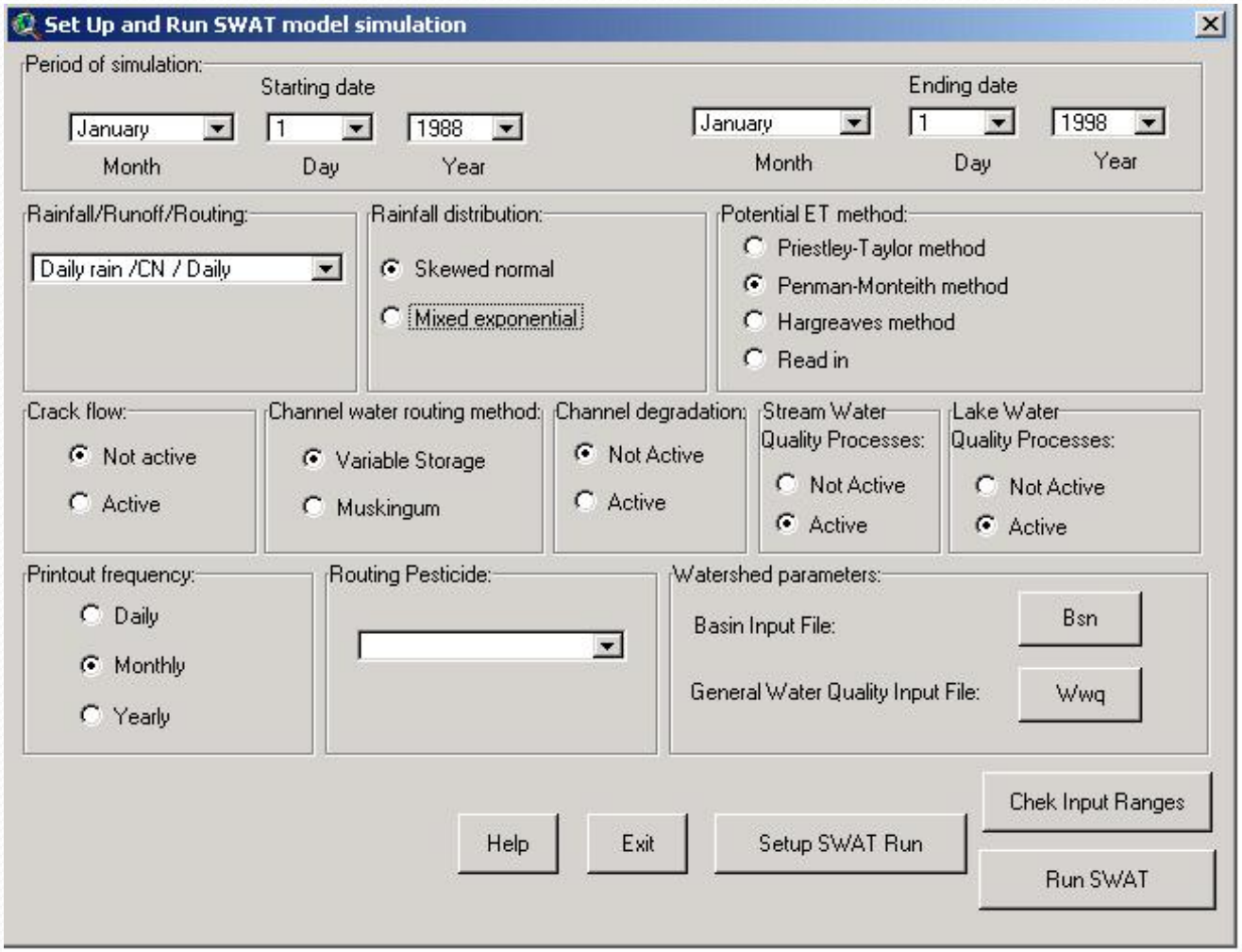
Step 2
Delineation of Watershed



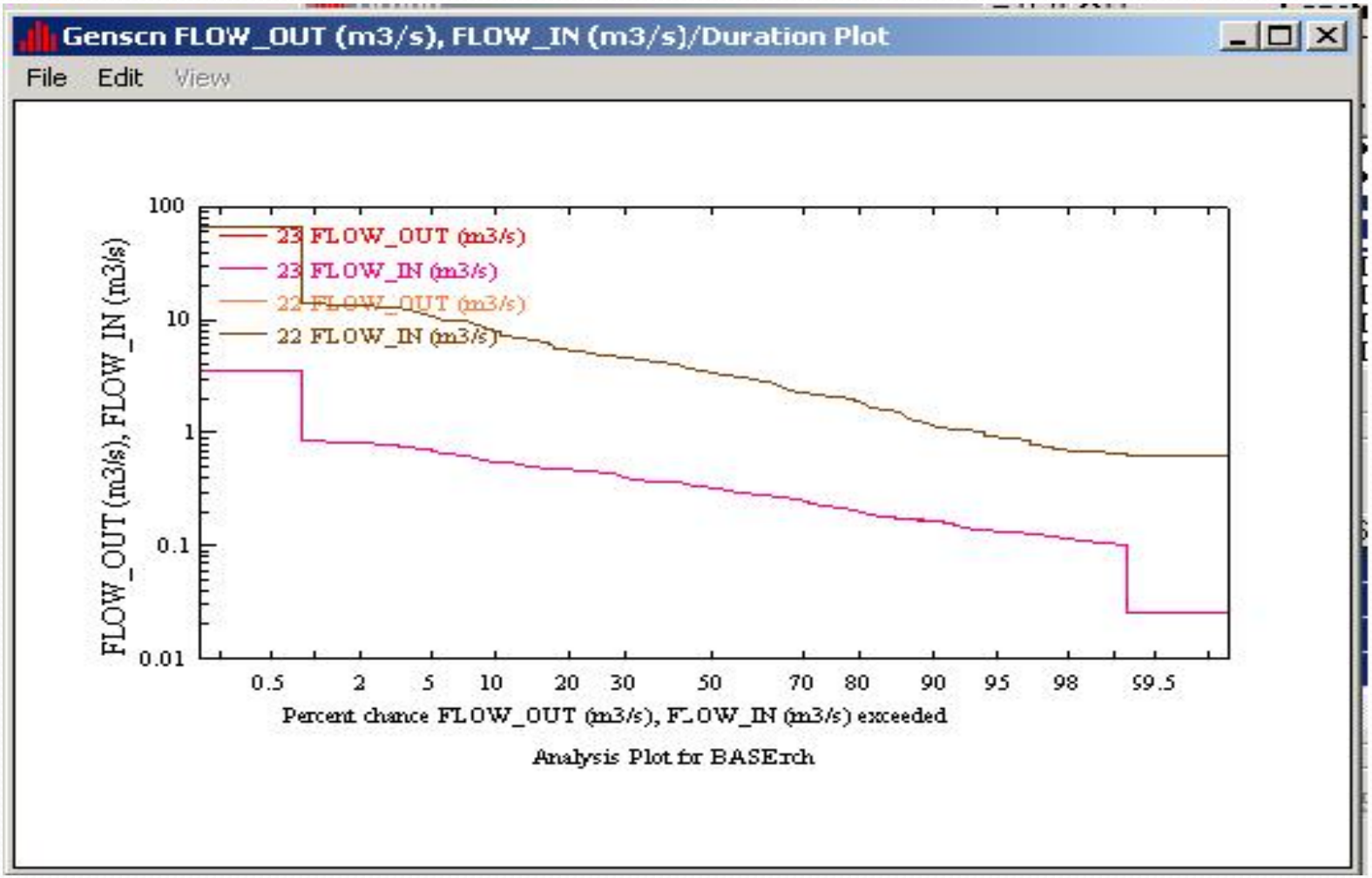
Step 3
Creation of HRUs



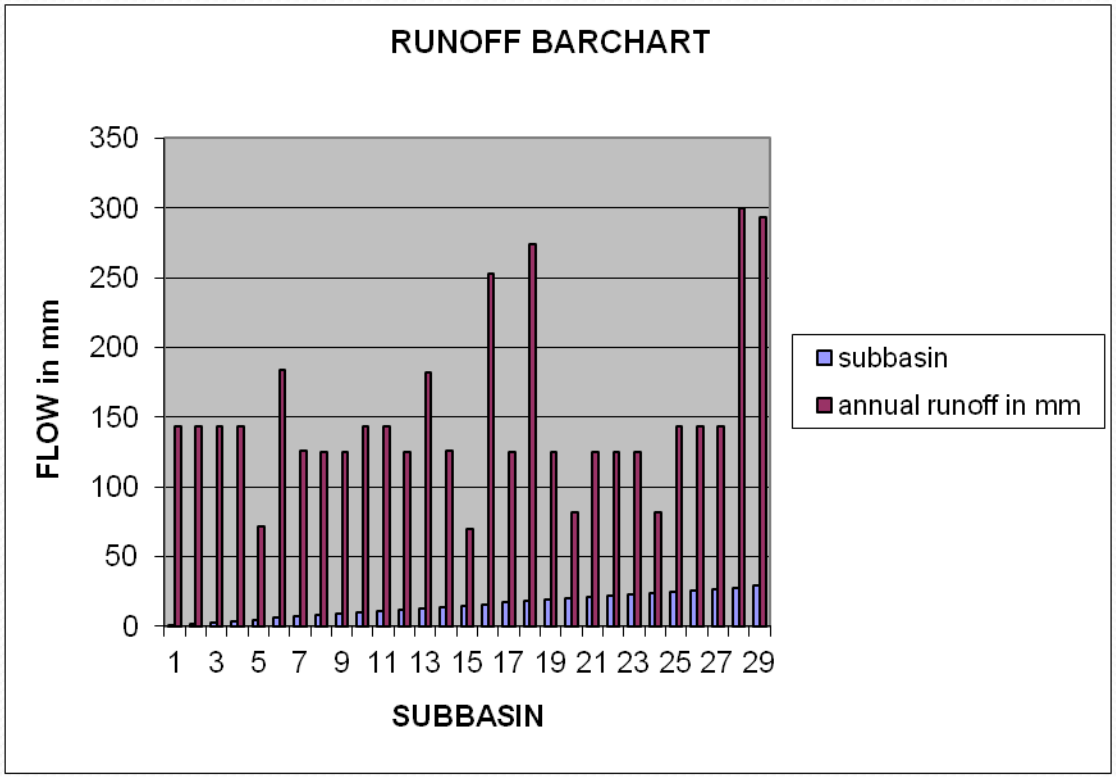
Step 3
Simulation of the Model



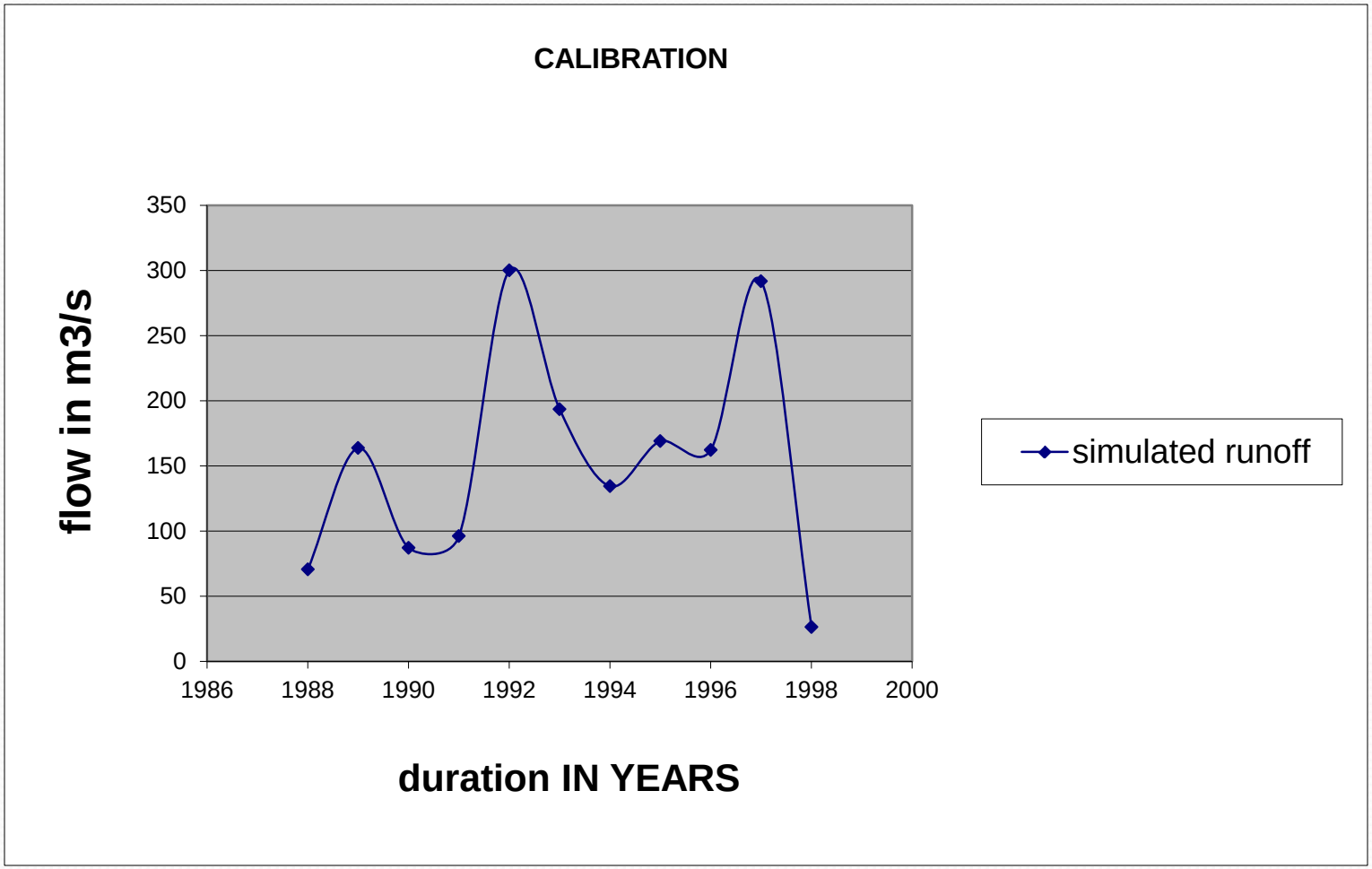
Monthly Flow curve for the single subbasin



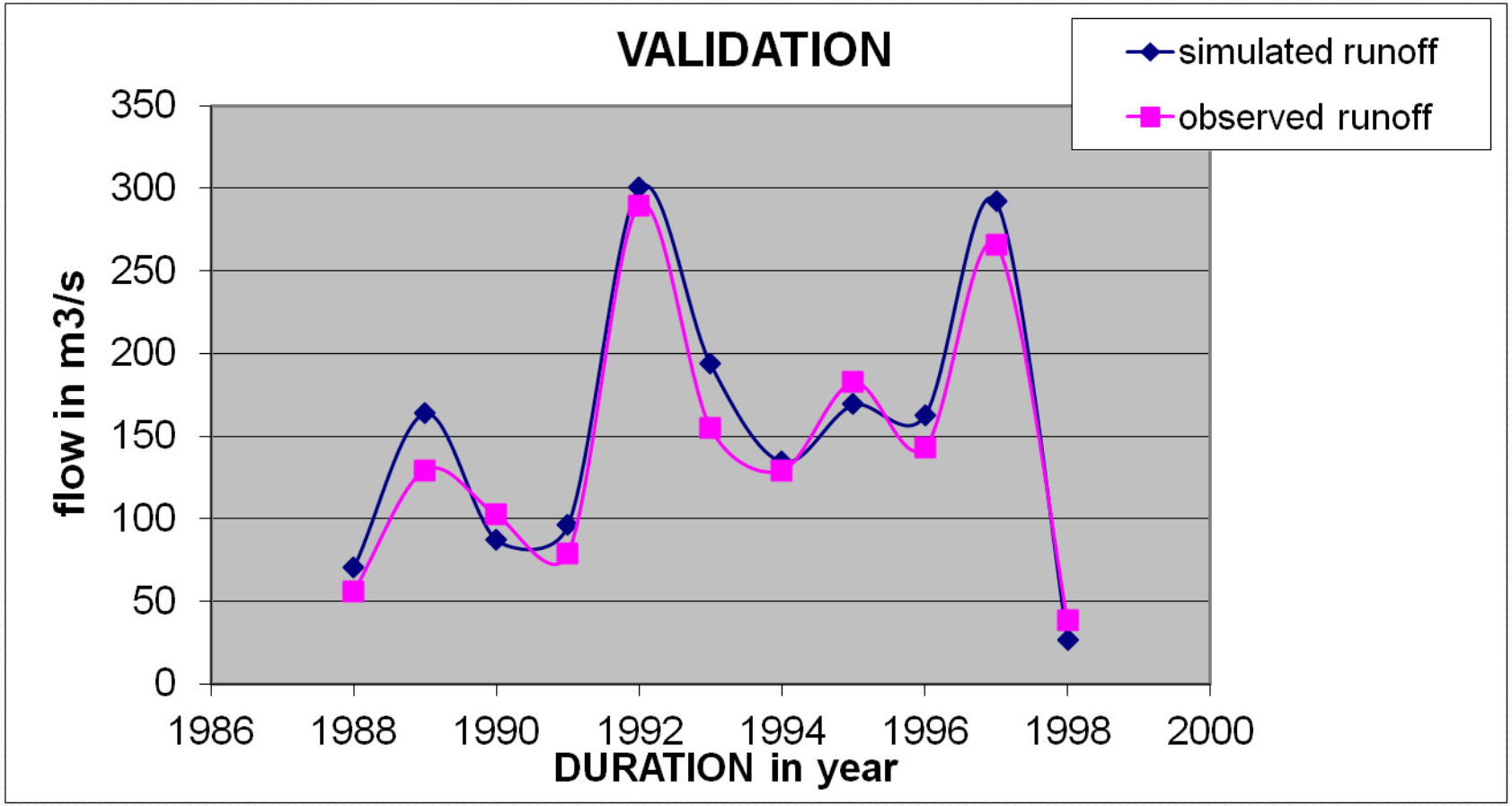
Annual Surface Runoff for each subbasin



SIMULATED RUNOFF CURVE



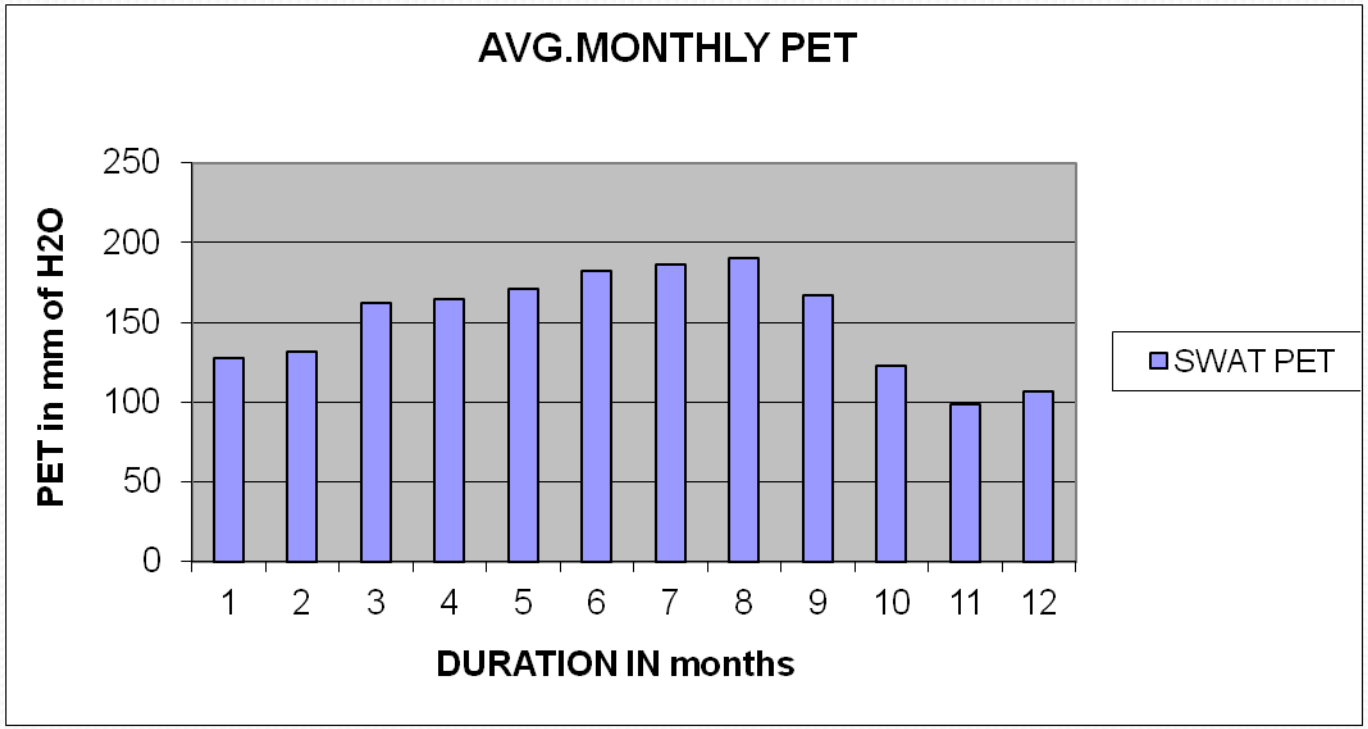
VALIDATION OF THE MODEL



YEARLY AVERAGE FLOW STATISTICS

YEARLY		
	OBSERVED RUNOFF	**SIMULATED RUNOFF**
MEAN	154. 1409	142.4745
STD DEVEIATION	79. 29586	85.89632
SLOP	0. 902385	
Correlation coefficient ®		0.9774
Coefficient of Determination(R^2)		0.9555

AVERAGE MONTHLY EVAPOTRANSPIRATION



MONTHLY AVERAGE PET STATISTICAL VALIDATION

MONTHLY		
	OBSERVED PET	SIMULATED PET
MEAN	158.9167	151.07921
STDDEVEIATION	28.96537	31.83488
Correlation coefficient ®		0.96779
Coefficient of Determination(R^2)		0.9366

Conclusion

- In most instances simulated values were closer to the observed values during the calibration period, calibration should also be based on several years of simulation in order to appraise parameters under a wide range of climatic and soil conditions .
- In each case calibrated models were developed in identifying land use characteristics responsible for adverse impact in stream water quality.

The following conclusions are derived from the study

- The percentage difference of the runoff obtained from the study is -7.5mm
- PET percentage difference obtained from 0 to 6.610mm of H2O
- Sediment yield ranges from 0 to 44.73t
- Organic Nitrogen yield obtained from the study ranges from 0 to 18.453kg/ha
- Nitrate in the surface runoff ranges from 0 to 0.381kg/ha
- Organic phosphorus ranges from 0 to 1.811kg/ha

RECOMMENDATION

- SWAT, calibration and validation procedures presented in this case studies will be useful to researchers and planners in studying water quality problems and taking decisions.
- The further studies based on nutrient and sediment yield can be carried out based on this study.
- The hydrological models help in evaluating and selecting the alternative land use and management practices. And it helps for the Socio economic development of the society. The model helps to find the water quality also.
- The project will be highly useful for the design of conservation structures to reduce the ill effects of sedimentation and to select the priority watersheds for resource management programmes.

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THANKYOU