H

D

A

-

Y

Volume II

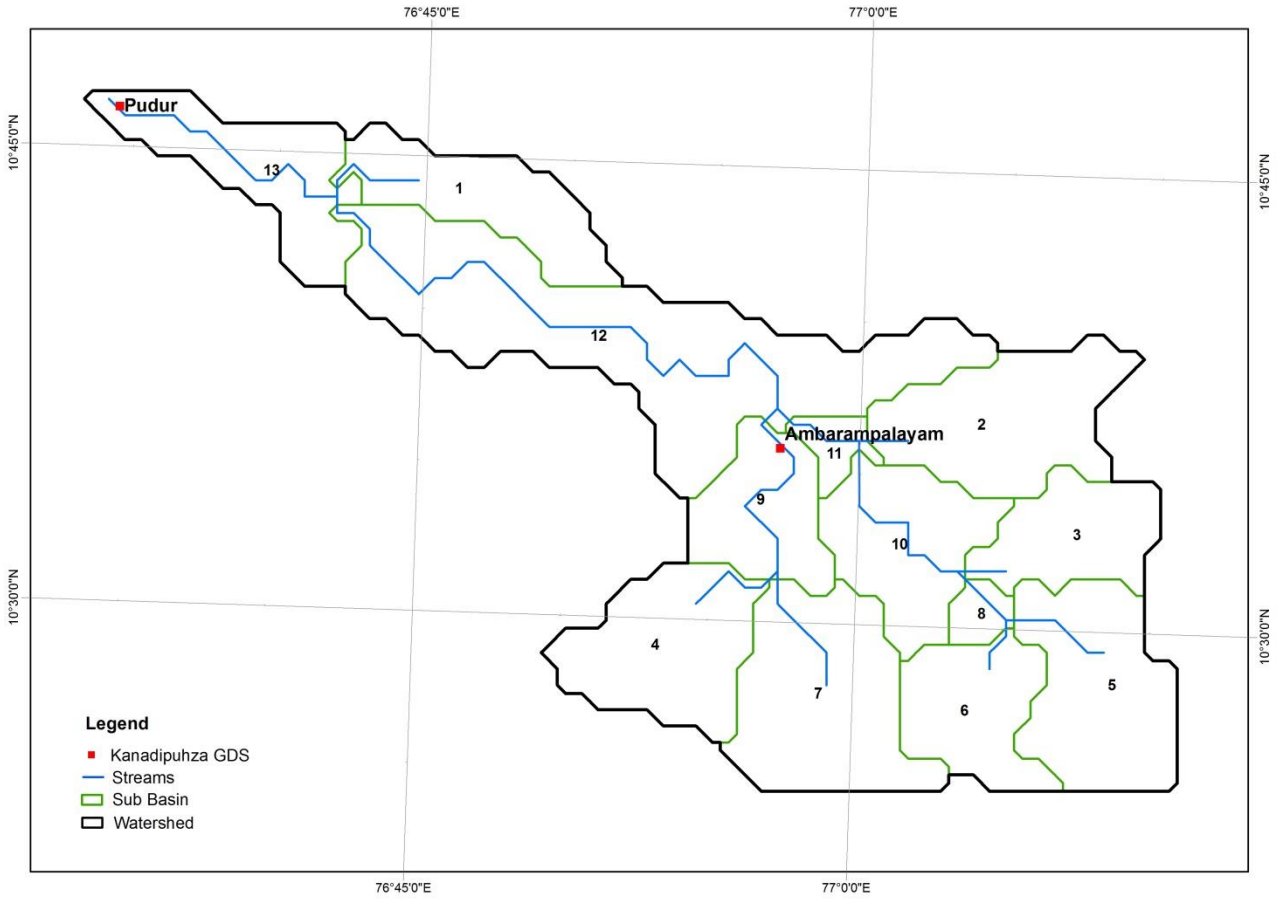
Central Water Commission Hydrological Design Aids

REGIONAL ANALYSIS FOR KANNADIPUZHA BASIN

Draft Final Report
Vol II, Appendix C25
March 2015

JACOBS® CES

MODELING OF KANNADIPUZHA SUB-BASIN, ANALYSIS AND RESULTS



Contents

List of Figure

List of Table

1.1 INTRODUCTION OF BHARATHAPUZHA AND KANNADIPUZHA BASIN

Bharathapuzha, also known as the River Nila, is the second-longest river in Kerala, after the Periyar River. The Bharathapuzha basin is bounded in the east by the Cauvery basin and in the west by the Arabian Sea. The basin is elongated in shape with its outlet into the Arabian Sea. The total drainage area of the basin is 6,186 sq km out of which nearly two third lies in the Kerala State. The Bharathapuzha basin receives rainfall from the south West monsoon.

Kannadipuzha River (called as Shokanashini)originates from the Anamalai hills in the eastern fringes of Palakkad district of Kerala. It is one of the main tributaries of the Bharathapuzha River. At Parli, it merges with Kalpathipuzha and flows as Bharathapuzha. The upstream area is relatively dry as it falls in the rainshadow of the Western Ghats. Tributaries of Kannadipuzha are Palar , Aliyar and Uppar Aliyar. The basin is also elongated in shape shown in ***Figure 1***.

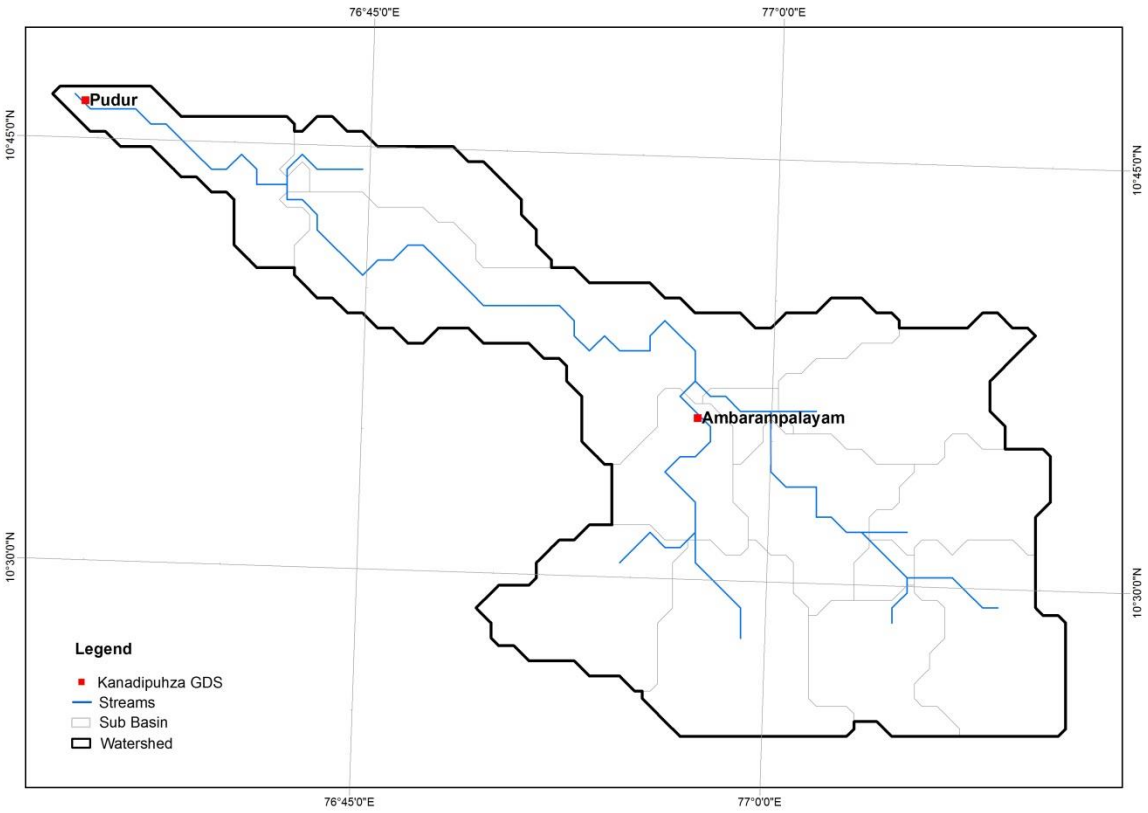


Figure 1 :Kannadipuzha sub basin

1.2 SUB-BASIN CHARACTERISTICS

1.2.1 Topography

The Kannadipuzha river originates in the foothills of the Anamalai hills at an elevation of 1634m and reaches the level of 64 m in a length of 133 km before it flows down as Bharathapuzha. The average elevation of the basin is 372m with 80% of area below 400m. The Kannadipuzha sub-basin lies in the states of Kerala and Tamil Nadu.

1.2.2 Rainfall

Based on the gridded rainfall from 1990-91 to 2004-2005, the annual weighted rainfall in the Kannadipuzha sub-basin has been calculated as 1545 mm with maximum of 2451 mm in 1994-95 and minimum of 585 mm in 2003-04. The sub-basin receives most of the rainfall from south- monsoon.

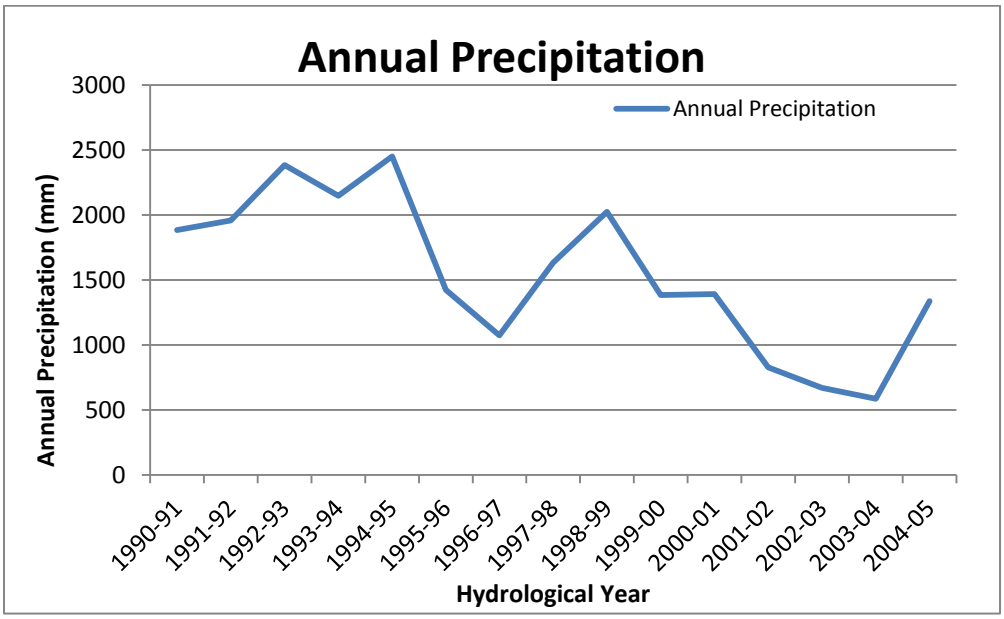


Figure 2:Weighted Annual Precipitation for Kannadipuzha sub basin

1.2.3 Soil

The Soil map (*Figure 3*) indicate that the soil cover is predominantly of Loamy type.

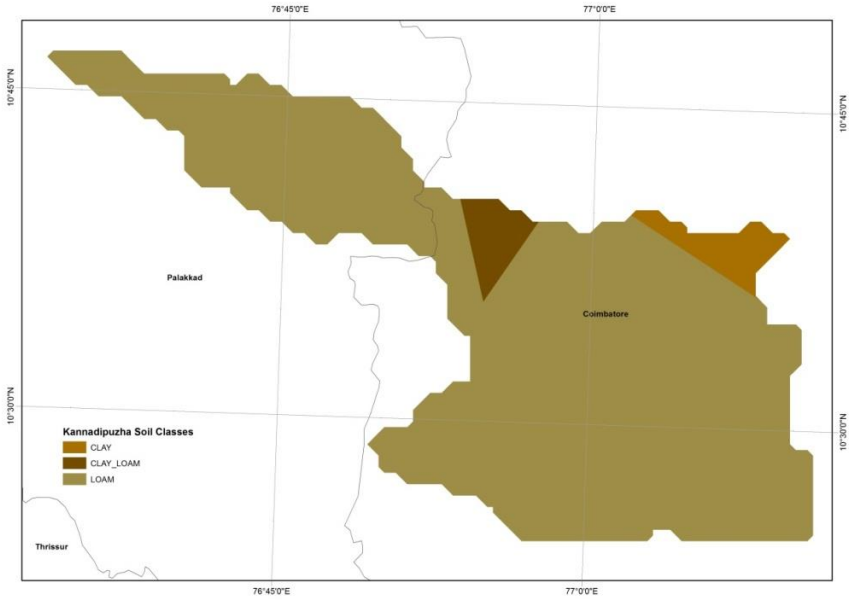


Figure 3 :Soil Map of Kannadipuzha

1.2.4 Land Use

The landuse map of Kannadipuzha indicates cropland area of 76%, Which is more than three- fourth coverage of the basin. About 15% of the area is under forest, mostly restricted to the upper ridge in the south as shown in *Figure 4*.

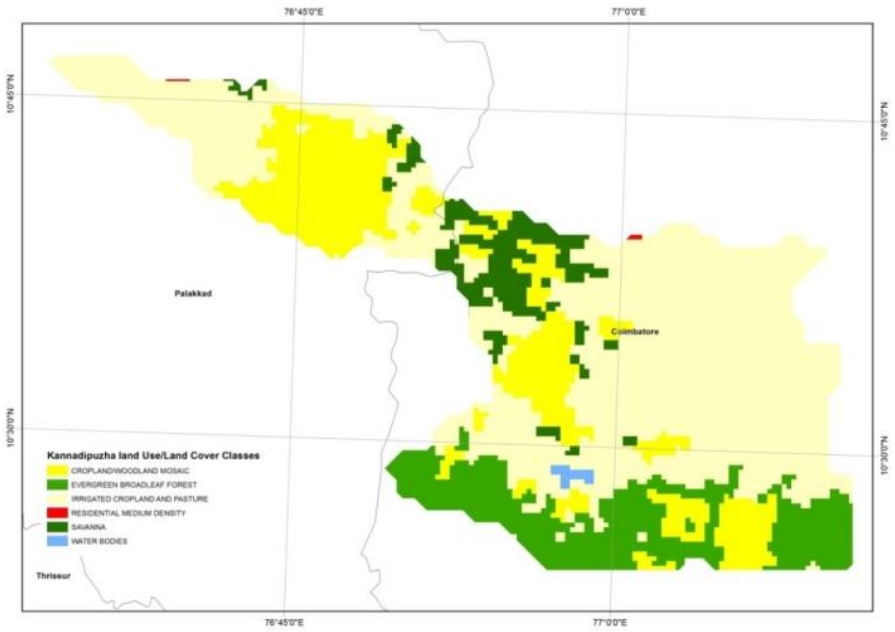


Figure 4:Land Use Map of Kannadipuzha

1.2.5 Flow Data

There are two G&D observations stations maintained by CWC located in Kannadipuzha sub-basin viz. Ambarampalayam and Pudur. The observation series indicate very little flow in summer along most part of the river, attributed by the fact that a large portion of the basin is located in relatively dry region. The sub-basin is extensively regulated as there are several dams/weirs along the course of the river. As indicated from the watershed has been derived from WRIS Web GIS site, the projects/ Dams/Weir on Kannadipuzha River, identified for assessment of utilization are :

1. Upper Aliyar (Reservoirs, Size : 112.86 ha)
2. Aliyar (Reservoirs, Size : 657.21 ha)
3. Thirumurthi (Reservoirs, Size : 385.42 ha)
4. Vandal
5. Kadambarai (Reservoirs, Size : 102.57 ha)
6. Moolathara Weir

1.3 CALIBRATION & VALIDATION

1.3.1 Calibration and Validation Period

Records on Monthly flows are available 1990-91 to 2004-05 for Ambarampalayam and Pudur G & D site. Calibration time period is considered for the first nine years 1990-91 to 1998-99 and validation for the next six year period 1999-00 to 2004-05.

1.3.2 Comparison Plot of Observed and Simulated Gauge and Discharge Site

The output results for Ambarampalayam and Pudur are presented in ***Figures 5, 6, 7*** and ***8*** in terms of comparisons of simulated and observed flows. The results of the model establish the fact that for a rational yield assessment of the basin, utilization from the projects and their salient details are an essential requirement. The model performance criteria values (R^2) have been shown in ***Table 1 and 2*** for further reference. For a meaningful dataset generation, the basin considered is small. Therefore Empirical relationship has not been developed for the sub-basin considered.

Table1: Model performance for simulation of Ambarampalayam site

Component	Calibration	Validation
	R^2	**R^2**
Stream flow (Annual) Ambarampalayam flow	0.57	0.65
Stream flow (Monthly) Ambarampalayam flow	0.11	0.03

Table 2 : Model performance for simulation of Pudur site

Component	Calibration	Validation
	R^2	R^2
Stream flow (Annual)		
Pudur flow	0.67	0.79
Stream flow (Monthly)		
Pudur flow	0.69	0.51

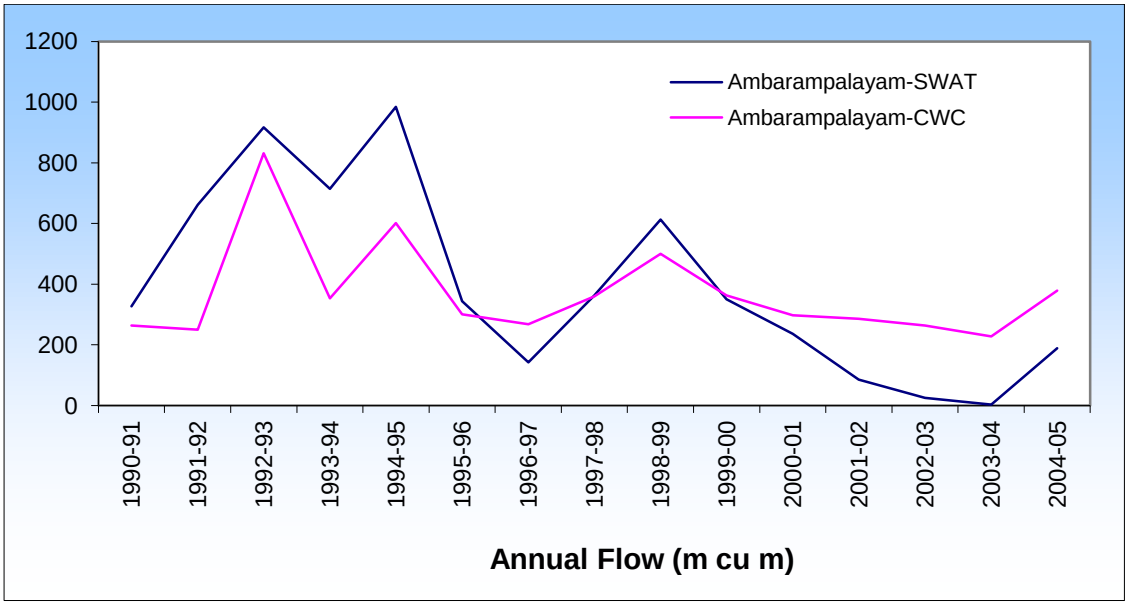


Figure 5:Comparison plot of Annual flow for Ambarampalayam site

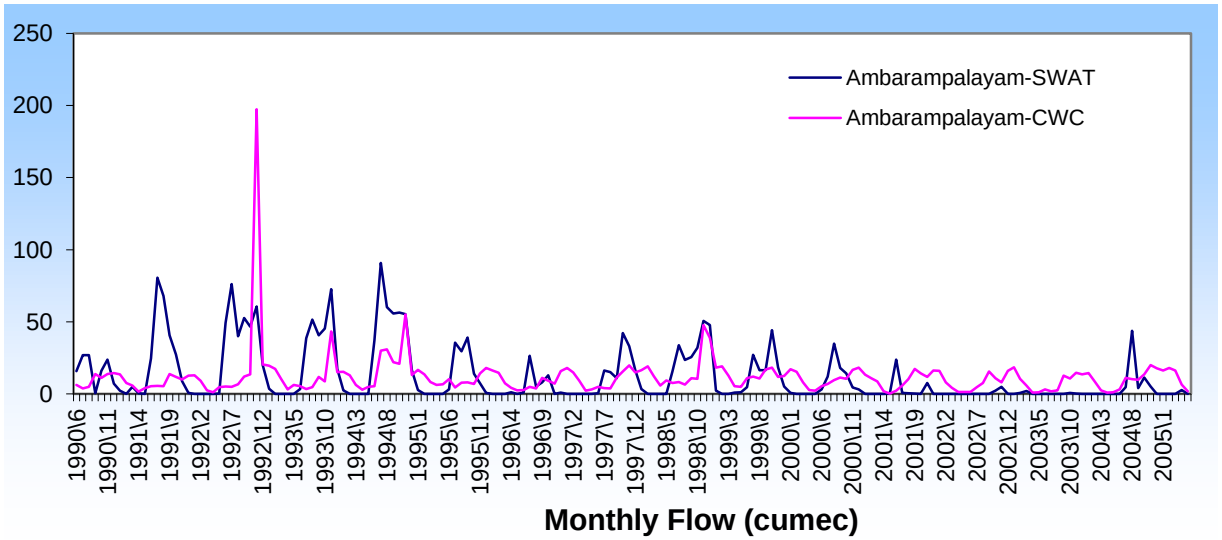


Figure 6:Comparison plot of Monthly flow for Ambarampalayam site

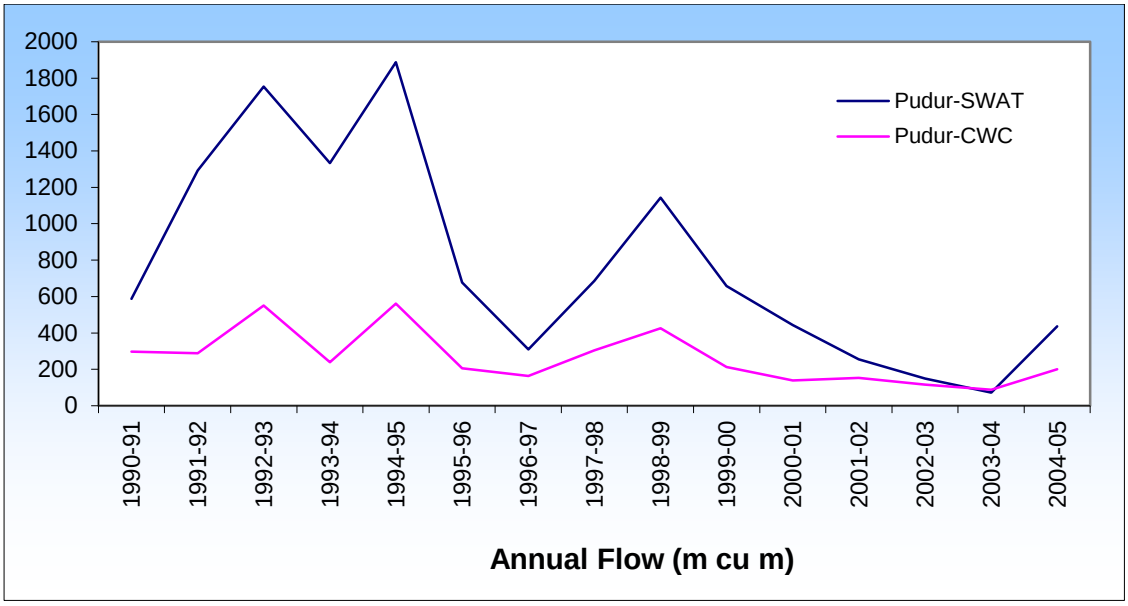


Figure 7:Comparison plot of Annual flow for Pudur site

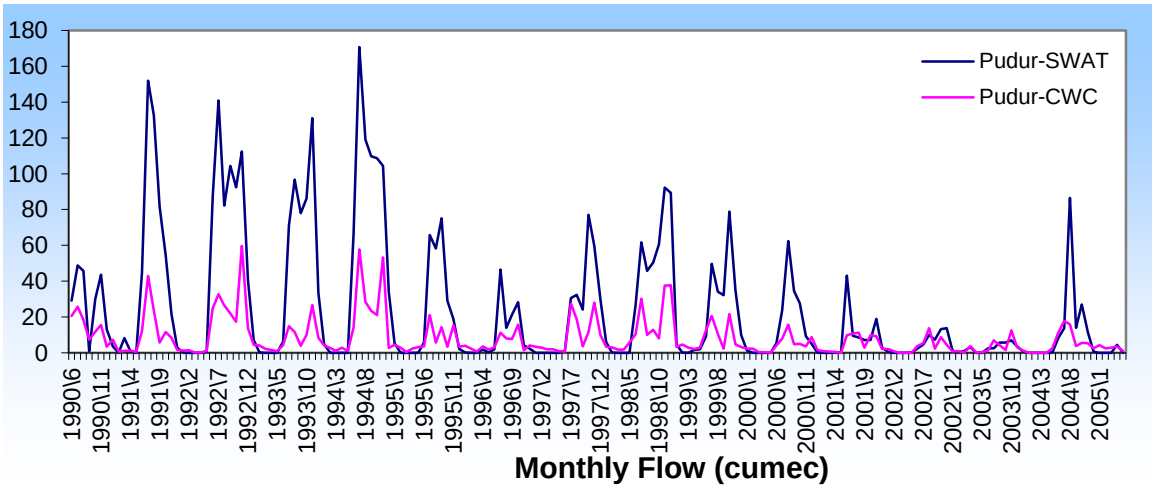


Figure 8:Comparison plot of Monthly flow for Pudur site

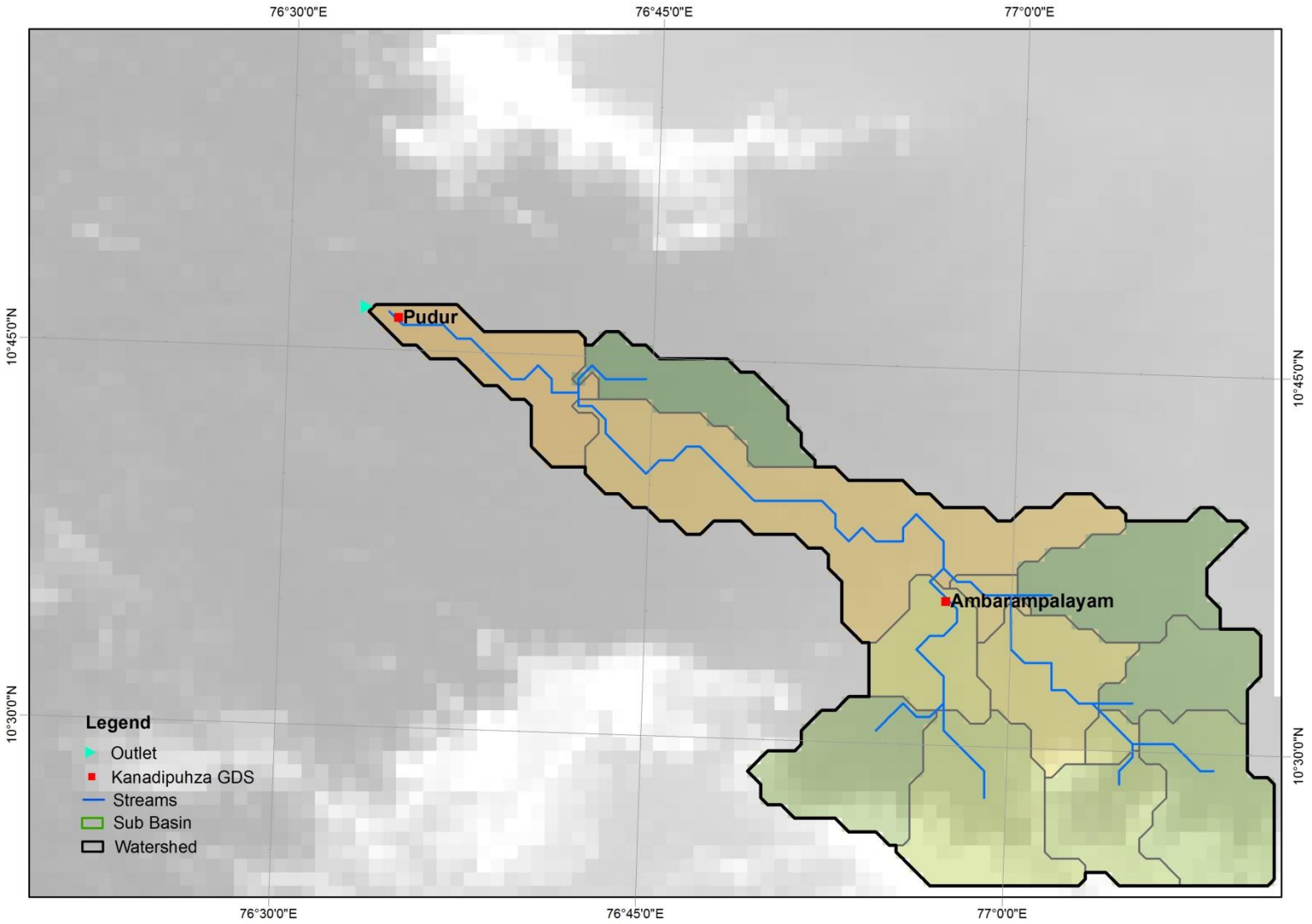


Figure 9:Elevation Map of Kannadipuzha sub basin