Analysis of Major Parameters in a Tropical Climate Watershed

Case Study: Tabma Sub-basin, Thailand

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Content

Statement of Problems

Rainfall and runoff decreasing or increasing or uncertainty

- In 2005, Drought was occurred in June and July and Flood in the last year in Rayong Province . So, both of situations occurred in the same year.

- many water used such as agriculture and industrial.
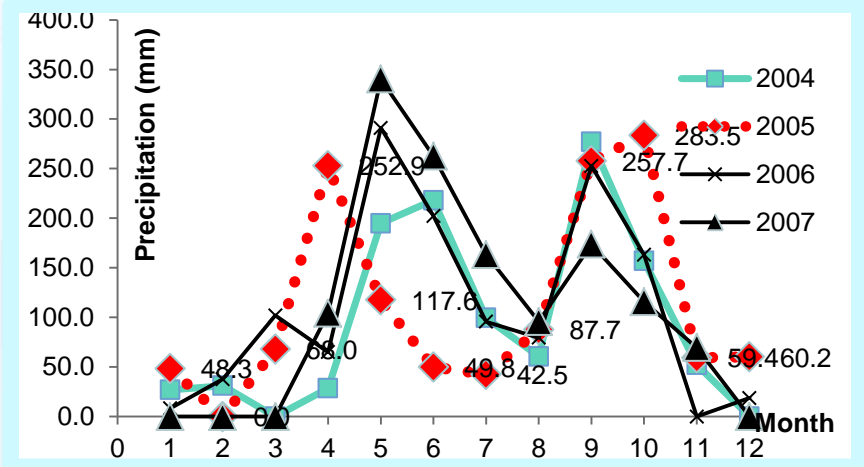
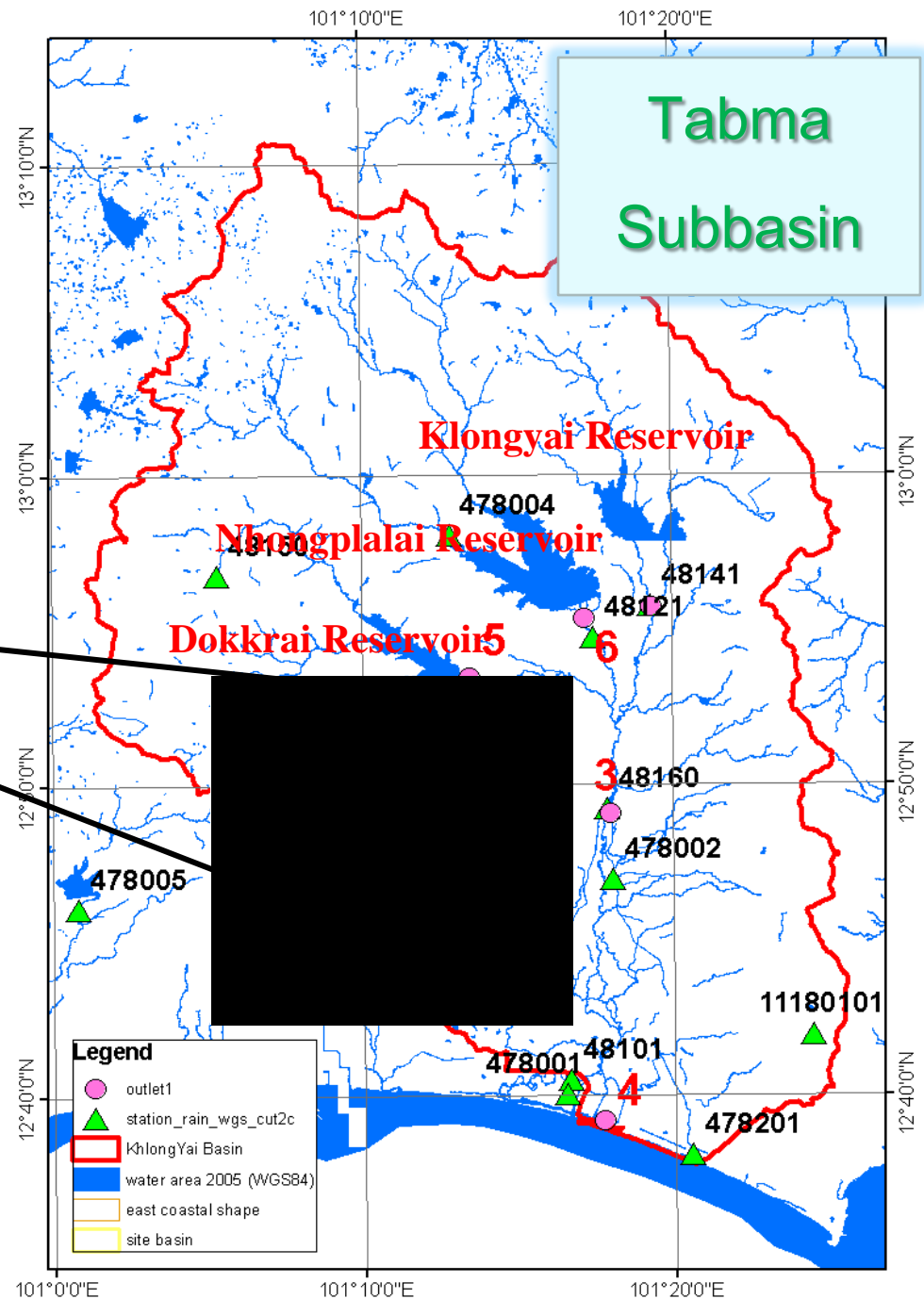Agricultures

Rice field Para rubber

Industries

Area: 1,704 km²

8 rainfall stations
1 runoff station

Tabma Subbasin

Klongyai Reservoir

478004

Nhongplalai Reservoir
48100

48141
48121
5   6

Dokkrai Reservoir

3 48160

478002

478005

11180101

478001 48101
4
478201

Legend
- ● outlet1
- ▲ station_rain_wgs_cut2c
- ▭ KhlongYai Basin
- ▬ water area 2005 (WGS84)
- ▭ east coastal shape
- ▭ site basin

Scope of Study

Section 1

Section 2

Section 3

Historical Temperature Trends

Increase and decrease

Historical Precipitation Data

Peak season

Hydrological Model

SWAT:

Soil and Water Assessment Tool

Data   **-Landuse**

- DEM (Digital Elevation Model)

-Climatologically data

- rainfall

-Temperature

-Relative humidity

Simulated

Runoff

Objectives

- To simulate stream flow and identify major parameters which are sensitive to a tropical climate in the Tabma Sub-basin.

Methodology

Input Data in SWAT model

Data	Year	
	calibration	**Validation**
Rainfall	**2001-2002**	**2003**
DEM	**2001**	**2001**
Land use	**2001**	**2001**
Soil series	**2001**	**2001**
Temperature (Max and Min)	**2001-2002**	**2003**
Runoff	**2001-2002**	**2003**

Parameter values which used in calibration can be apply to use in next year of data
Assume: Land use doesn't change within 3-5 years. So, use these to instance values
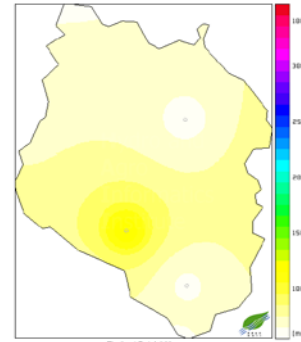
Relationship between rainfall and observed flow data
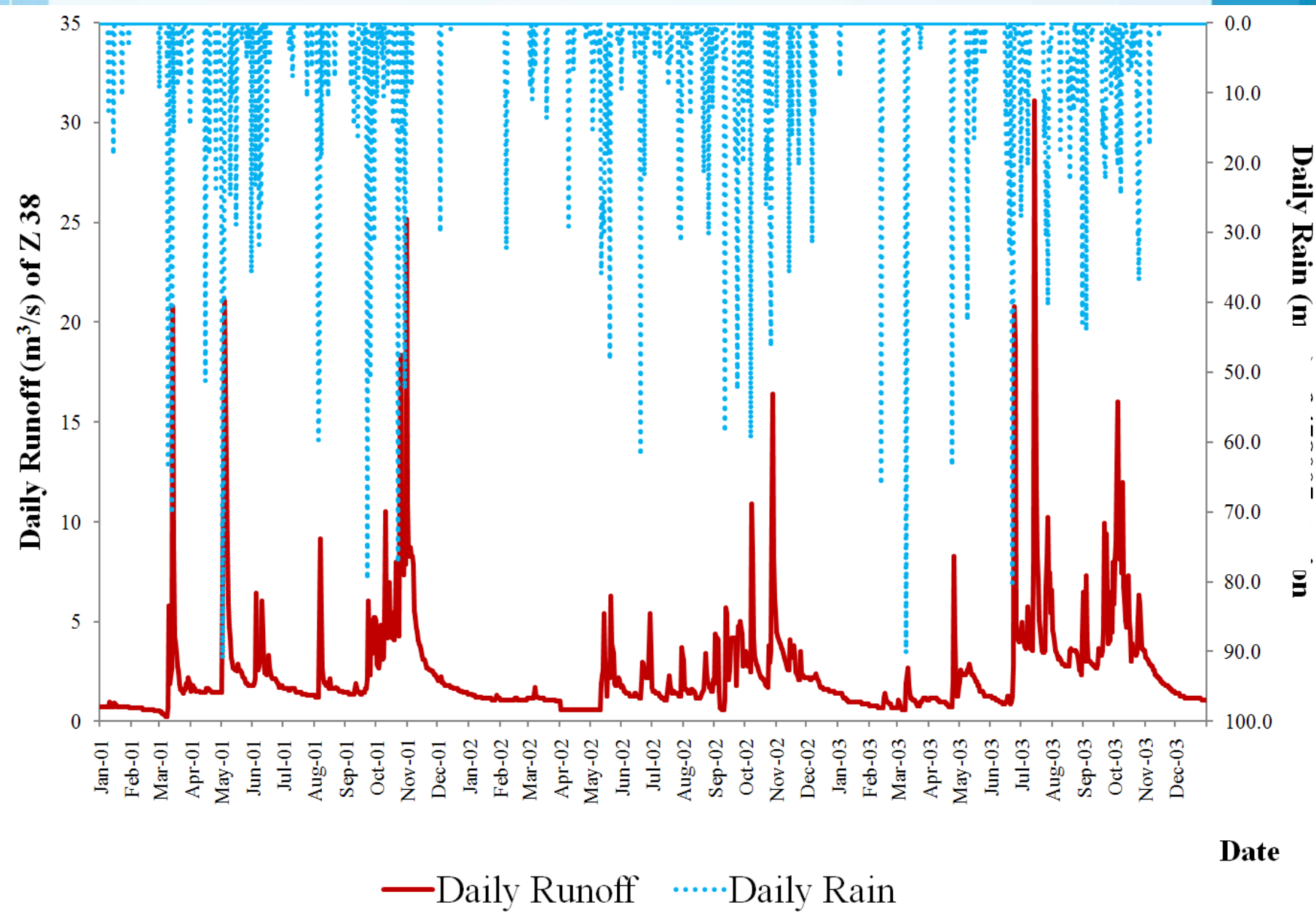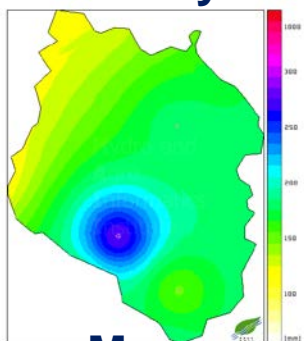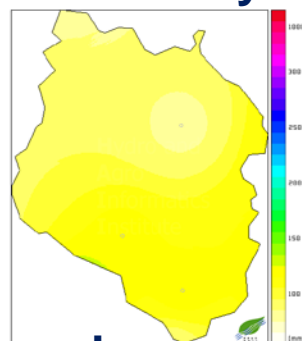
Rainfall map in 2001
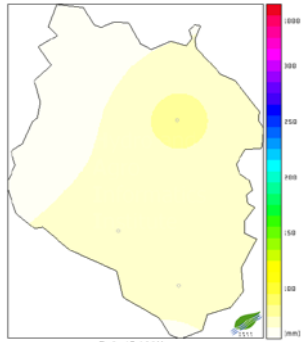
January
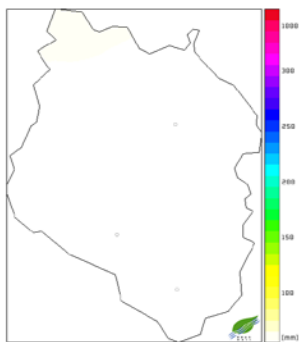
February
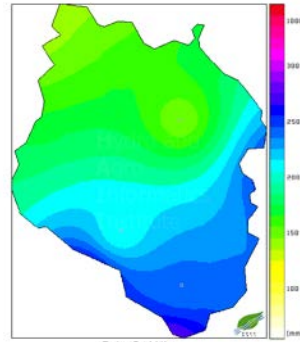
March

April

May

June
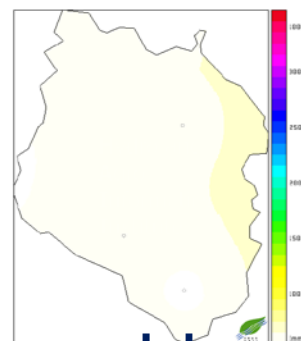
July
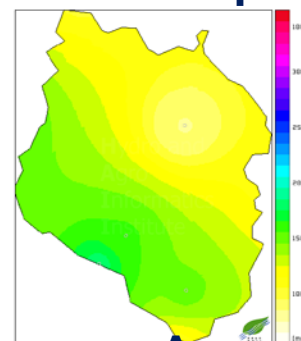
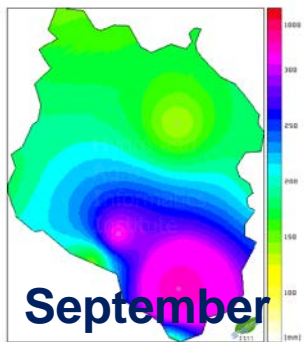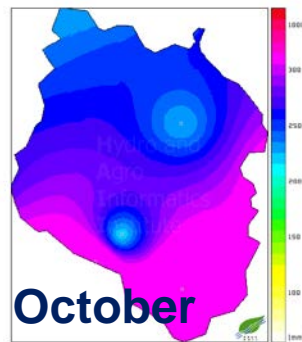August

September

October

November

December

Source: Hydro and Agro Informatics Institute (HAII)
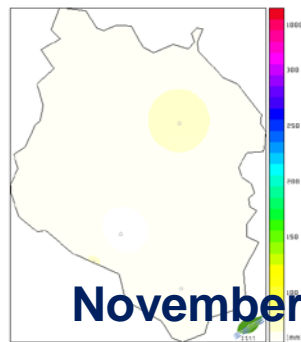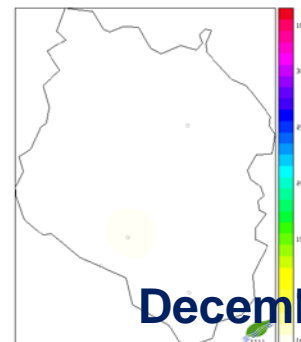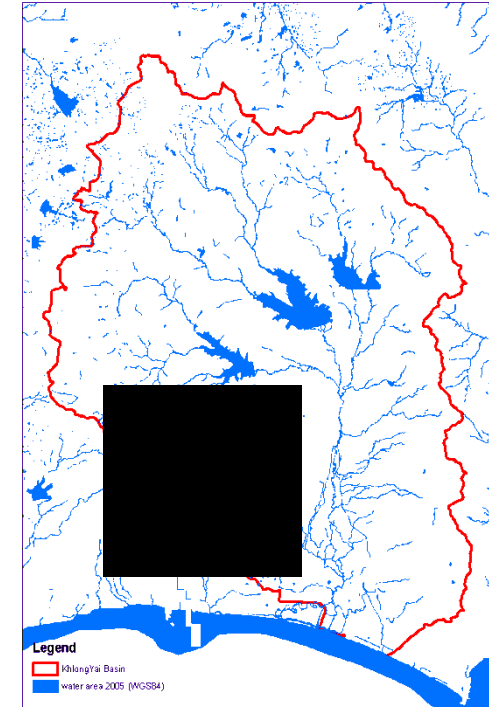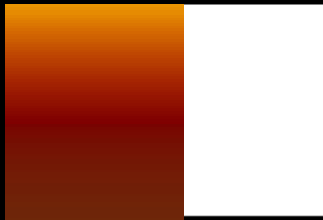
Tabma Subbasin:
Digital Elevation
Model :DEM
Resolution: 30 m

Runoff Station (Z 38)

Tabma Subbasin:

Landuse
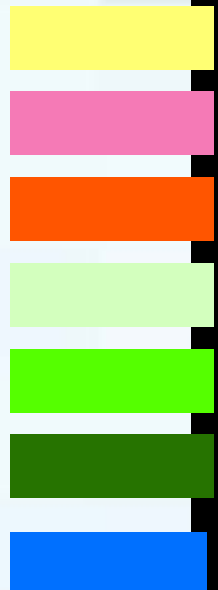
Runoff Station (Z 38)

# Tabma Subbasin:
SWAT Process

DEM   **Delinated Watershed**   **Land use**   **Soil Series**

⬇ ⟵ **Input data**

SWAT model

⬇ ⟵ **Calibration & Validation**

Runoff
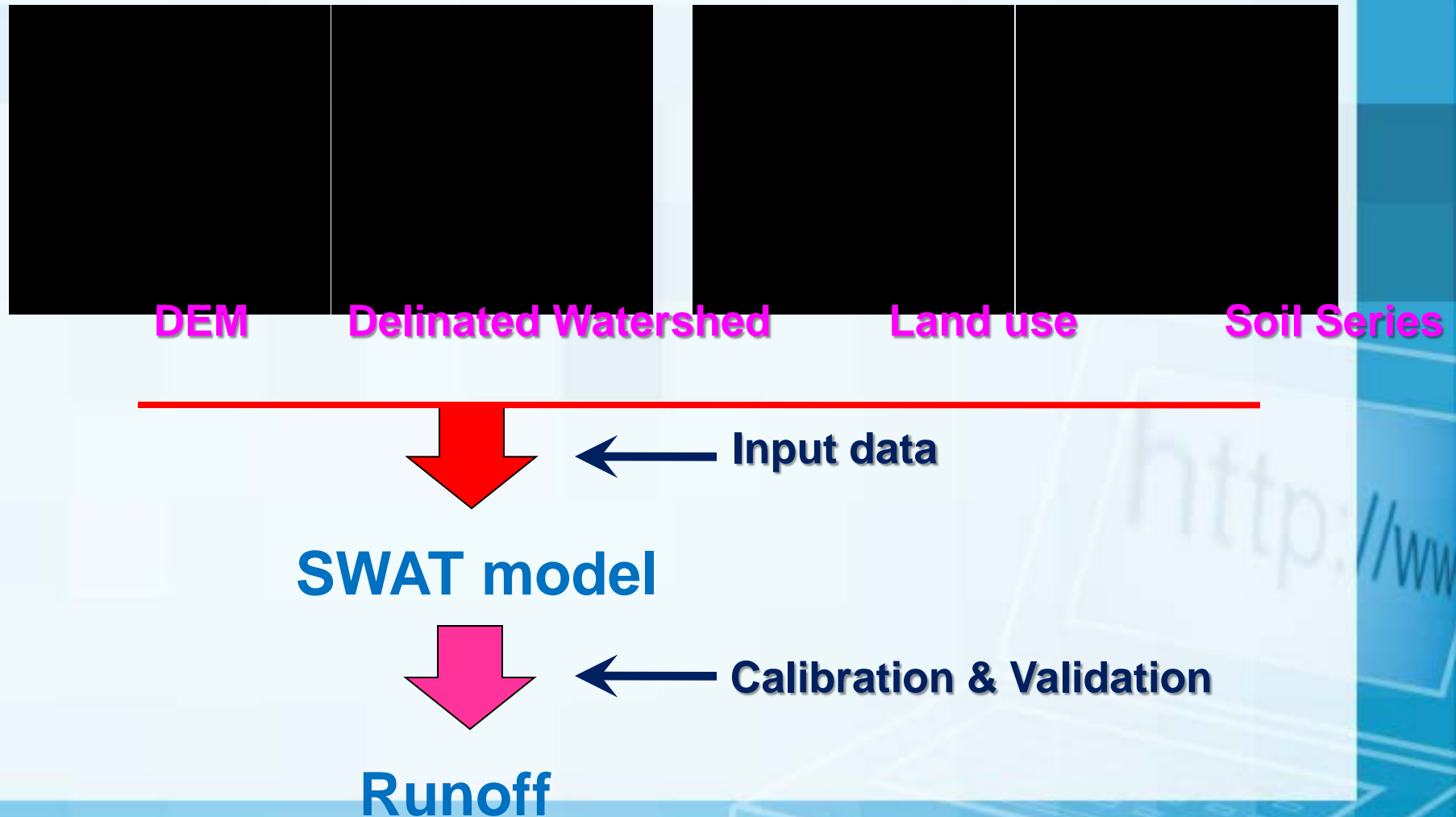
Result of research

Most sensitive parameters of SWAT model

Sensitivity analysis	parameters	Group	Range of value	Values
1	Ch_K2	rte	0.00 – 150.00	**1.03**
2	Cn2	mgt	35.00 – 98.00	**42.35**
3	Esco	HRU (Hydrologic response unit)	0.00 - 1.00	**0.015**
4	SOL_AWC	Soil unit	0.00 - 1.00	**0.65**
5	Sol_k	Soil unit	0.00 - 150.00	**22.32**
6	Alpha_Bf	GW (Groundwater)	0.00 - 1.00	**0.66**

Error	Calibration 2001-2002	Validation 2003
Nash	0.651	0.312

Result of research
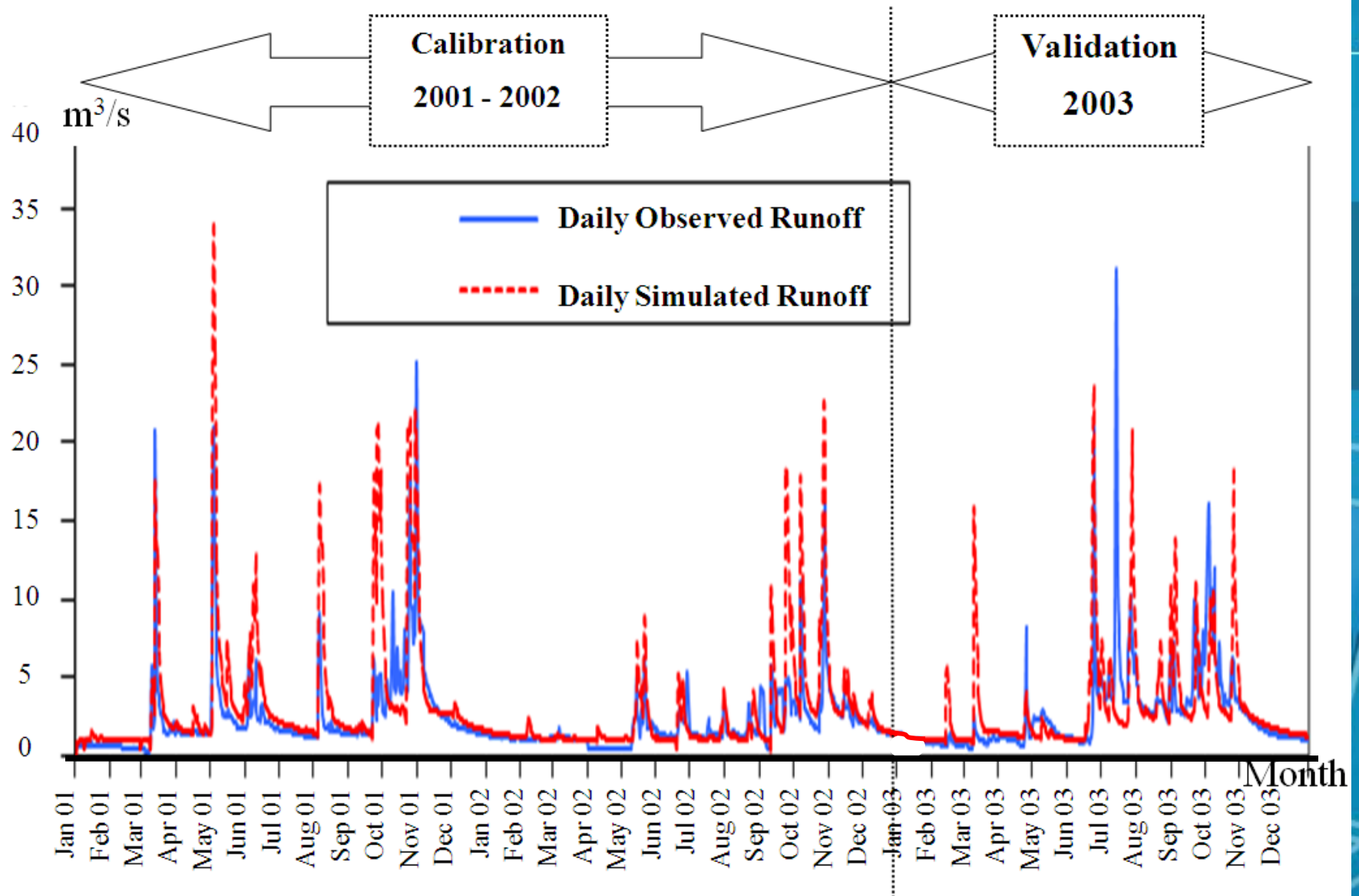
Conclusion

- **The most sensitive parameters were: CH_K2, CN2, Alpha BF, Sol K, and Sol AWC**

- **The model performs not so good to simulate flow in this sub-basin, it might be because land use has been changing every year.**

Thank you

for your kind attention