Hydrological Modeling of Bagmati River Basin in Bihar, India using SWAT model

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Objective of the study

- To explore the feasibility of using SWAT for real time flood forecasting in Bagmati River Basin of Bihar, India
Typical flood forecasting situation

Rain forecast

Flood producing storm

Time used by observation and forecasting

Transmission Time

Data processing

Forecast formulation

Transmission time

Forecast reaches user

Rain begins

Rain ends

Total Forecast Lead Time

Effective Lead Time

Flood reaches outflow station
IMPORTANT TASKS OF PRESENT STUDY

1. Calibration and sensitivity analysis using SWAT
2. Hourly Runoff generation using Green Ampt Method
3. Modify SWAT for developing error updating technique for real time flood forecasting applications
Study Area
### Elevation Summary – Bagmati Basin
Slope in Nepal portion is very steep and that in Indian portion is flat.

<table>
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<tr>
<th>Parameter</th>
<th>Elevation (m)</th>
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<td>Minimum Elevation</td>
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<td>Maximum Elevation</td>
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<td>Mean Elevation</td>
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<td>Standard Deviation</td>
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<th>CLAY1</th>
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Land use (Global USGS)
Subbasins (32 Sub-basins)
Rain Gauge and Stream Gauge Stations
Calibration chart for Hayaghat for Monthly simulation
Validation chart for monthly simulation for Hayaghat

<table>
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<tr>
<th>Variable</th>
<th>p-factor</th>
<th>r-factor</th>
<th>R2</th>
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Validation chart of calibrated model for daily flows of year 2004
Validation chart for daily stream flow for year 2010

FLOW_OUT_18

Validation Chart for daily simulation for year 2010 at Hayaghat
Validation graph for hourly simulation for 2004 event
Validation graph for hourly simulation for 2010 event
ARIMA Parameters

B1(LAG1) = 1.3153
B2(LAG2) = -0.0162
B3(LAG3) = -0.3013
A Typical Real time flood forecasting graph generated by SWAT model

![Direct Surface Runoff Hydrograph at Khagaria for 10 July - 11 July - 04](chart.png)

- Discharge in cumecs
- Rainfall in mm
- Time in hours

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Real time flood forecasting Graph
Hourly Discharge
CONCLUSIONS

SWAT model can be used as an efficient tool for real time flood forecasting by incorporating suitable changes
Thank You