Effect of Extreme Years in Hydrological Model Calibration Performance

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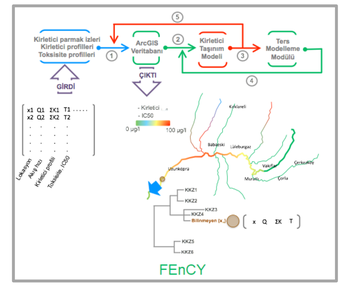


ABSTRACT

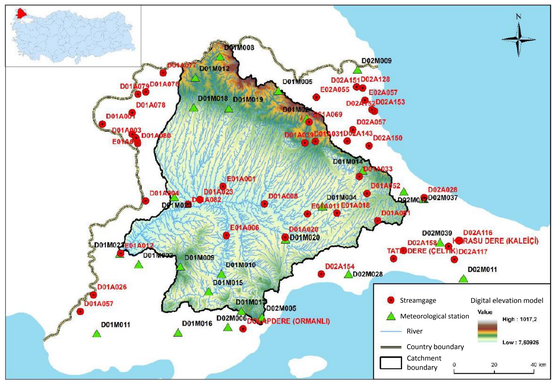
Hydrological models are useful in predicting and developing management strategies for controlling the system behavior. Specifically they can be used for evaluating streamflow at ungaged catchments, effect of climate change, best management practices on water resources, or identification of pollution sources in a watershed. This study is part of a TUBITAK project named "Development of a geographical information system based decision-making tool for water quality management of Ergene Watershed using pollutant fingerprints". Within the scope of this project, first water resources in Ergene Watershed is studied. Streamgages found in the basin are identified and daily streamflow measurements are obtained from State Hydraulic Works of Turkey. Streamflow data is analyzed using box-whisker plots, hydrographs and flow-duration curves focusing on identification of extreme periods, dry or wet. Then a hydrological model is developed for Ergene Watershed using HEC-HMS in the Watershed Modeling System (WMS) environment. The model is calibrated for various time periods including dry and wet ones and the performance of calibration is evaluated using Nash-Sutcliffe Efficiency (NSE), correlation coefficient, percent bias (PBIAS) and root mean square error (RMSE). It is observed that calibration period affects the model performance, and the main purpose of the development of the hydrological model should guide calibration period selection.

STUDY AREA

Yenigoruce Subbasin of Ergene Catchment

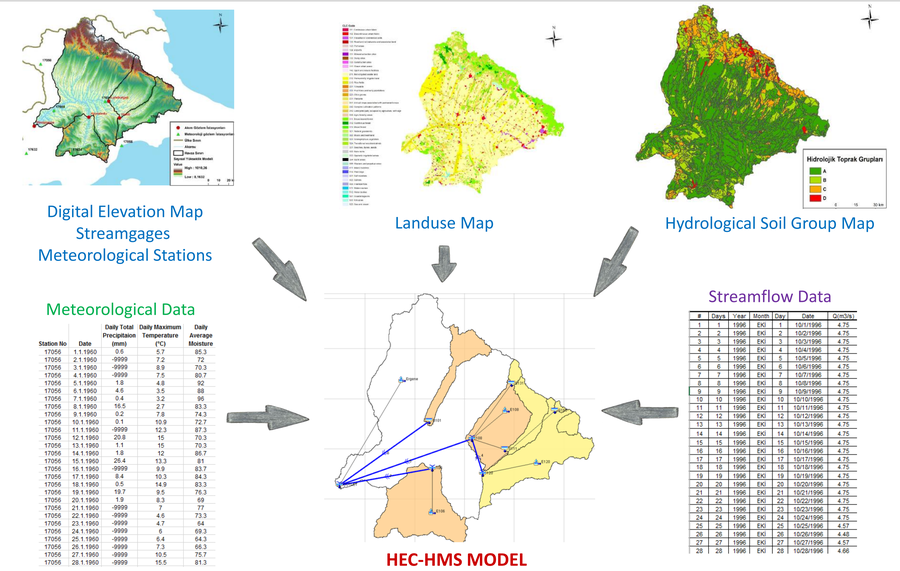
Located in the Trakya Region of Turkey

- Maximum river length = 231.59 km
- Elevation = 9 m
- Average catchment slope = 0.0524
- Drainage area = 10,508 km^2
- Mean annual flow (1996-2005) = 30.8 m^3/s

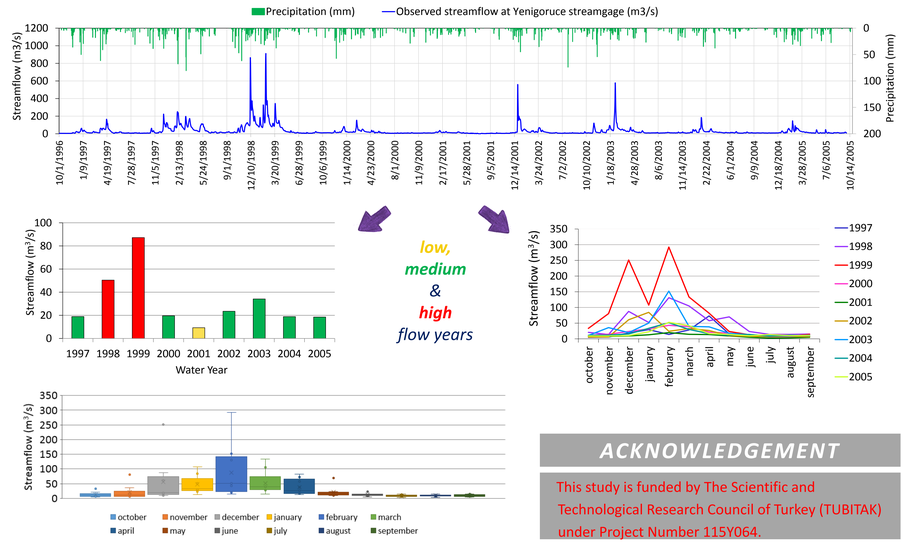


Yenigoruce Subbasin (E01A012) of Ergene Catchment

HEC-HMS MODEL



STREAMFLOW ANALYSIS



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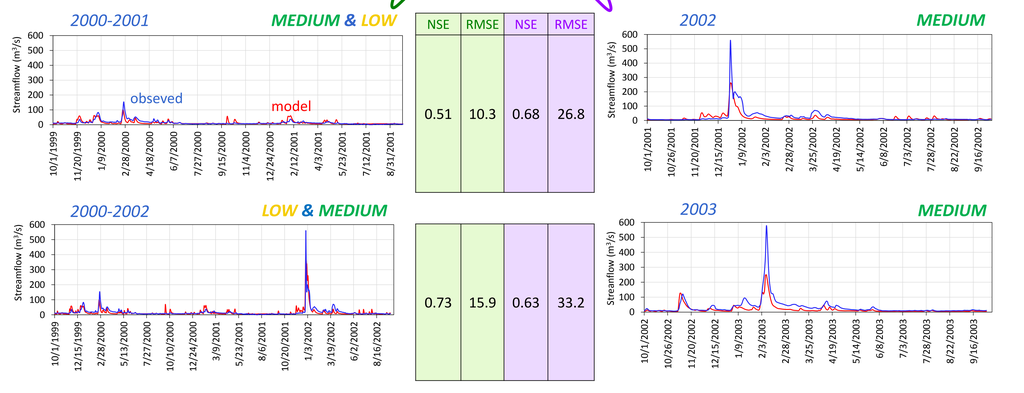
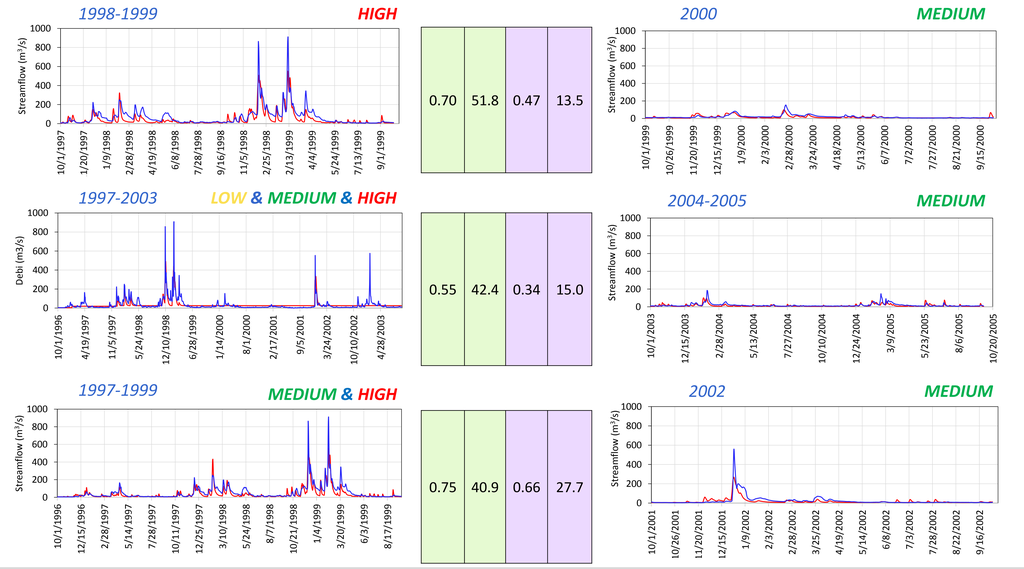
RESULTS

LOW & MEDIUM FLOW period is used for calibration & for validation MEDIUM FLOW period is used



MEDIUM & HIGH FLOW period is used for calibration & for validation MEDIUM FLOW period is used



CONCLUSIONS

- Calibration with low & medium flow periods resulted in acceptable sucess for medium flow periods in validation.
- It is observed that calibration period affects the model performance. However, inclusion of all types of flow (low, medium & high) does not necessarily improve the model performance.