

APPROXIMATION OF HYDROLOGICAL PHENOMENA FOR A COASTAL WATERSHED USING SWAT + MODEL

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Introduction

- Coastal watersheds differ from others by their unique features, including proximity to the ocean, weather and rainfall patterns, subsurface features, and land covers.
- Land-use changes and competing needs for valuable water and land resources are especially more distinctive to such watersheds. Hence, it is necessary to show proper watershed management in coastal regions to represent hydrological fluxes.
- This study concentrates on the approximation of hydrological phenomena in the coastal watershed modelling by using the Soil and Water Assessment Tool Plus (SWAT+). Here, SWAT+ is a small watershed to river basin-scale model to simulate the quality and quantity of surface and groundwater and predict the environmental impact of land use, land management practices, and climate change.

Study area

Mattole watershed was located in California in the coastal region and drains the watershed with an area of 182.12 sq.km Figure 1. The predominant land use type in Mattole is Evergreen Forest with a percentage area of 96.19%. Following it are Residential low density, Brushes, Grasses, Mixed forests and Deciduous forests with percentage area of 0.15%, 2.22%, 0.87%, 0.48%, 0.09% respectively in accordance to NLCD (National Land Cover Dataset). The climate in the watershed is Mediterranean with precipitation ranging from about 0 mm to 100.58 mm, and temperatures ranging from -9.88 degree Celsius to 39.89 degree Celsius. The model setup into warmup period (2001-2002), calibration period (2003-2008), validation period (2009-2011).

Results and Conclusions

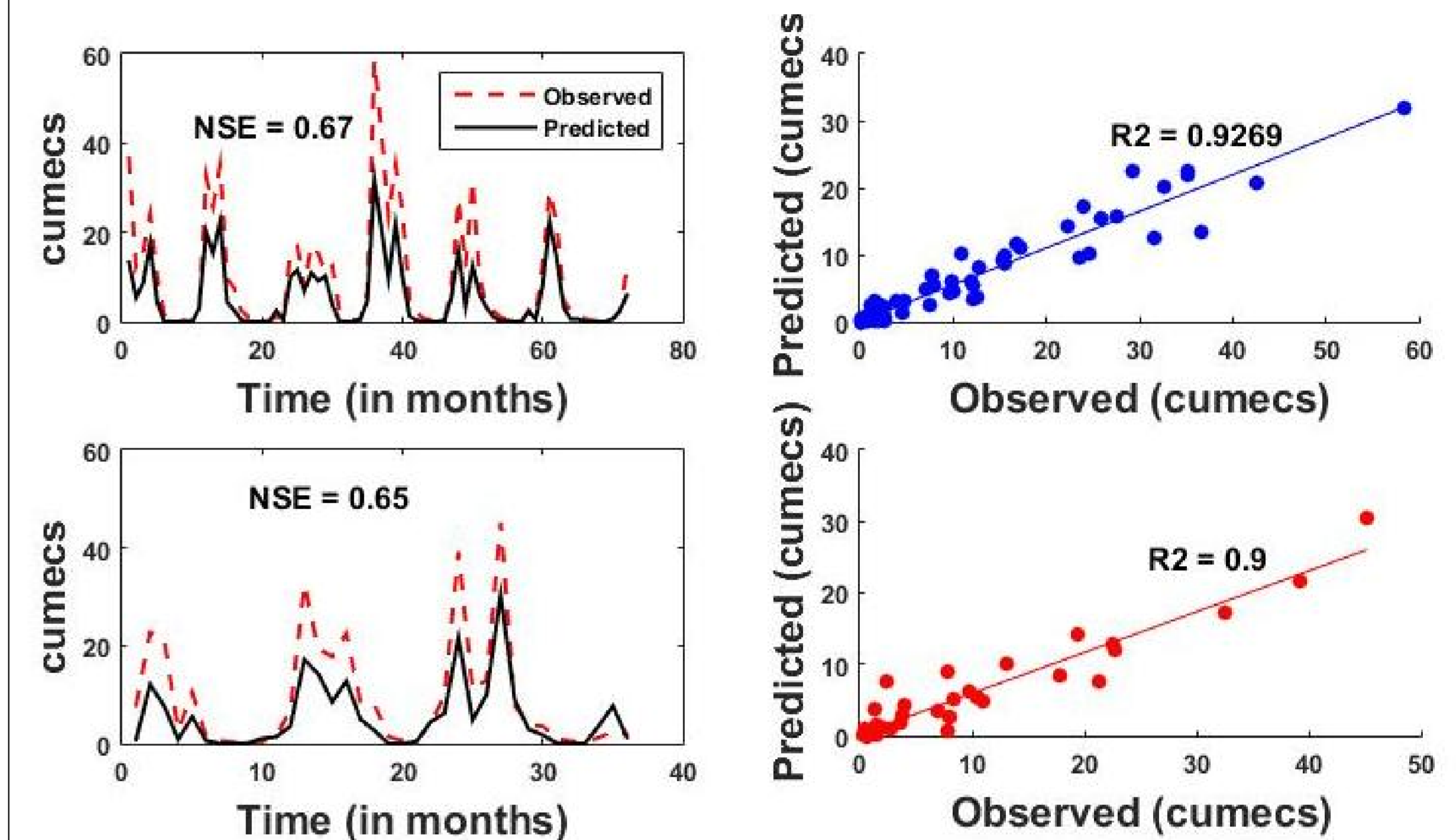
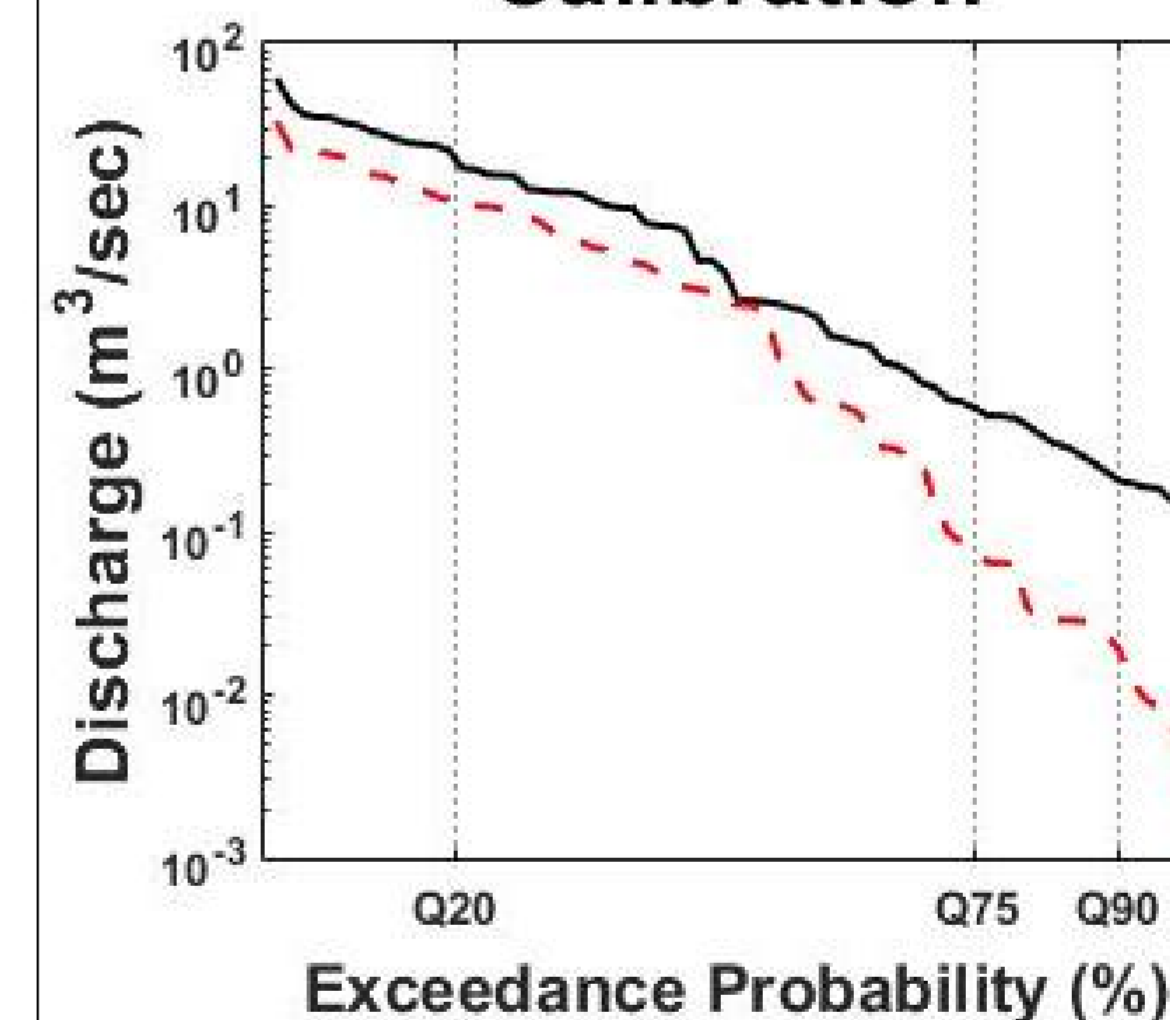


Figure 2: Performance indicators for streamflow prediction.

Data Sources

- Streamflow: United States Geological Survey (USGS) Current Water database
- Precipitation: National Climatic Data Center (NCDC) database
- Digital Elevation Model (DEM): National Hydrography Dataset (NHD)
- Land Use and Land Cover (LULC): National Land Cover Dataset (NLCD)
- Soil data : USSTASTGO

Calibration



Validation

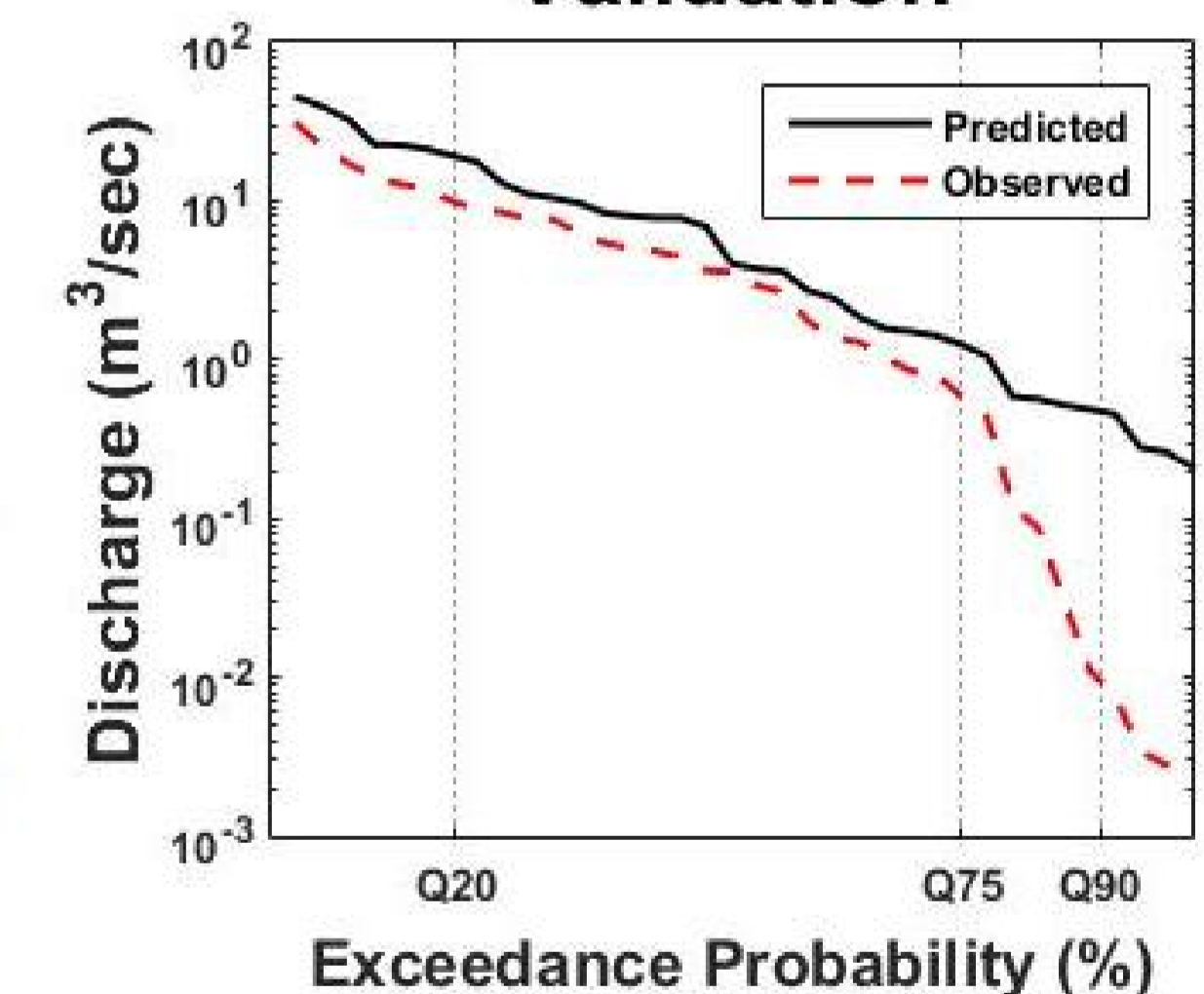


Figure 3: Flow duration curves for representing flow signatures.

Hence, the approximated model of Mattole river watershed through SWAT+ showed the best performances in capturing of observed data.

Importance of Study

This approximated model is intended to assist resources managers, researches, consultant groups, and government agencies for adopting sustainable watershed management.

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References

- Wu, Kangsheng and Y. Jun Xu, 2006. Evaluation of the Applicability of the SWAT Model for Coastal Watersheds in Southeastern Louisiana. Journal of the American Water Resources Association (JAWRA) 42(5):1247-1260.

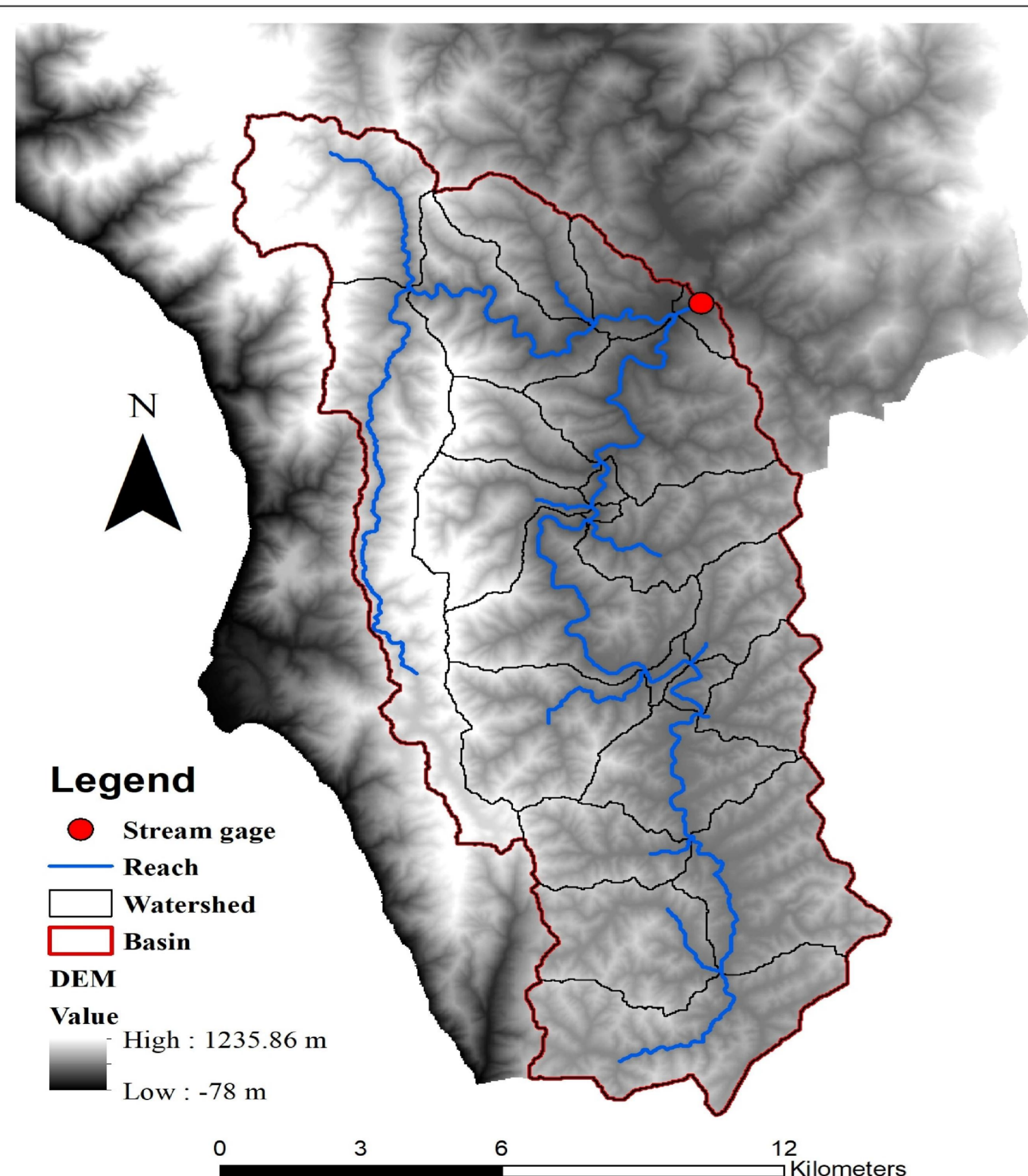


Figure 1: Map showing of Mattole River basin.