

# **HYDROLOGICAL MODELING IN RIVER BASINS:**

## **MANYAS LAKE UPPER BASIN STUDY**

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### **EXPERTISE THESIS ABSTRACT**

The purpose of this thesis is to define the hydrological processes underlying the issues such as climate change, water allocation, flood / drought, water quality in basin-based integrated water management and to obtain information about how it works and to implement hydrological modeling work, which provides a scientific support for decision makers, for flood and ecological water need, by using objective functions in a pilot basin.

The HBV hydrological model, widely used in the world, has been applied to the upper basin of the Manyas Lake wetland, using daily inputs from the hydrological years 2003-2015. The basin boundary was determined by taking the exit point of D03A008 current monitoring station (AGI) station belonging to General Directorate of State Hydraulic Works with ArcHYDRO tool based on Geographical Information Systems (GIS). Hydrometeorological data have been obtained from the nearest three stations due to the lack of Meteorological Observation Station (MMI) in the basin of the General Directorate of Meteorology. All meteorological and current data obtained statistical analyzes and evaluations on thematic maps were carried out to establish model inputs.

Within the HBV model, model results calibrated with logReff, ReffPeak, and multi-objective function approach with Reff, the Nash-Sutcliffe (NSE) model yield during the calibration period selected as 2007-2011 for all hydrological periods, and the results were validated for hydrological years 2003-2006 and 2012-2015. The objective functions for flood and ecological water needs were evaluated by comparing the results of the validation.

Soil moisture and snow-covered area data from 2012-2015, obtained from remote sensing of satellite images, were gathered from the European Center for Medium-Scale Weather Forecasts

(ECMWF) and compared with the model results. It has been found that the soil moisture complied with the trend and the snow covered days were estimated correctly with a range of %80-%97. xv

The model was run using 1 and 2 day forecasts between January and September 2015, obtained from the Weather Research and Forecasting (WRF) Model, developed in cooperation with the countries' atmospheric research and forecasting centers, and compared with the model results run with observation data. The efficiency of the model operated with 1 day forecast is 0.43.

All of the studies show that the model can work effectively and it is usable, and it is determined that in order to increase the model efficiency, there is a need of observational data that can represent the basin.

**Key Words:** Hydrological Modelling, HBV-Light, objective function, Manyas Lake Upper Basin, Kocaçay