Table 2. Hydrologic Models

Model	Description	Critical Assumptions	Citations
DHSVM	The Distributed Hydrology-Soil-Vegetation Model (DHSVM) of Wigmosta et al. (1994) is a deterministic distributed-parameter hydrologic model that provides an integrated representation of watershed processes including: • a multi-layer canopy model for evapotranspiration, • energy balance models for canopy snow interception and ground snowpack processes, • a multi-layer rooting zone, • saturated subsurface and surface flow models.	Two soil layers. Spatial scale described by digital elevation model (DEM) data. One-dimensional stream.	http://etd.pnl.gov:2080/watershed/ Wigmosta et al., 1994; Wigmosta and Lettenmaier 1999.
Topmodel	TOPMODEL is rainfall-runoff model that bases its predictions on an statistical analysis of catchment topography. The model predicts saturation excess and infiltration excess surface runoff and subsurface flow.	Uniform vegetation and soils. Relatively thick soils. No streams.	http://www.es.lancs.ac.uk/hfdg/topmodel.html
BASINS	Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) is a suite of interrelated components for performing watershed and water quality analysis. These components include: • national databases, • assessment tools for evaluating water quality and point source loadings at a variety of scales, • utilities including local data import, land-use and DEM reclassification, watershed delineation, and management of water quality observation data, • watershed and water quality models including HSPF.	Relatively large spatial scales consistent with 4th level Hydrologic Unit Code.	http://www.epa.gov/ost/BASINS/index.html
HSPF	Hydrological Simulation Program - FORTRAN (HSPF) is a comprehensive package for simulation of watershed hydrology and water quality. HSPF incorporates watershed-scale ARM and NPS models into a basin-scale analysis framework that includes fate and transport in one dimensional stream channels.		http://www.epa.gov/ceampubl/savearea/hspf.htm
TOPOG	TOPOG is a deterministic distributed-parameter hydrologic model that describes how water moves through landscapes; over the land surface, into the soil, through the soil and groundwater and back to the atmosphere via evaporation. The primary strength of TOPOG is that it is based on a sophisticated digital terrain analysis model, which accurately describes the topographic attributes of three-dimensional landscapes.	Intended for application to small catchments (up to 10 km2, and generally smaller than 1 km2). Conservative solute (tracer) movement.	http://www.dwr.csiro.au/topog/intro/intro.html

Model	Description	Critical Assumptions	Citations
MIKE SHE	MIKE SHE is a proprietary integrated modeling environment with a modular structure. Individual components can be used independently and customized to local needs depending on data availability and aims of the given study.		http://www.dhisoftware.com/mikeshe/index.htm

Conclusions

The National Academy of Sciences recently concluded that DHSVM represents the state-of-the-art in distributed watershed modeling. The source code for DHSVM is free and publicly available. As part of a separate EPA grant with Battelle and Oregon State Univeristy, DHSVM has been linked with ecosystem process model BiomeBGC. It includes a sophisticated snowmelt algorithm, which is critical to estimating the distribution of flowpaths in areas such as the Adirondaks. In additional to functioning as a fully-distributed model, DHSVM can be used to represent individual plots.