

The Texas A&M University and U.S. Bureau of Reclamation Hydrologic Modeling Inventory (HMI) Questionnaire

December 19, 2009

This document is the Texas A&M University (TAMU)-U.S. Bureau of Reclamation (USBR) Hydrologic Modeling Inventory (HMI) Questionnaire. Your response to this questionnaire will provide the basis for the HMI on-line database accessed through the HMI Web page. Modelers can interactively obtain information about your model through this Web-enabled model inventory complete with search capabilities. The information you provide will hopefully foster wider interest in your model. A designated contact will be explicitly acknowledged and posted within the HMI Web page database.

Given more and more applications of GIS and remote sensing techniques to hydrologic modeling, water resources and watershed management, the Subcommittee on Hydrology has recently set up a workgroup to organize and publicize information on GIS applications in the fields of hydrology and hydraulics. This scope has been expanded to include related water quality, watershed management, and ecological sciences GIS applications. This work is intended to make information on GIS applications in hydrology and hydraulics more generally available. This questionnaire is also designed to gather limited but key information about a particular GIS application in order for a potential user to decide if the application fits his/her computer system, data requirements, and physical system to be modeled.

These applications should be public domain and supported by user documentation. Availability on the Web is not necessary if the application can be distributed on CD ROM or through e-mail requests. If a short abstract, fact sheet, or technical paper is available on the application, please attach a copy. Please respond this email before **22 January, 2010**.

Name of Model, Date, Version Number:

Watershed Bounded network Model WBNM2007. Version: 2007

Contact (with e-mail, web site, and/or phone number):

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Brief Description:

An event based hydrologic model for flood studies on urban and rural watersheds. Includes recorded and design storms (for Australia but other design storms can be used), flood detention basins, culvert hydraulics.

Model Type:

An event based precipitation-hydrograph hydrologic model.

Model Objective(s):

Flood studies on rural and urban watersheds, including culvert hydraulics, flood detention basins, and flow diversions when channel/culvert capacity is exceeded.

Model Structure or Mathematical Basis:

Rural and urban watersheds.

Has modelled small paved areas less than 1 hectare, up to large rural watersheds, up to 10,000 km².

Event based probabilistic.

Components modelled are precipitation, rainfall infiltration losses, overland flow, channel flow. Channel flow modelled as linear or nonlinear reservoir, Muskingum reservoir, or translation. Culvert hydraulics use US Dept. Transportation FHWA method, inlet and outlet control, allowing for partial blockage.

Branched network structure representing the watershed stream network. Sub-watersheds of watershed defined by surface topography and represented in model by lumped nonlinear reservoirs. Automatic calculation of lag times based on sub-watershed size and impervious fraction.

Spatial Scale Employed in the Model:

Network of sub-watersheds, based on the stream network and surface topography.

Temporal Scale Employed in the Model:

Event based model, with time step ranging from minutes to hours depending on the watershed size.

Input Data Requirement:

Watershed characteristics: topographic data, drainage area, impervious fraction.

Climate data: rainfall intensity in time.

Streamflow data: recorded hydrograph or stage hydrograph with rating curve can be used for validation.

Land use data: Impervious fraction of sub-watersheds used to automatically adjust sub-watershed lag times. Other land uses (forest, pasture) can be used to adjust lag times if required.

Model Output:

Rainfall hyetograph on all sub-watersheds.

Overland flow and channel flow hydrographs for all sub-watersheds.

Hydrographs of flows diverted into or out of the sub-watershed.

Hydrographs into and out of flood detention basins plus stage hydrograph in basins.

All output written to output file.

Input Data Format:

All input data placed in text file.

Output Data Format:

All output data written to output text file.

Parameter Estimation/Model Calibration:

Model has automatic determination of lag times depending on the size and impervious fraction of all sub-watersheds, based on validation tests. A single scaling parameter can be used to adjust lag times for calibration.

Model Testing and Verification:

Validated on 54 rural watersheds in Australia, size range 0.1 to 7300 km², stream slopes 0.9 to 152 m/km. Tests for the influence of watershed size, flood size, slope and region were used to validate the relations incorporated into the model.

Validated on 20 urban watersheds to confirm the relations for impervious fraction and lag time.

Model Sensitivity:

Sensitivity of calculated hydrograph to lag time has been investigated.

Model Reliability:

Can reproduce recorded hydrographs from small paved lots to large rural watersheds. Examples are given in the documentation.

Model Application/Case Studies:

Used for flood studies on rural and urban watersheds, including culvert hydraulics, flood detention basins, flow diversions.

Platform/Operating System:

Runs on any DOS based PC.

Programming language and software:

FORTRAN for calculation engines, DELPHI for graphics.

Web-based or desk-top application?

Desk-top.

Is the application flexible to couple with external programs and user created executables?

Output hydrographs can be input to hydrodynamic models.

Are system and user documentation available? (Web site)

Documentation available at:

www.uow.edu.au/eng/cme/

www.rienco.com.au

Are example applications available? (Web site)

Example input datafiles for a wide range of applications available in documentation at:

www.uow.edu.au/eng/cme/

www.rienco.com.au

Is there a user group or hotline-type support? (Website)

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Other Comments: