

NRCS Geo-Hydro Fact Sheet

ArcGIS 9.x Interface to WinTR-20

The NRCS Geo-Hydro System (GeoHydro) is an ArcGIS interface to the WinTR-20 hydrologic computer model. It operates with ESRI (Environmental Systems Research Institute) ArcMap 9.1 and the Spatial Analyst extension. Geo-Hydro is organized to automate the process used in a WinTR-20 hydrologic analysis: defining the watershed boundary, dividing the watershed into sub-areas, developing cross sections, etc. The end result is a WinTR-20 execution with peak discharges, hydrographs, etc. The Geo-Hydro is designed for use in any size of watershed where required GIS data are available. Geo-Hydro operates with any cell size in units of feet or meters.

NRCS Geo-Hydro is installed as an extension that uses several basic operations of ESRI ArcHydro Tools. A GeoDatabase is designed in the same way as an ArcHydro GeoDatabase. This GeoDatabase stores the feature datasets needed for a user's project.

System Requirements

Operating System & Hardware Requirements

- Windows XP or equivalent
- Intel Pentium or compatible processor, 100 Mhz or greater
- video display resolution of 600 x 800
- 700 MB hard disk space and CD-ROM drive

Software Requirements

- Arc GIS Version 9.1
- ESRI ArcGIS Spatial Analyst Extension
- ESRI ArcHydro Tools and AP Framework
- NRCS Geo-Hydro ArcGIS extension
- WinTR-20

Data Requirements

Geo-Hydro is used to develop input for the WinTR-20 from GIS data. Required GIS layers that are needed include Digital Elevation Model (DEM), soil data, and land use grid layers, and a stream layer such as National Hydrography Dataset (NHD). The user may also import any other layers to help identifying locations, roads, streams, etc. Some of these optional layers include digital ortho quads (DOQ), digital raster graphs (DRG), TIGER data, Hydrologic Unit Code (HUC) maps, etc. The Geospatial Data Gateway (Gateway), <http://datagateway.nrcs.usda.gov>, provides a single access point for these resource data.

Digital Elevation Data (DEM)

A DEM grid layer is required for the general area being studied. In addition to Gateway, the DEM data also is obtained from the USGS seamless DEM.

Digital Land Use Data

A land use grid layer is also required. A RCN (*runoff curve number*) table is included in the geodatabase for the standard USGS land use categories. The RCN table contains the land use code, land use name, and the runoff curve number that applies to that land use on Hydrologic Soil Groups. If another GIS land use layer is being utilized, the RCN table can be modified.

Digital Soil Data

Both spatial and tabular data from SSURGO (Soil Survey Geographic) Database is used to generate a grid layer for the hydrologic soil group. SSURGO data can be downloaded from Soil Data Mart, <http://soildatamart.nrcs.usda.gov>. The primary soil attribute used in NRCS Geo-Hydro is the hydrologic soil group.

Storm Data

A table that contains a list of states and counties with their rainfall frequencies is included with the system. The table contains storm rainfall data from 1-year to 100-year.

Channel Geometry Coefficients

Hydraulic geometry coefficients that relate channel depth and width to the drainage area are used in GeoHydro. The user may develop these coefficients through field measurements, use coefficients already developed for a geomorphic region, or use the default values (coefficients for the eastern US).

Menus and Tools

The functionality of Geo-Hydro is grouped into a series of menus, buttons, and tools which are designed to be used in a sequential manner.

Pre-processing Menu

Extract Subset by Graphics, Preprocessing, Generate Curve Number grid layer, Drainage Area Processing, and Select Watershed Outlet Point.

WinTR-20 Interface Menu

Load Storm Data for Study Area, Set Default Values for Time of Concentration parameters, Set Channel Geometry Coefficients, Calculate Sub-Area Attributes.

Add Cross Section Tool  This tool is used to indicate cross section transect lines for stream segments to be used as channel routing reaches. The Cross Section Editor dialog box contains data developed from the DEM, a cross section rating table (which includes a relationship of elevation, discharge, flow area, top width, and slope for that transect location), and default values upon which the rating table is based. The user can revise these values if they do not accurately represent the characteristics of the locations. A plot of the cross section transect may be viewed. If a cross section is not satisfactory, it may be re-drawn at a different location.

WinTR-20 Interface Menu

Generate WinTR-20 Input File, Open WinTR-20 Controller/Editor.

Contact: William.Merkel@wdc.usda.gov or Quan.Quan@wdc.usda.gov