CHAPTER 18

SWAT INPUT DATA: URBAN.DAT

SWAT uses five databases to store information related to plant growth, urban land characteristics, tillage implements, fertilizer components and pesticide properties. The urban database summarizes parameters used by the model to simulate different types of urban areas. Appendix A documents the source of parameter values in the database file provided with the model.

Following is a brief description of the variables in the urban database file. They are listed in the order they appear within the file.

Variable name	Definition
IUNUM	Urban land type identification number. IUNUM is the numeric code used in the management file to identify the urban land type present in an HRU. The different land types in the urban database must have unique values for IUNUM. Required.
URBNAME	4-character code for urban land type. The 4-letter codes in the plant growth and urban databases are used by the GIS interfaces to link land use/land cover maps to SWAT plant types. This code is printed to the output files. When adding a new urban category, the four letter code for the new urban land type must be unique. Required.
URBFLNM	Full description for urban land type—may take up to 54 characters. (not used by SWAT) Optional.
FIMP	Fraction total impervious area in urban land type. This includes directly and indirectly connected impervious areas. Urban areas differ from rural areas in the fraction of total area that is impervious. Construction of buildings, parking lots and paved roads increases the impervious cover in a watershed and reduces infiltration. With development, the spatial flow pattern of water is altered and the hydraulic efficiency of flow is increased through artificial channels, curbing, and storm drainage and collection systems. Required.
FCIMP	Fraction directly connected impervious area in urban land type.

Variable name	Definition
FCIMP, cont.	Impervious areas can be differentiated into two groups—the area that is hydraulically connected to the drainage system and the area that is not directly connected. As an example, assume there is a house surrounded by a yard where runoff from the roof flows into the yard and is able to infiltrate into the soil. The rooftop is impervious but it is not hydraulically connected to the drainage system. In contrast, a parking lot whose runoff enters a storm water drain is hydraulically connected. When modeling urban areas the connectedness of the drainage system must be quantified. The best methods for determining the fraction total and directly connected impervious areas is to conduct a field survey or analyze aerial photographs. Required.
CURBDEN	Curb length density in urban land type (km/ha). Curb length may be measured directly by scaling the total length of streets off of maps and multiplying by two. To calculate the density, the curb length is divided by the area represented by the map. Required.
URBCOEF	Wash-off coefficient for removal of constituents from impervious area (mm^{-1}). Wash off is the process of erosion or solution of constituents from an impervious surface during a runoff event. The original default value for urb_{coef} was calculated as 0.18 mm^{-1} by assuming that 13 mm of total runoff in one hour would wash off 90% of the initial surface load (Huber and Heaney, 1982). Using sediment transport theory, Sonnen (1980) estimated values for the wash-off coefficient ranging from 0.002-0.26 mm^{-1}. Huber and Dickinson (1988) noted that values between 0.039 and 0.390 mm^{-1} for the wash-off coefficient give sediment concentrations in the range of most observed values. This variable is used to calibrate the model to observed data. Required.
DIRTMX	Maximum amount of solids allowed to build up on impervious areas (kg/curb km). Required.

Variable name	Definition
THALF	Number of days for amount of solids on impervious areas to build up from 0 kg/curb km to half the maximum allowed, i.e. 1/2 DIRTMX (days). Required.
TNCONC	Concentration of total nitrogen in suspended solid load from impervious areas (mg N/kg sed). Required.
TPCONC	Concentration of total phosphorus in suspended solid load from impervious areas (mg P/kg sed). Required.
TNO3CONC	Concentration of nitrate in suspended solid load from impervious areas (mg NO_3-N/kg sed). Required.
URBCN2	Curve number for moisture condition II in impervious areas of urban land type. Required.

Every urban land type uses two lines in the urban.dat file to store input values. The format of every set of two lines is described below.

Variable name	Line #	Position	Format	F90 Format
IUNUM	1	space 1-3	integer	i3
URBNAME	1	space 5-8	character	a4
URBFLNM	1	space 10-64	character	a55
FIMP	1	space 65-72	decimal(xxxx.xxx)	f8.3
FCIMP	1	space 73-80	decimal(xxxx.xxx)	f8.3
CURBDEN	2	space 5-12	decimal(xxxx.xxx)	f8.3
URBCOEF	2	space 13-20	decimal(xxxx.xxx)	f8.3
DIRTMX	2	space 21-28	decimal(xxxx.xxx)	f8.3
THALF	2	space 29-36	decimal(xxxx.xxx)	f8.3
TNCONC	2	space 37-44	decimal(xxxx.xxx)	f8.3
TPCONC	2	space 45-52	decimal(xxxx.xxx)	f8.3
TNO3CONC	2	space 53-60	decimal(xxxx.xxx)	f8.3
URBCN2	2	space 61-66	decimal(xxxx.x)	f6.1

REFERENCES

Huber, W.C. and R.E. Dickinson. 1988. Storm water management model, version 4: user's manual. U.S. Environmental Protection Agency, Athens, GA.

Huber, W.C. and J.P. Heaney. 1982. Chapter 3: Analyzing residual discharge and generation from urban and non-urban land surfaces. p. 121-243. *In* D.J. Basta and B.T. Bower (eds). Analyzing natural systems, analysis for regional residuals—environmental quality management. John Hopkins University Press, Baltimore, MD.

Sonnen, M.B. 1980. Urban runoff quality: information needs. ASCE Journal of the Technical Councils 106(TC1): 29-40.