

WATERSHED MODELING PRIMER



*Physical Watershed
Model*

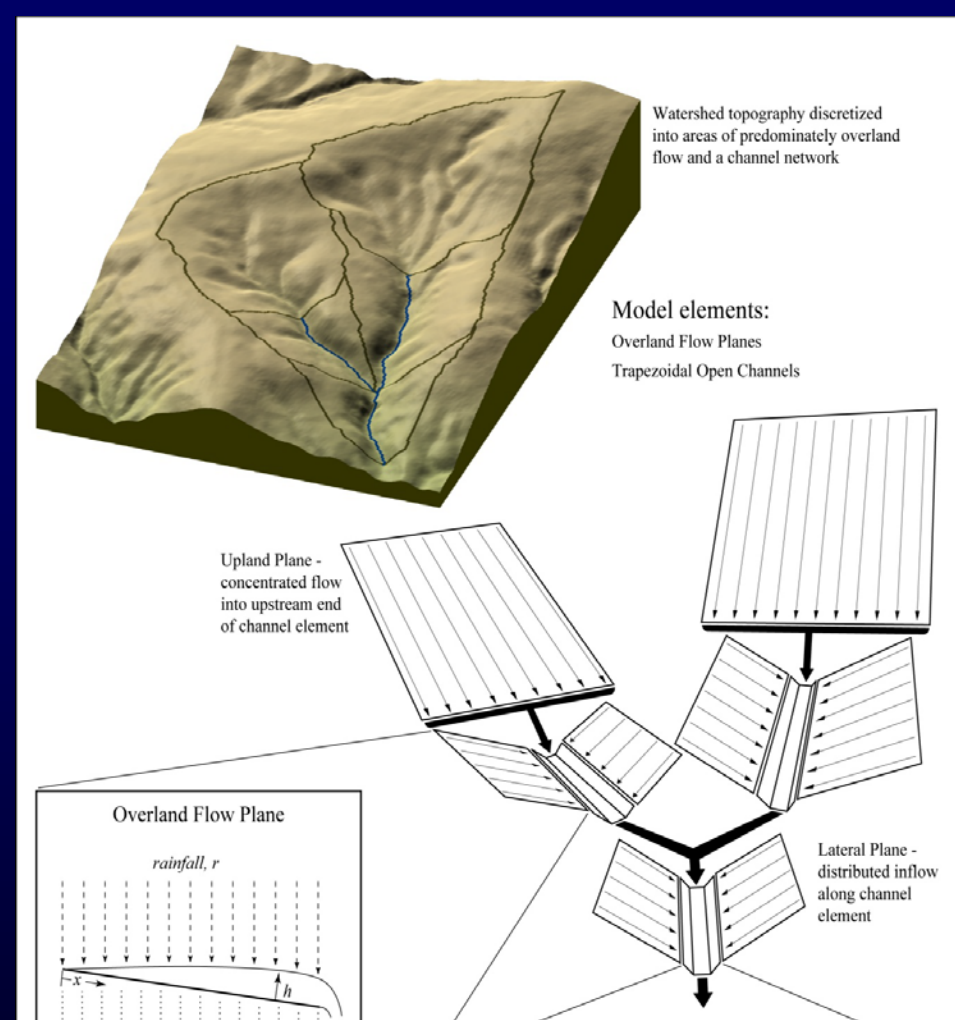
A watershed model attempts to predict the response of a watershed (runoff, erosion, water quality change, etc.) to precipitation and climate drivers.

Computer simulation watershed models – there are many of them – are commonly used as they can be more easily adapted to different watersheds as compared to a physical watershed models

Watershed Response Depends on:

- Topography
- Land cover/use
- Soils
- Precipitation
- Human modifications

Using research and observations, mathematical relationships between these factors and are programmed into the watershed computer model



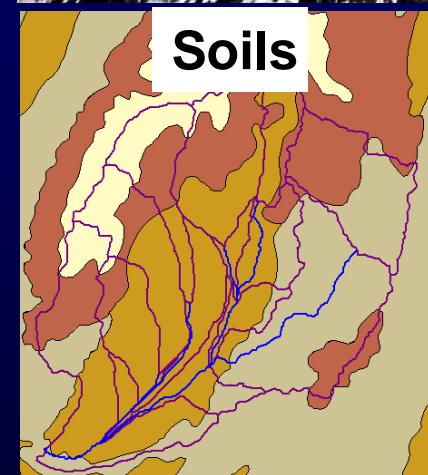
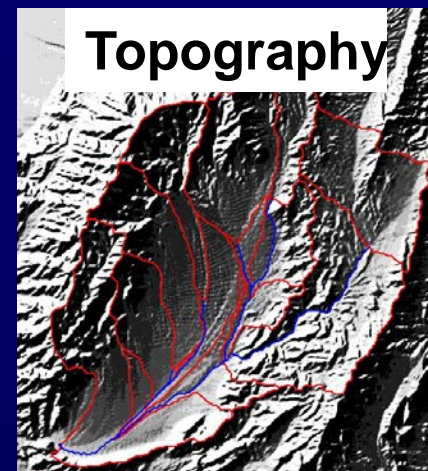
Distributed watershed models break up the watershed into smaller modeling elements to better represent the spatial variability of the watershed

Characterizing a Watershed

Geographic Information Systems (GIS) and nationally available data sets provide a rapid way to define spatially distributed watershed characteristics and set up watershed modeling elements (e.g. hillslopes, channels)

- Digital Elevation Model (DEM) – USGS
- Soils – USDA-NRCS
- Land Use - Land Cover (NASA, USGS)
- Weather – NOAA design storms or observed
- Management Information
 - Where and what - information must be provided by user (i.e. burn severity map)

The Automated Geospatial Watershed Assessment (AGWA) tool automates watershed characterization and model set-up and execution for the USDA KINEROS2 watershed model



Conceptual Design of AGWA

PROCESS

Build GIS Database

Discretize Watershed
f (topography)

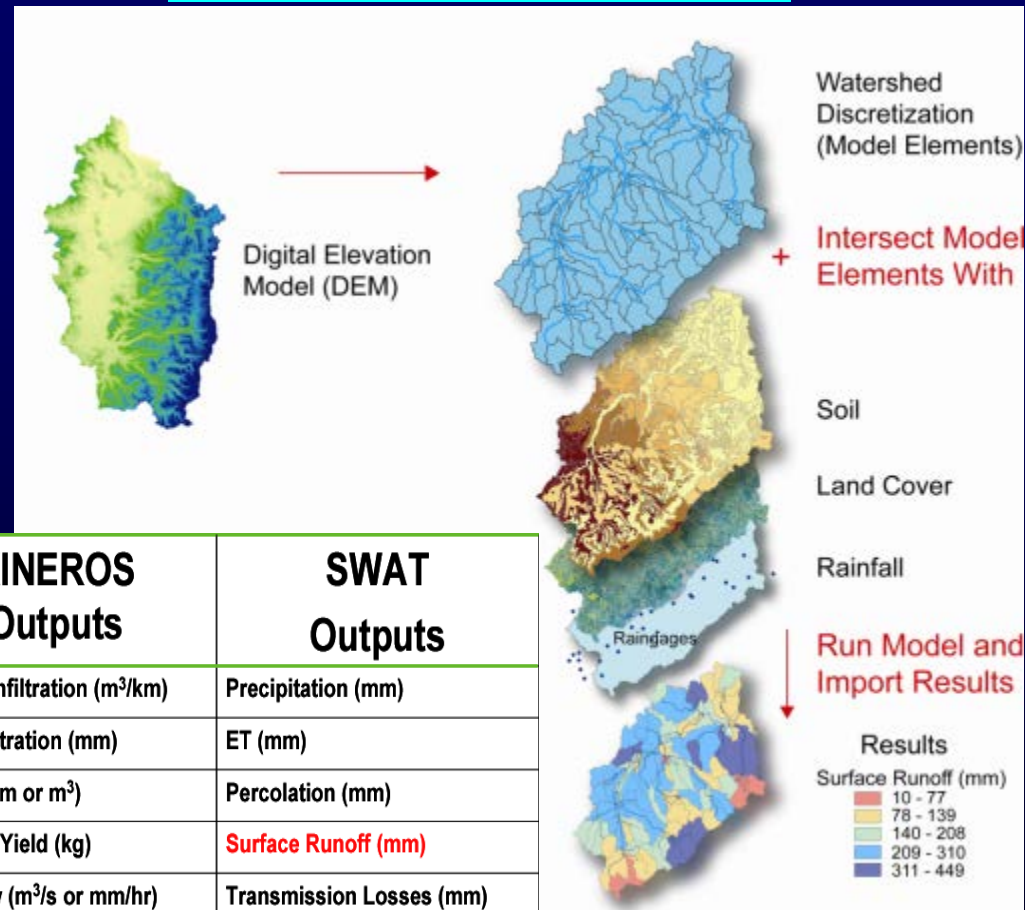
Characterize Model Elements
f (land cover, topography, soils)

Derive Secondary Parameters
look-up tables from Exp./Res.

Build Input Files
& Run Model

View Model Results
link model to GIS

INPUTS & OUTPUTS



KINEROS Outputs

Channel Infiltration (m³/km)

Plane Infiltration (mm)

Runoff (mm or m³)

Sediment Yield (kg)

Peak Flow (m³/s or mm/hr)

Channel Scour (mm)

Sediment Discharge (kg/s)

SWAT Outputs

Precipitation (mm)

ET (mm)

Percolation (mm)

Surface Runoff (mm)

Transmission Losses (mm)

Water Yield (mm)

Sediment Yield (t/ha)

Nitrate in Surface Runoff (kg N/ha)

Phosphorous in Surface Runoff (kg P/ha)