Why ArcHydro? (information summarised or modified from the book Arc Hydro GIS for water resources edited by D.R. Maidment)

ArcHydro: >7000 USGS streamflow gaging stations plus daily streamflow time series records

Information from map (e.g. digital raster): Hydrography and Hypsography

Hydrography

- Definition: the description, study and charting of bodies of water, such as rivers, lakes and seas

- which signals to the map reader the meandering path of river, the shoreline of a lake, or the location of the coastline

Hypsography

- Hypsography studies the distribution of elevations on the surface of the Earth

Water resources management

- Hydrography + Hypsography (from map)
- AND: Hydrology: a science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere

- Hydrology data is obtained from field monitoring stations, such as streamflow and rain gage recorders and climate stations

Hydro data model: 5 components

Hydro data model: (1) Hydrography: the base data from topographic maps and tabular data inventories

Hydro data model: (2) Drainage: Drainage area and stream lines defined from surface topography

Hydro data model: (3) Channel:
a 3-D line representation of the shape of river and stream channels

Hydro data model: (4) Network: connected sets of points and lines showing pathways of water flow

Hydro data model: (5) Time series table: tabular attribute data describing time-varying water properties for any hydro feature

Integration of the components

Managing Hydro feature: 5 feature clacsses

- (1) HydroEdge: a network of "blue lines" describing map streams and water body centerlines
- (2) HydroJunction: a set of junctions located at the ends of flow segments and at other strategic locations on the flow network (Topologically connected to HydroEdge in the hydro network)
- (3) Waterbody: the significant ponds, lakes, and bays in the water system
- (4) Watershed: the drainage areas contributing flow from the land surface to the water system
- (5) MonitoringPoint: a set of points representing gage locations where water is measured

ArcObjects: three types

- (1) Obejcts: these are data tables that store only attributes, such as a time series data table

- (2) Features: these are data tables that store both spatial coordinates and attributes (points, lines, and areas), such as a stream gage location

ArcObjects: three types

- (3) Network features: these are special points and lines called junctions and edges whose data tables store the connectivity between the junctions and edges, in addition to their attributes and spatial coordinates. Stream segments are presented by network features.

- -Simple network features: formed by a single spatial feature and a single set of attributes

- -Complex network features: formed by several connected spatial features and a single set of attributes