











Selecting a Model

Consider:

- Who will run the model?
- Will they require special training?
- How long will it take to set up?
- How much will it cost vs. value of information generated?
- How accurately will the model represent the real world?

Common pitfalls when selecting models for TMDLs

- Not deciding what questions you need to answer *before* selecting model
- Lack of data: climate, land use, land management, etc.
- Selecting the wrong model for a given situation (don't necessarily accept model suggested by consultants)
- Lack of experience using the models



























Data Requirements by Models

- Every model needs data simulate model
 - Simple model: Small amounts of data
 - Eg. Load duration curve:-
 - Flow and pollutant concentration at the outlet of watershed
 - Eg. STEPL model:-
 - Landuse, animal, soil within watershed
 - Mid range model: Medium amounts of data
 - Eg. SWAT:-
 - Landuse, Soil, Slope, Management, Weather (daily temperature and precipitation) to setup the model
 - Flow, constituents of interest (sediment, nutrients, bacteria) etc. to calibrate and validate the model

- Complex Models: Large amount of Data

- Eg. HSPF:-
 - Landuse, Soil, Slope
 - Channel dimensions
 - Meteorological records of precipitation
 - Estimates of potential evapotranspiration
 - Air temperature, dewpoint temperature, wind, and solar radiation
 - Flow, constituents of interest (sediment, nutrients, bacteria etc.) to calibrate and validate the model

Data Sources

- Digital Elevation Model (DEM):
 - 10 and 30m DEMs USGS
 - Lidar DEMs USGS, State agencies
 - Landuse:
 - General landuse NLCD
 - Detailed landuse -- NASS, CDL
- Soil:
 - General soils: STATSGO
 - Detailed soils: SSURGO
- · Weather (precipitation, temperature, solar radiation, windspeed, relative humidity)
 - Precipitation
 - Rain gauge data: NCDC
 - Nexrad: NCDC
 - Interpolated global precip data: NCEP (National center for Environmental Prediction)
 - temperature, solar radiation, windspeed, relative humidity
 - NCDC
 - State and federal agencies
- Management Practices
 - Local agencies, stakeholders and farmers in the watershed of interest
- Calibration data
 - Streamflow: USGS or locally installed ISCO samplers
 - Constituents: USGS or locally installed ISCO samplers

Other important data sources

- USGS (LTRMP)
- US Army Corps of Engineers
- Local, state and federal agencies
- Agricultural Statististics
- Population Census
- Municipalities
- US Forest service

Calibration and validation





Implementation planning



 Analyze scenarios: Apply model to project future loads under new conditions (after implementing BMPs)

Use model to evaluate impact of different land use practices (new BMPs, cultivation techniques, etc.) on water quality