

PA Statewide Preliminary Assessment of Water Resources Quantity

DEP/USGS Screening Tool
Demand Projection Analysis
Yield Analysis Tool

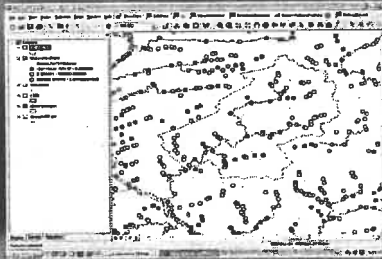
THE SCREENING TOOL:

- is GIS based & covers the entire state
- is structured based on nested Watersheds represented by pour points
- assumes GW and SW are the same
- Computes water availability for each watershed/pour point
- Indicates if the water availability is positive/negative/ (on the border line)
- Some editing and scenario capabilities
- Projected future demands
- Requested water use



Pour Point

- Each watershed is represented by its mouth called pour point



Water Availability

$$= W. \text{ Supply} + \text{Discharges} - w. \text{ withdrawal}$$

WA is computed at each PP



Water Availability Components

Water Supply

- Some % of 7Q10 say (50%)
- Uses updated USGS regional low flow regression EQN
- is based on health of the stream during low flow

Discharges

- Are based on Disch. Monitoring Reports, DMRs
- DMRs are collected by River Commissions



Some Basin Characteristics Evaluated in the Regression Analysis

- Some Basin characteristics to define stream flow examples:
 - Drainage area
 - Land use
 - Drainage density
 - Channel slope
 - Precipitation
 - Dominant rock type
 - Permeability



Lehigh River Basin
Land Use



Withdraws/Water-Use Data

- From PaDEP database
- Includes all surface-water and ground-water withdrawals and returns over 10,000 gal/day
- Categories include public supply, thermoelectric, mining, commercial, and industrial
- Withdrawals are added up at each PP



Screening Tool – Products

- Static and model product to evaluate water "availability" at the approximate 10,000 pour points

Static Product: (to be determined)

- General public access
- Web-based
- Will show water "availability", basin characteristics, and water use for all pour points

Desktop Product:

- PaDEP access
- Some capability to edit existing water-use
- Run for projected condition
- Will compute basin characteristics, water use, statistics and water availability
- Color code the results



Stream Pour Point Node Coloration

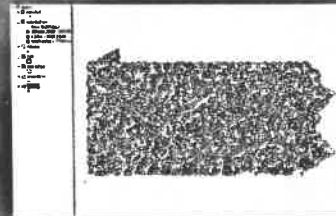


- Normal
- Potentially Stressed
- Stressed

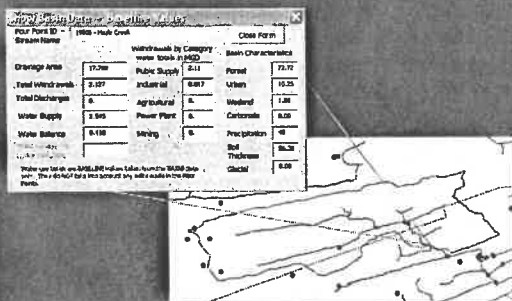


Available Desktop Application Functions

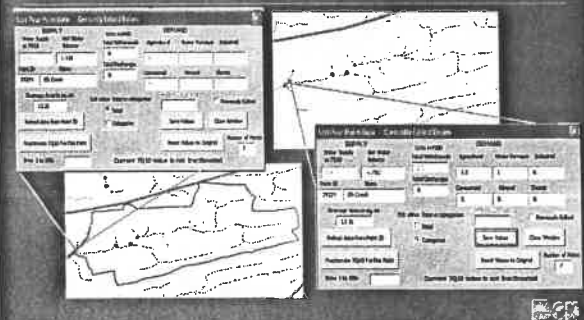
- Show Basin
- Edit Basin
- Fraction Supply
- Fraction Point
- Recalc Selected Area
- Save Scenario
- Load Saved Scenario
- Reload to Baseline
- Recalc Entire



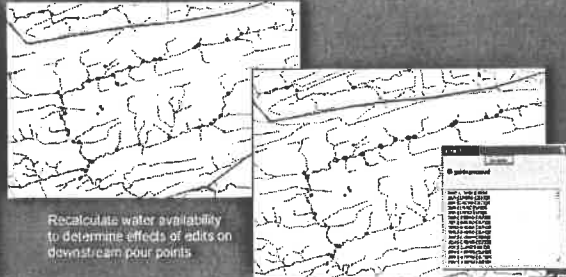
Show Basin Function



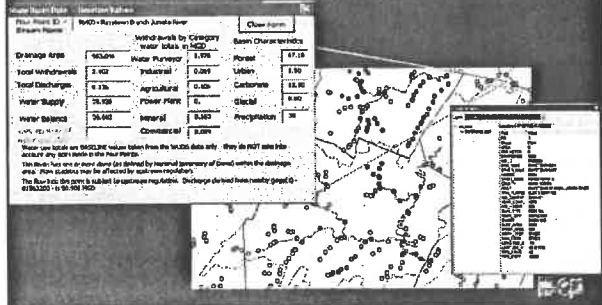
Edit Basin Function



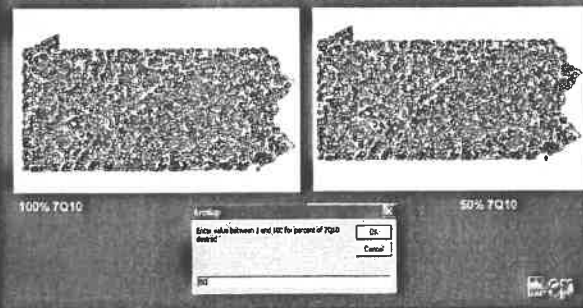
Recalculate Function



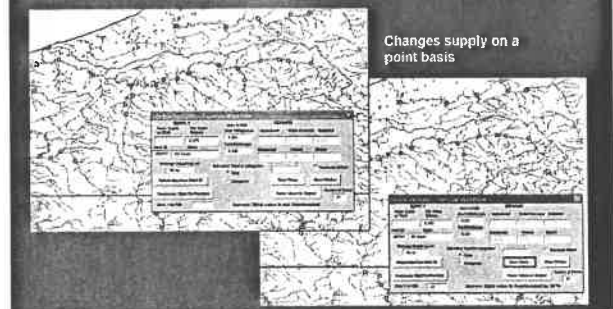
More Functionality



Percent Supply Function



Fraction Point Function



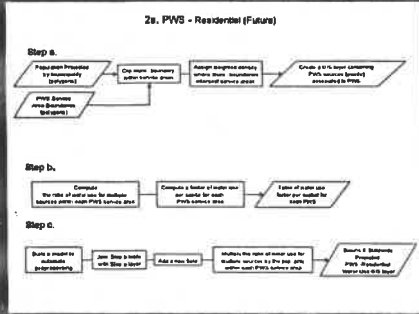
How will projections interface with USGS tool?

- Use water demand forecasting methodologies established in the *Water Demand Forecasting for Pennsylvania* project
- Create separate GIS layers of future water demand for:
 - Residential
 - Nonresidential
 - Agriculture
 - Mining
 - Thermoelectric Power
 - Hydroelectric Power
- Import the GIS layers as x,y data into the Screening Tool for analysis.

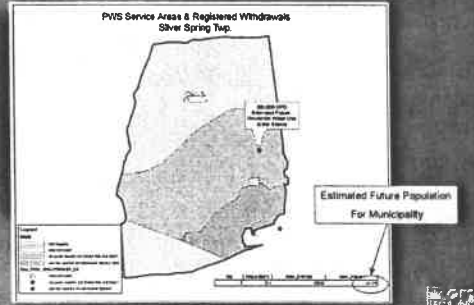
Building the GIS layers for Water Use Analysis

- Developed flowcharts for each sector as steps to transform various data sources (i.e. Act 220 Reg., Ag Census, Labor & Industry, etc.) to input data
- Use GIS for analysis of data sources to develop a layer for each sector.
- Develop water use factor tables for calculating water use totals

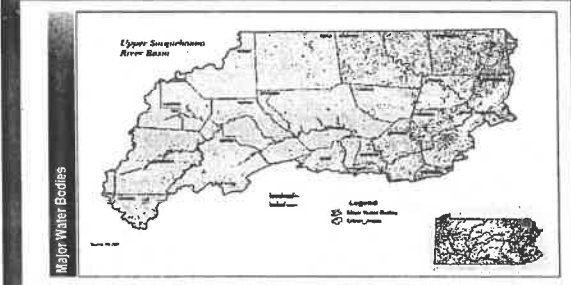
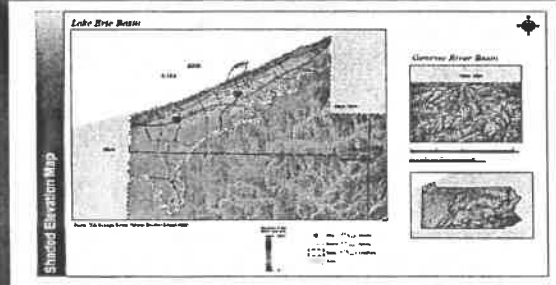
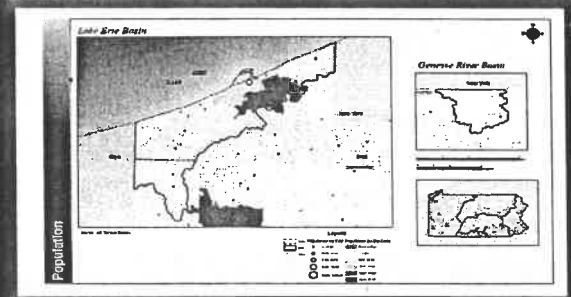
Example of a Flowchart: PWS Residential Projected

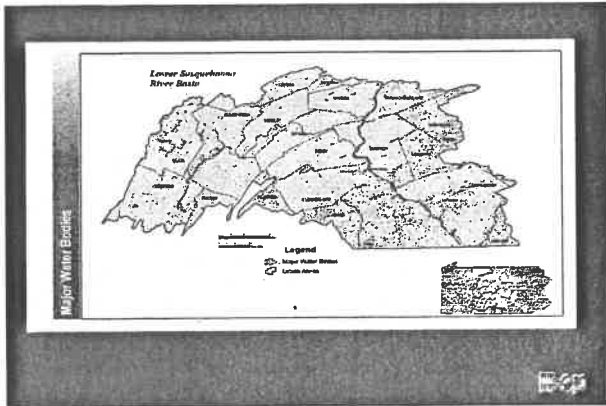


Example of GIS Analysis: PWS Residential Projected



Some Preliminary Maps for a State Water Plan Atlas





COLOC Project

Link Water Use Data System (WUDS) SF records to corresponding PA Drinking Water Information System (PADWIS) records

COLOC Project

Goals of Project

1. Improve Water Use Data System (WUDS) SF record locational position (Mapped vs. GPS)
2. Link to PADWIS SF record attribute information for State Water Plan Update

COLOC Project

Goal 1 Details in eFACTS

1. WUDS Lat-Long replaced if PADWIS metadata indicates better method of locational determination.
2. WUDS NHD attribute data changed based on new locational position
3. PADWIS database receives NHD attribute data

Yield Analysis Tool

Scope

Develop a GIS based tool that will provide the staff of the Susquehanna River Basin Commission (SRBC), the PA Department of Environmental Protection (DEP), the Delaware River Basin Commission (DRBC), and the PA Fish and Boat Commission (PFBC) with the ability to perform water resources related yield analysis functions.

Yield Analysis Tool

- SRBC acting as contractor for tool development with DEP funding
- SRBC has contracted with Buchart Horn to develop the tool
- Updates and adds new features to 1997 Water Allocation Decision Support System application (ArcView 3.2)
- Tool to be used by DEP for the State Water Plan Update and Water Allocation Program
- Delivery in September – October 2006

Yield Analysis Tool

Tool Components

1. Population and Demand Analysis
2. Run-of-Stream Yield Analysis with Instream Flow Requirement Analysis
3. Reservoir Yield Analysis with Instream Flow Requirement Analysis
4. Water Supply Well Water Availability Analysis with Instream Flow Requirement Analysis



Yield Analysis Tool Details

Population and Demand Analysis

1. Public Water Supply System Service Area GIS data layer
2. DEP Population projections to year 2030
3. Census Block GIS data layer
4. WUDS or Water Allocation Permit Application Water Use Detail



Yield Analysis Tool Details

Run-of-Stream Yield Analysis

1. Drainage Area Delineation by USGS StreamStats application
2. Drainage Area Characteristics
3. Q7-10 Calculation by 5 methods
 - DA/DA, Armbruster, Bulletin 15, WRJ 82-211, Streamstats
4. Instream Flow Calculation



Yield Analysis Tool Details

Reservoir Yield Analysis

1. Drainage Area Delineation by USGS StreamStats application
2. Procedures of Water Resources Bulletin 7I-7A
3. Instream Flow Calculation



Yield Analysis Tool Details

Water Supply Well Analysis

1. Drainage Area Delineation by USGS StreamStats application
2. Geologic Characteristics and Recharge Rates layers
3. Withdrawal and NPDES Discharge layers
4. Instream Flow Calculation



Yield Analysis Tool Details

Products/results

1. Installation Manual and DVD
2. User Manual
3. Standard reports across all modules
4. Data exports with uploads to respective corporate databases

