

# Integrating Water Quality Monitoring and Modeling as a Tool for Water Resource Management in the District of Columbia

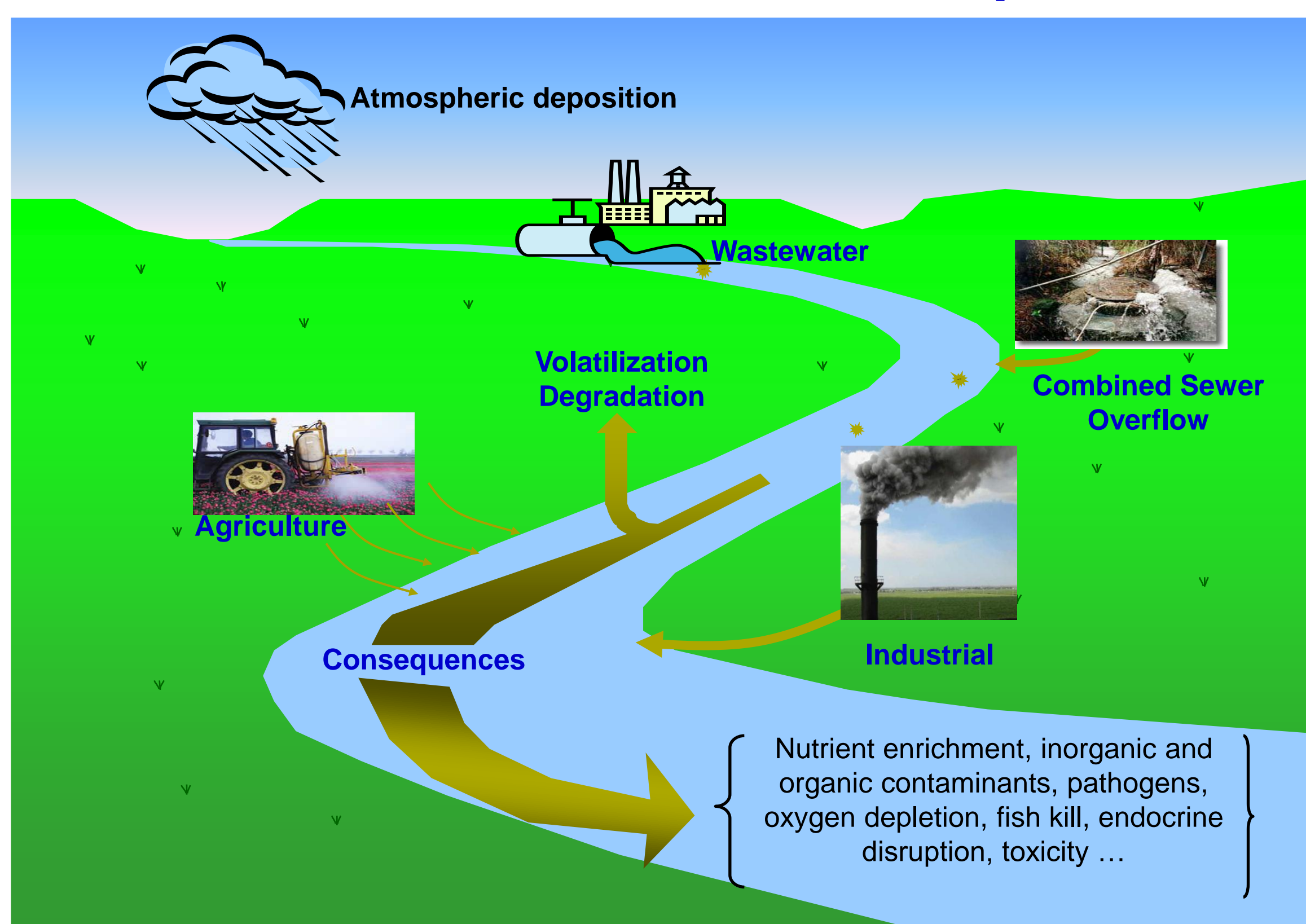
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## Objectives

The University of the District of Columbia has established two new laboratories: Water Quality Testing Lab and The Environmental Modeling & Simulation Lab. Integrating monitoring and mathematical modeling, both labs will serve the research and training needs of our faculty, students as well as water and wastewater operators. The main objectives are:

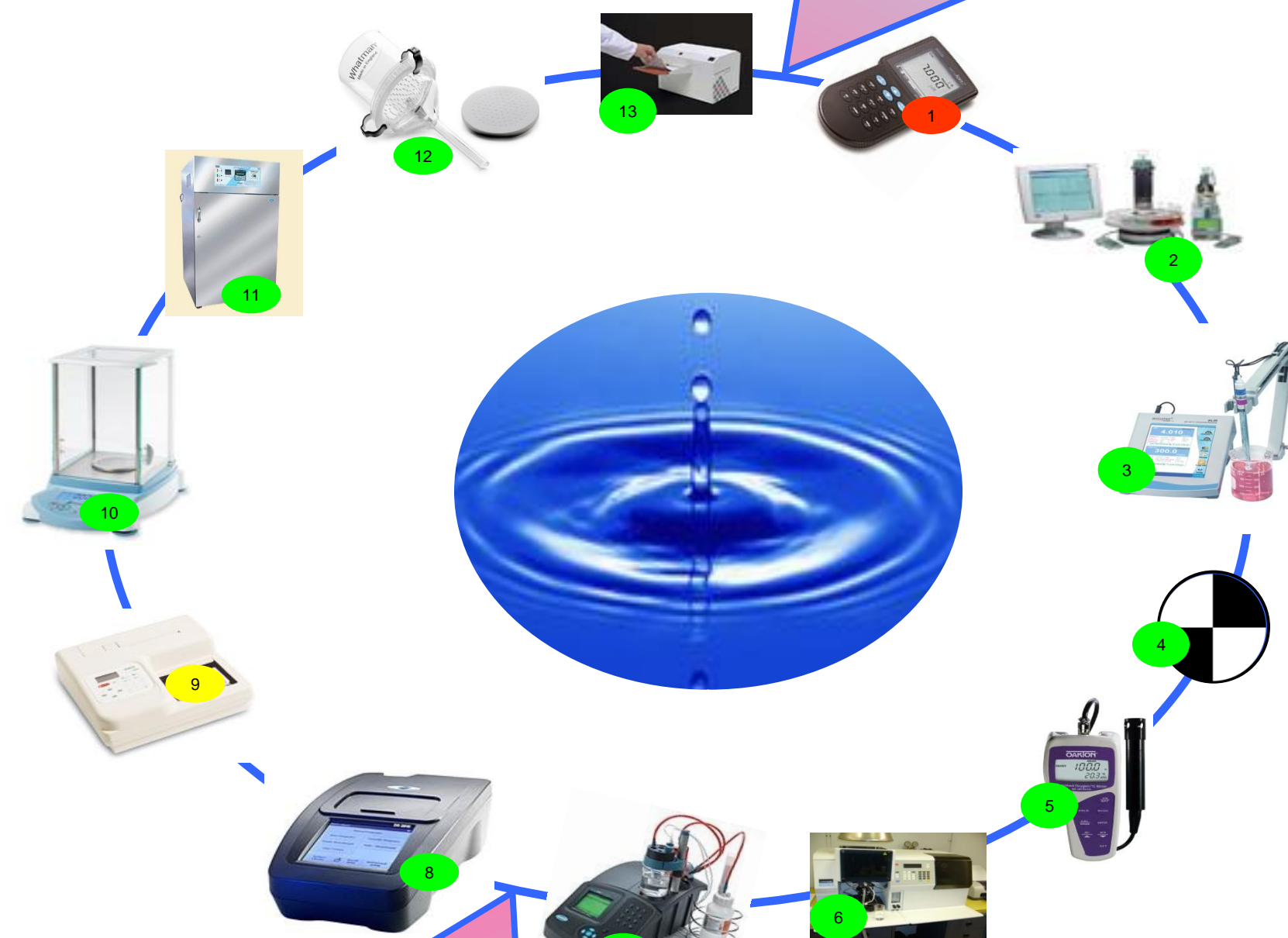
- To become an unbiased monitor of surface, ground, and municipal water quality in the District of Columbia to protect water resources and human health.
- To develop and evaluate the application of mathematical models as a predictive tool for water resource management.

## Pollution Sources and Consequences



## Water Quality Testing Lab

The new water quality testing lab has state-of-the-art equipment that can be applied to the analysis of chemical and biological water quality parameters in water and wastewater. Examples are: (1) Senion2, (2) Titrino, (3) pH electrode, (4) Secchi disk, (5) Dissolved Oxygen Electrode, (6) Atomic Absorption Spectrophotometer, (7) AutoCat, (8) DR 2800, (9) Microplate Reader, (10) Analytical Balance, (11) Incubator, (12) Filter Funnel, and (13) Quantitray Sealer.



These pieces of equipment are used to analyze the following water quality parameters: (1) Nitrate and ammonia, (2) Carbonates and bicarbonates, volatile fatty acid, (3) pH (4) Turbidity, (5) Dissolved oxygen (6) Lead and Copper (7) Chlorine residue, (8) Phosphate, Nitrite and COD, (9) Steroid hormones, (10) Chemical solutions preparation, (11) BOD, E. Coli and Total Coliform, (12) Total Suspended Solids, and (13) Seal for #11

## Environmental Simulation Lab

The new modeling and simulation lab has the following capacities:

- WEST Model:** Wastewater treatment modeling and process optimization
- SWMM Model:** Storm water quantity and quality modeling and urban water system analysis and optimization
- GIS Technology:** Geo-referencing of water quality problems in the District of Columbia

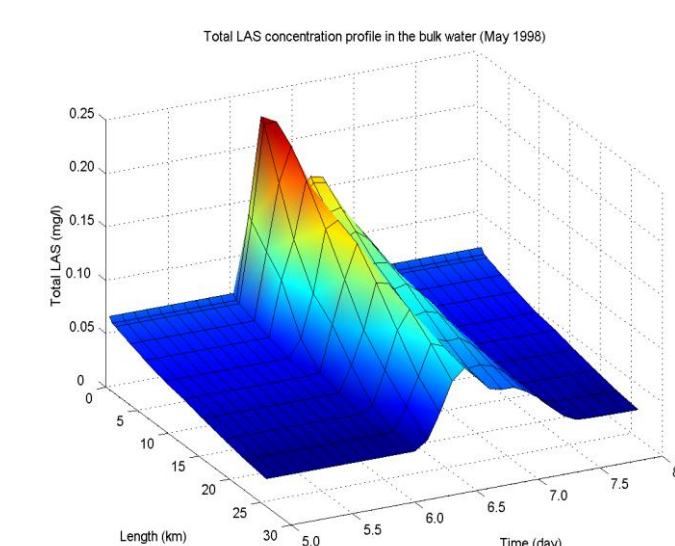
### Modeling Concept



Real environment  
Actual data



Virtual Environment

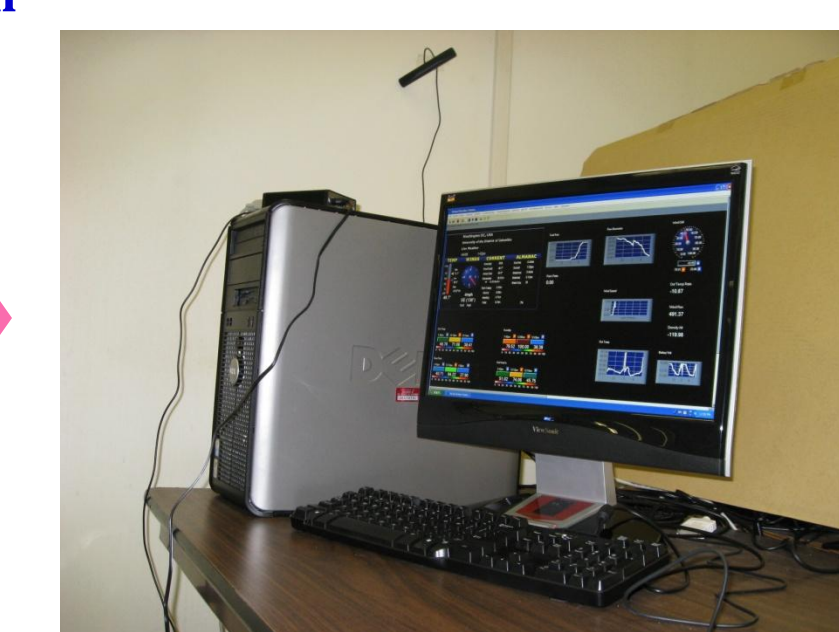


Predicting the  
consequence  
Simulated data

### Modeling and simulation capacities at the UDC lab:

- River water quality
- Ground water quality
- Wastewater treatment plant
- Sanitary Sewer system
- Storm water
- Rainfall runoff

### Wireless weather station



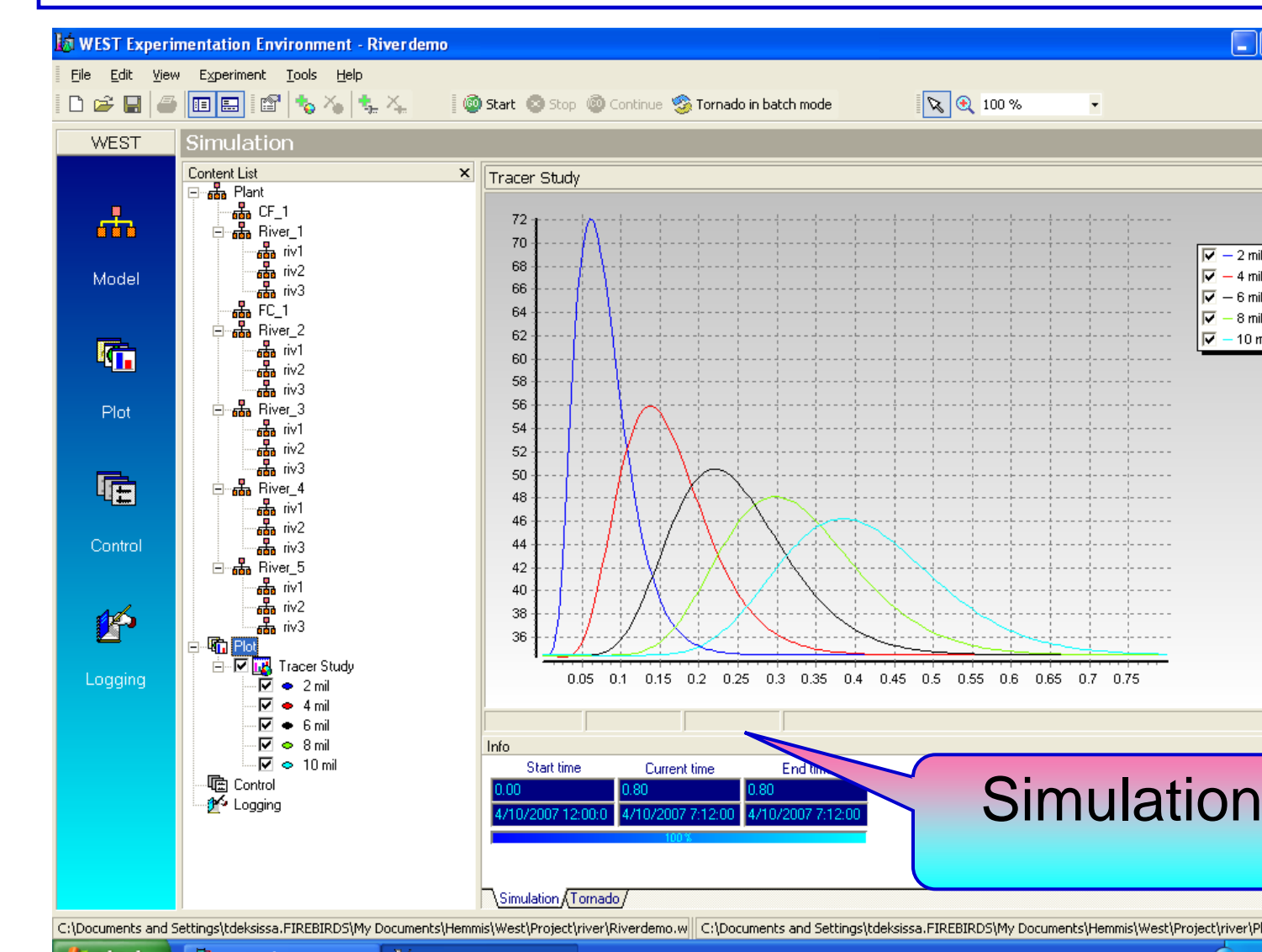
## River Water Quality & Quantity Monitoring



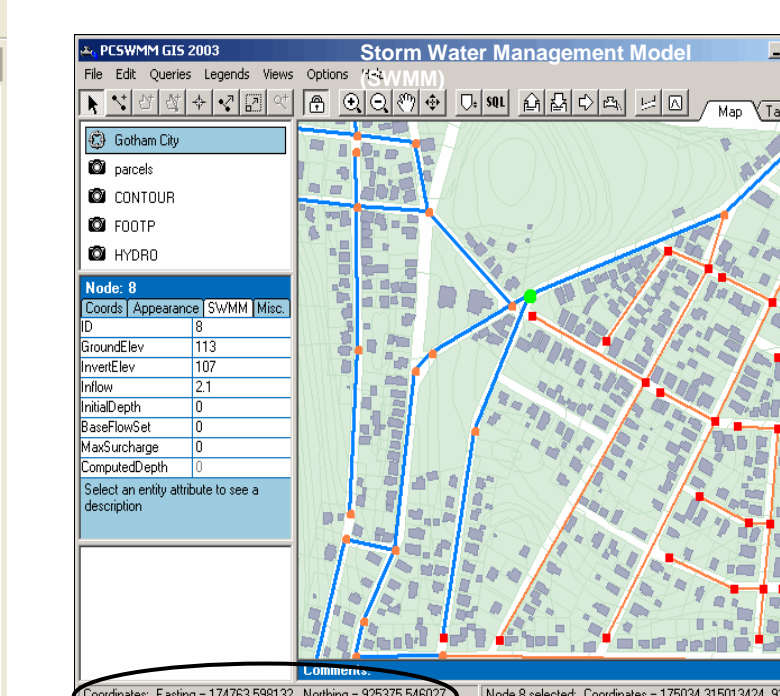
## Water Resource Management Tools

- Water Quality Testing/Monitoring:** Assures compliance with the requirements of environmental regulations.
- Mathematical Models\*:** Evaluates the future state of bodies of water in view of actual pollution loading as well as alternative management.

\*Although monitoring data are the real measures of environmental samples under consideration, mathematical models have the capacity to predict the future and analyze 'if what' or site specific scenarios.



Simulation



Geo-referencing