Online Educational Tool for Fox River Basin

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Background

River basin as a component of socio-economic systems... Conflicts!
Outline

- Motivations
- Problem Statement
- Methodology
  - Online platform
  - Simulation model - SWAT
- Live Demo
- Fox River Database
- Conclusions
- References
Motivation

- Watershed management needs enhanced stakeholder participation
- An online platform allowing instant interactions among stakeholders
- Incorporating modeling and data support into the online tool to help stakeholders better understand the problem
- Educational value: allowing students to play as stakeholders online and learn real-world problem solving
Problem Statement

- Stakeholder meeting is often necessary for negotiation, learning and problem solving
- Geographical distance and time difference prevent frequent meeting among stakeholders
- Online communication within the context of a particular watershed management problem can be as effective as face-to-face meeting
- An online communication platform can be even more useful by incorporating model and data sources
Methodology

- Web Application is implemented with state-of-the-art techniques
  - LAMP server
  - Database Management
  - PHP, Flex
- SWAT model is incorporated into the Online Educational Tool to provide instant simulation online.
- GIS Database will be installed into the Online Educational Tool
SWAT Model for Fox River

- **Data input**
  - Meteorological data (NOAA NCDC)
  - Stream flow data (USGS)
  - DEM (USGS)
  - Land use and cover (USGS)
  - Soil map (USDA)

- **Modeled region**
  - 76 sub-basins
  - 6 demand sites
  - 6 effluent discharge sites
  - Monthly modeling from 2000 to 2005
Incorporate SWAT Model into Web Tool
Remote Login

Instant Interaction

Summarization

1. Please choose one agent by click the button listed on the right hand side.
2. If the agent you chosen is taken by other user, there will be a popup window informing you. And please pick another agent.
3. Enter the amount of what you request into the system.
4. A popup message will show up to tell you the available water for your downstream.
5. Record about your request will show at the top left corner.
6. Click the “Overall Result” button to view the results for the system.

Agents:

You request:

Inflow 500

1. Dam 90
2. Farm1 100
3. Farm2 800

Request:

History of Iteration

You request:

240 units water

Summary of Current Game

Inflow 500

Summary:

Agent Dam Requests: 90 units water
Agent Farm1 Requests: 100 units water
Agent Farm2 Requests: 800 units water
Agent City Requests: 100 units water
Agent Ecosystem Requests: 100 units water
Downstream has: 1030 units water

Finish This Iteration

RESET
Live Demo

- URL:
Fox River Database

- **Ecological data**
  - Fish sampling data
    - E.g., sampling sites, fish species and quantity
  - Fishery statistical data
    - E.g., richness, abundance, IBI score

- **Environmental data**
  - Geomorphology data
    - E.g., slope, sinuosity
  - Land use data
    - E.g., urban, forecast, agriculture
  - Water quality data
    - E.g., DO, N, P
  - Climatic data
    - E.g., precipitation, temperature
  - Hydrologic data
    - E.g., natural flow regime
The collected 1992 Fish samples
The water quality data (DO,N)
The water quality data (P)
Database target

- Target
  - Collect data from different sources
    - EPA, DNR, USGS, etc
  - Provide people access to these data
  - Analyze the relationship between fish and environmental factors
Conclusion

- An online communication tool is built with state-of-the-art techniques
- The tool provides remote access and instant simulation modeling support to multiple stakeholders online
- The tool also provides a learning environment and problem negotiation support to stakeholders
- The tool can be used for education
References

- Data set for SWAT model:
  - Meteorological data (NOAA NCDC)
  - Stream flow data (USGS)
  - DEM (USGS)
  - Land use and cover (USGS)
  - Soil map (USDA)
- HSPF model for Fox River Basin from Water Survey, UIUC.
Thank You!

Questions or Comments?