

WATER SUPPLY

Water Supply Planning Modeling Tool for Local Governments

Abstract

This project will build a web-based tool to illustrate to local officials, NIPC's primary constituency, the water supply consequences of land use decisions. It calculates the expected change in water demand with development and relates it to expected availability. To do so we are collaborating with Purdue University to build an extension into the existing Long-Term Hydrologic Impact Assessment (L-THIA) model now available online. We have completed the conceptual framework for the tool and have now begun coding to develop the actual web site.

Introduction

Raising awareness among local decision-makers in northeastern Illinois about the effects of land use on water supply remains crucially important. In addition to the high ranking this issue received the Northeastern Illinois Planning Commission's (NIPC) *Strategic Plan for Water Resource Management* published in 2001, concern remained strong throughout NIPC's larger *Common Ground* planning process, which ended last year and resulted in the *2040 Framework Plan*. This plan calls for improved awareness of water quantity issues in the region and stepped-up efforts to plan for the judicious use of available water supplies. The current project attempts to illustrate to local officials, NIPC's primary constituency, the water resource consequences of land use decisions by giving them a web-based model that calculates the expected change in water demand with development and relates it to expected availability. To do so we are collaborating with Purdue University to build an extension into the existing Long-Term Hydrologic Impact Assessment (L-THIA) model available online. L-THIA now computes expected stormwater runoff and pollutant loadings given land use scenarios provided through user input. The current project will add a water quantity module to complement the water quality focus of the core L-THIA model, allowing local government users to determine whether their decisions are expected to be sustainable with regard to water supplies and providing them options for reducing their "hydrologic footprint."

Narrative Report

Because of funding delays and the decision to break the award into separate grants to NIPC, Purdue, and UIC, work on this project essentially began during this reporting period, despite the grant having been awarded in 2004. Following several meetings in summer 2005 between Bernie Engel and his graduate student Dibyajyoti Tripathy at Purdue, we decided (1) to approach the project by beginning simply but building into L-THIA the ability to accept further information as it became available; (2) to tailor water demand and supply calculations to local government decision-makers and frame decisions in terms of land use; and (3) to use as much of the existing L-THIA and NIPC architecture as possible.

These presuppositions led us to define land uses for the web interface based on a blend of existing L-THIA categories and the NIPC "Paint Chip Palette" used in the regional population forecasting process. Commercial and industrial water use varies widely by industry type, but we elected to take an average based on the *land use type* rather than industry type. As principal investigator, NIPC took the lead in determining the inputs, calculation processes, and outputs of the L-THIA extension, developing a computation flow chart to communicate the results to the project team. NIPC also performed a strategic literature review (still ongoing) to determine the appropriate values to use in the computations. Several GIS studies were undertaken to establish certain land use parameters for the region (e.g., net/gross density by lot size, average landscaped area per residential parcel as a function of lot size, etc.) In addition, NIPC worked with several municipalities to collect water use information to use for benchmarking and verification. NIPC also collected available GIS information from the Illinois State Water Survey for use by Purdue. NIPC also coordinated with the previous project manager, now at Hey and Associates, to determine detention basin volume requirements and leakage rates to estimate the potential contribution of these basins to groundwater recharge.

In January NIPC used the opportunity of its semi-annual Southern Lake Michigan Regional Water Supply Consortium meeting to have a community of experts review the concept and execution of the L-THIA extension. Participants were able to examine a mockup of the web site and review the computations behind the interface. We requested that participants fill out a survey form, the results of which indicated that they supported the project on the whole and provided numerous valuable improvements. We are now at the stage of coding the program to run the L-THIA water supply module, and NIPC is working with Purdue to accomplish this. When a beta version is ready (mid-summer), we intend to work with UIC to evaluate the tool in a user group setting.

Potential Application/Benefits

The purpose of this project is to illustrate to local officials with land use control authority the water demand effects of conversion from one land use to another and to relate demand change to expected water availability. As an applied project, the

entire point is to influence local government behavior.

Keywords

water supply, web-based, land use change, water resources, development

Lay Summary

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Partnerships with other institutions/Individuals initiated or continued by your project

Purdue University, University of Illinois at Chicago

Undergraduate/Graduate Names and Degrees

None; however, Purdue's part of the project includes support for a graduate student, and UIC may partly support a graduate student in the upcoming months.

Awards and Honors

None directly related to this project. However, NIPC's *2040 Framework Plan* was selected as national plan of the year in 2006 by the American Planning Association. One of the thirteen Implementation Strategies in the 2040 Plan concerns improved planning for and management of regional water supplies.

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Research Information

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- Initiation Date: March 1, 2004
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