NATIONAL INSTITUTES FOR WATER RESOURCES SURVEY

JUL 1, 2006 TO JUN 30, 2007

The Institute of Water Research

Michigan State University

Institute of Water Research Highlights

- Great Lakes Protection Fund

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About the Institute

The Institute of Water Research at Michigan State University is responsible for coordinating research and educational programs on surface water and groundwater quality and quantity. Established in 1961, the Institute addresses multi-disciplinary issues arising from the dynamic interaction of land and water resources, and strengthens MSU's commitment to finding effective solutions to contemporary water resource problems.

Director, Dr. Jon F. Bartholic

Our Goal

The Institute's goal is to provide the most accurate and complete information on contemporary land and water issues to citizens, stakeholders, government agencies, and resource managers. To achieve this goal, the Institute consistently collaborates and forges partnerships with other research and resource conservation organizations. The result of these collaborations is the development of science-based information for use by decision-makers faced with complex land and water issues. The increasing use of information technologies and geographical information systems (GIS) for better decision-making is a fundamental part of the Institute's mission in the 21st century.

Restoring Great Lakes Basin Waters Through the Use of Conservation Credits and Integrated Water Balance Analysis System

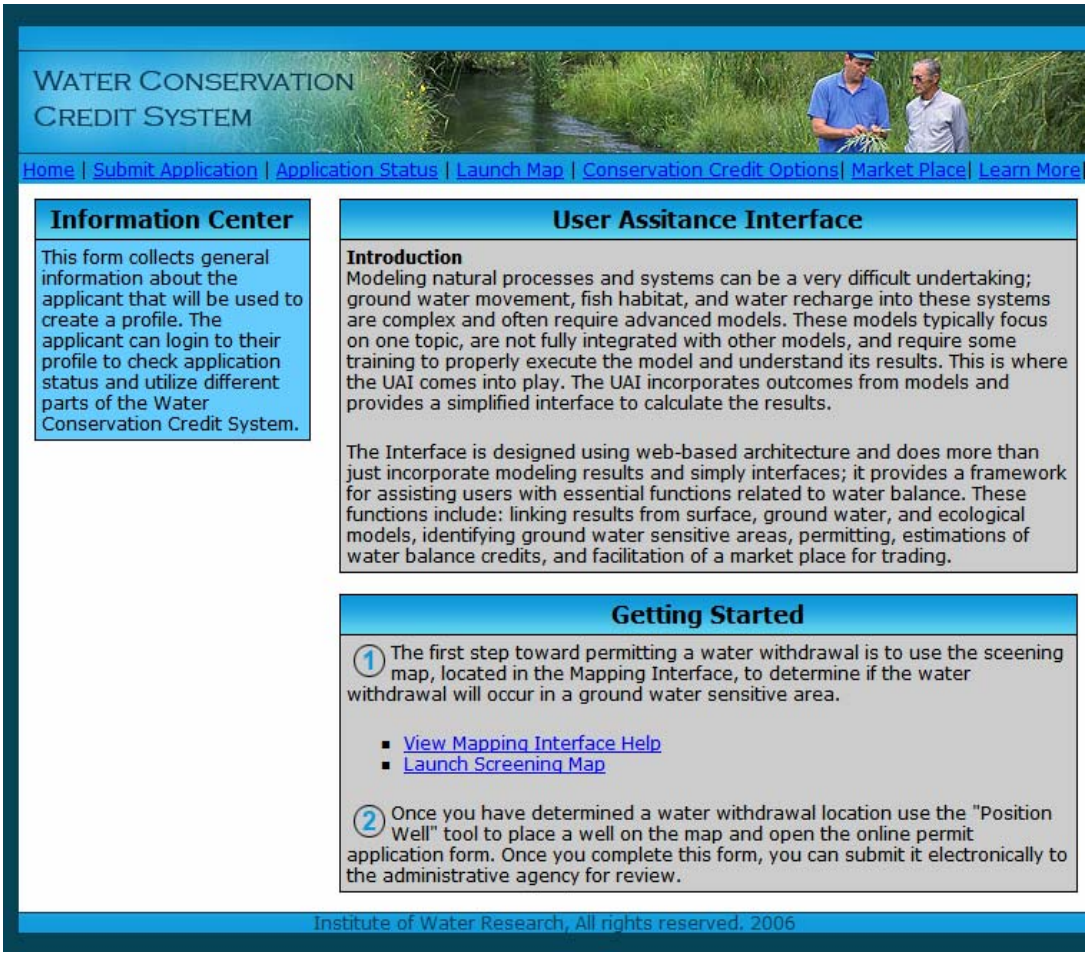
A two-year, $540,000 project funded by the Great Lakes Protection fund has been concluded this year by the Institute of Water Research, Michigan State University (MSU). This innovative market-based approach to groundwater management, using an integrated model with a system of conservation credits trading was developed through the collaborative efforts Michigan State University, the University of Michigan, the World Resource Institute, the U.S. Geological Survey, and Public Sector Consultants. The Integrated Watershed Balance Analysis model is the first-of-its-kind in assessing the impacts of groundwater withdrawals.

The Project Team designed a groundwater permitting system that could be hypothetically used for ecologically-sensitive watersheds in which connections between groundwater and

Restoring Great Lakes Basin Waters Through the Use of Conservation Credits and Integrated Water Balance Analysis System cont.

stream flow exist and large withdrawals might cause adverse impacts on trout populations and related habitats. Stream flows in Michigan streams depend on groundwater supply for over half of their volume, on average, 60%. The model is used to determine the rates of groundwater recharge and the ecological impacts of groundwater withdrawals.

The innovative Integrated Watershed Balance Analysis model uses the health of a cold-water trout stream and fish populations as an indicator and measure of the ecological impact of proposed groundwater withdrawals. The model integrates three major components.
First, the Soil and Water Assessment Tool (SWAT) estimates stream recharge rates and the long-term water balance. Second, a groundwater aquifer model provides data connecting the impacts of changes in local groundwater resources on ecological values associated with water resources in that area as evidenced by trout populations. Third, an aquatic ecosystem model measures the changes in trout populations resulting from the changes in the groundwater resources.



Water Conservation Credit System DEMO

To provide water users with convenient access to the system, the team designed a User Assisted Interface (UAI) with a Web portal linked to the hypothetical groundwater withdrawal permit and conservation credit system. The portal linked the modeling results from an integrated model consisting of surface, ground water, and ecological models to assist users in identifying groundwater-sensitive areas and estimates of associated conservation credits within the case study area.

The final project report was submitted to the Great Lakes Protection Fund in early May 2007, and can be found at http://www.iwr.msu.edu/research/projects.html

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