

## WATER

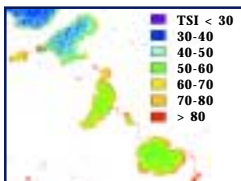


The Upper Midwest contains 16% of the world's fresh water in the form of rivers, inland lakes, and the Great Lakes

**The Center is investigating water supply and quality issues in the Upper Midwest:**

- River flow and lake level modeling in the Great Lakes and Mississippi basins, using models that respond to changes in land cover, vegetation, and climate
- Water supply variability estimation as land use and land cover changes in the future
- Satellite-based lake water clarity monitoring for which citizens measure lake water clarity in coordination with Landsat's orbit

The University of Wisconsin is working with state agencies to develop a lake clarity monitoring system that coordinates satellite imagery collection with on-the-ground testing by citizen lake water monitoring groups. Using a satellite image processing protocol



developed at the University of Minnesota, researchers can generate seasonal water clarity maps for the entire three-state region.

### UPPER MIDWEST REGIONAL EARTH SCIENCE APPLICATIONS CENTER

The Center is an *Environmental Information Service*. Like the familiar Weather Service, we report regional forecasts and local trends and conditions. We use new tools of earth observation satellites to monitor facets of the environment other than weather, and provide that information directly to planners, decision makers, and citizens to improve planning at all levels.

The Center is creating technologies that give all citizens access to satellite imagery, maps, air photos, and other environmental planning and management information right at their desktops.

If there are ways we can help your organization, please contact our offices or visit our website:

<http://resac.gis.umn.edu>

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## UPPER MIDWEST REGIONAL EARTH SCIENCE APPLICATIONS CENTER



The Upper Midwest Regional Earth Science Applications Center (RESAC) provides an *Environmental Information Service* for governmental agencies, commercial firms, and private citizens through technical expertise and an array of information products and decision support tools including:

- Internet access to satellite imagery, air photos, and maps
- Resource inventory, quality, and change monitoring techniques
- Management and predictive modeling techniques for ecosystems, physical processes, and land use change

### Our mission is:

- To support the immediate resource management needs of local decision makers and stakeholders
- To evaluate the long term sustainability of this region's natural resources as a basis for the economy, quality of life and livelihood of its citizens



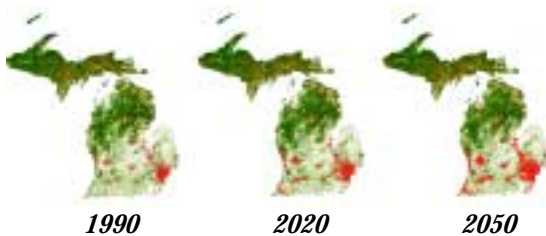
## LAND USE/LAND COVER



Nearly 20 million people live in Michigan, Minnesota, and Wisconsin. Policy makers and planners are concerned about the impacts of rapid urban development.

The Center is tracking land use change, creating models to predict future land use, and studying the impacts of the changing landscape. Services include:

- Modeling land transformation to predict future land use and its impacts
- Developing maps of historical land use in the region
- Assessing potential impacts of development and other land use changes using collections of maps, data, and imagery
- Assessing current land cover and land use in the region via remote sensing and geographic information systems (GIS)



How will our landscape change? Researchers at Michigan State University are running land transformation models to forecast land cover change and to better understand its processes.

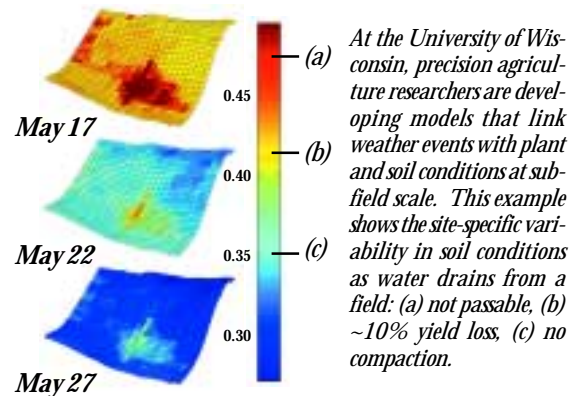
## AGRICULTURE



The Upper Midwest is a top producer of corn, dairy products, soybeans, wheat, turkeys, cranberries, wild rice, and other products.

The Center is developing tools for crop management and inventory in the region:

- Precision agriculture models to track crop and soil conditions on a sub-field scale
- Regional crop models to assess current productivity and productivity in future climate change scenarios
- Satellite-based monitoring of crop condition and development
- Digital atlases of past and current productivity and other agricultural statistics



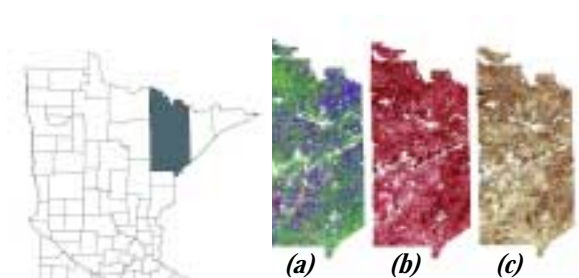
## FORESTRY



Forty-one percent of all land in Michigan, Minnesota, and Wisconsin is forested. Citizens value these forests for both economic and ecological reasons.

The Center is creating advanced tools to monitor and manage forest lands in the Upper Midwest:

- Improved forest inventory techniques utilizing a satellite imagery-based inventory of forest characteristics in a timely manner
- Fractional vegetation cover maps from satellite imagery to monitor forests
- Modeling the storage of carbon under differing land use strategies to lower atmospheric CO<sub>2</sub>
- Topographic mapping using interference patterns of radar in heavily forested areas



St. Louis County, Minnesota

At the University of Minnesota, researchers are developing satellite-based approaches to estimate and map (a) forest cover types, (b) volume, and (c) basal area.

